UNIVERSITY OF Southampton

FACULTY OF HUMANITIES

Department of Archaeology

DESIGN AND CONNECTIVITY:

THE CASE OF ATLANTIC ROCK ART

VOLUME 1 OF 2

by

Joana Valdez-Tullett

Thesis for the degree of

Doctor of Philosophy

July 2017

Em memória da minha avó

In memory of my grandmother

To my beloved husband Andy and my beautiful son Thomas

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF HUMANITIES

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Design and Connectivity: the case of Atlantic Rock Art

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Circles, cup-marks and wavy lines are some of the most emblematic motifs associated with Atlantic Rock Art. The term 'Atlantic' was only introduced in the 1940s and is used throughout this thesis as it reflects the widespread distribution of the prehistoric assemblage of rock art, but also the geographic scope of this investigation. This particular iconography is known from Portugal, through to Spain, Ireland, England and up to Scotland, sharing a number of characteristics. Prior to the use of this expression, Atlantic Art was known by a variety of designations that demonstrate the fragmented character of its historiography and the regional nature of investigations. In 1997 Bradley's study introduced a turning point in investigations, with an inter-regional approach and the premise of Landscape Archaeology. This contrasted with traditional studies, more focused on the motifs and creation of typologies, failing to view Atlantic Art holistically, as a socially meaningful practice. In this thesis I set out to investigate differences and similarities of Atlantic Art. I define what its quintessential characteristics are beyond the motif typologies, and identify regional variations. Contextualizing these similarities and deviations, I assess the social and cultural implications of its creation and use. In each one of my five study areas (one in each country), I subjected empirical data to a three-scale investigation: i) Graphic – to study the motifs, ii) Sensorial – to study the rock medium and iii) Environmental – to study the landscape placement. These were developed under principles of Relational Ontology and Assemblage Theory, combining a multi-scalar methodology with a dynamic perspective of the data, explored through a detailed categorical scheme and its analysis with a Presence/Absence Matrix (PAM), spatial analysis carried out with GIS and Social Network Analysis (SNA) to relate and explore the differences and similarities, relationships and connectivity between the study areas. Concepts of developmental psychology and cultural transmission were used to posit that the tradition spread through methods of teaching. Contextualizing the tradition chronologically, it became clear that it formed another transformative processes that characterised the Neolithic.

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The Electronic Supplement to this thesis include a PDF version of this PhD, along with data which was used through the investigation, namely:

- 3D models of the carved rocks,
- CSV files with data organized according to the three approaches used in the Network Analysis.

Declaration of Authorship

I, Joana Valdez-Tullett declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

An Art of Illusion: Atlantic Rock Art in Context

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. All images and 3D models reproduced are my own, except otherwise stated.
6. I have acknowledged all main sources of help;
7. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
8. Parts of this work have been developed from ideas published and discussed in:
   Valdez-Tullett, J. and Chittock, H. (2015) 'The unique result of a unique temperament' (Oscar Wilde): seeing texture through the making of art", World Art, DOI: 10.1080/21500894.2015.1068217
   Valdez-Tullett, J. (2016) 'Art, Materiality and Creativity: understanding Atlantic Rock Art', in Chittock, Helen; Valdez-Tullett, J. (ed.) Archaeology with Art. Oxford: Archaeopress, pp. 53–77

   The section referring to the Social Network Analysis (SNA) and the network analysis benefitted from frequent discussions and technical support from Tom Brughmans

Signed:

Date: 27th July 2017

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Although I ended up choosing a different study area, a special thanks to César Parcero and Pastor Fábrega for sharing with me data for Galicia, but also Prof. Rámon Fábregas and Carlos Rodríguez Rellán for allowing me to use their data of Barbanza Peninsula in this study. A special thanks to the pharmacist at Portosín in Galicia for the super-drugs that cured the flu I was having in the first days of fieldwork, almost jeopardizing the whole campaign. I am indebted to Lara B. Alves and Mário Reis for sharing their unpublished data of Monte Faro with me. Finally, to the owners of all properties with whom we spoke to and who granted us access to the rock art.

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All pictures and 3D models are my own, unless otherwise stated. However, thank you to Gonçalo Cruz, Richard Stroud, Ian Hobson, Lolo and Antonia Thomas for photographs, and of course, a special thank you to Maya Hoole for the amazing maps she produced to illustrate my Network Analysis results.

Many thanks to my amazing family who have supported me at all times, even when that meant that I was leaving home and living away in another country. *Mamã, papá, Lela e Micas, obrigada pelo vosso apoio, carinho, compreensão*. My most profound gratitude to my mother who has been the most amazingly supportive being and without whom this journey would have been a lot more difficult. Throughout the years she has always been available for my family at all times, travelling to Britain countless times to help out with our daily lives

and looking after my son, allowing me the extra time to work, coming along to conferences and even experiencing archaeological fieldwork. And to my beloved grandmother who did not live to see me complete this chapter of my life, but to whom I will always look up to.

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...and to Blaze, whom I have never met but has inspired me so much.

DEFINITIONS AND ABBREVIATIONS

BA	Bronze Age
BRAC	The British Rock Art Collection
CHI	Cultural Heritage Imaging
CNS	Código Nacional de Sítio (National Site Code)
CSIRM	Carved Stone Investigations: Rombalds Moor Project
CSR	Complete Spatial Randomness
CVARN	Corpus Virtual de Arte Rupestre do Noroeste Português (Virtual Rock Art corpus of NW Portugal)
DEM	Digital Elevation Model
DGPC	Direcção-Geral do Património Cultural (Directorate General for Cultural Heritage)
DIA	Digital Image Analysis
EBA	Early Bronze Age
ENARDAS	Espaços naturais, arte rupestre e deposições na Pré-história Recente da fachada ocidental do centro-norte português: das acções aos significados (Natural spaces, architectures, rock art and depositions from the Late Prehistory of the Western front of Central and Northern Portugal: from actions to meanings)
ERA	England's Rock Art
HER	Historic Environmental Record
GIS	Geographic Information Systems
IA	Iron Age
IAG	Ilkley Archaeological Group
ISPRS	International Society for Photogrammetry and Remote Sensing

LBA	Late Bronze Age
LoS	Line of Sight
NA	Network Analysis
NN	Nearest Neighbour Analysis
P/AM	Presence/Absence Matrix
PTM	Polynomial Texture Map
ScRAP	Scotland's Rock Art Project
SNA	Social Network Analysis
RAPP	Rock Art Pilot Project
RTI	Reflectance Transformation Imaging
SfM	Structure from Motion
XML	Extensible Markup Language

CHAPTER ONE: INTRODUCTION

1.1. UNBOUNDED ATLANTIC ROCK ART AND RESEARCH AIMS

The term Atlantic Rock Art was popularised in the 1990s by Bradley (1997) and refers to a type of carving practice widespread across Atlantic Europe. With its northern limit set in Scotland and the southern in Portugal, it spans c. 1800 km, traversing Scotland, England, Ireland, France and Spain (Bradley 1997: 17,34). Eóin MacWhite was the first author to use the term 'Atlantic' for this type of rock art, bringing together components of a style, previously studied separately (e.g. Obermaier 1923 in Galicia; Péquart *et al.* 1927 in France; Simpson 1867 in Scotland), and distinguishing open-air art from what became known as Megalithic Art (Bradley 1997: 38; MacWhite 1946). Both display motifs based on simple shapes such as circles and spirals that are also found on artefacts such as the Gardboldisham macehead (Figure 1) but the complexity and exuberance of Megalithic Art, at times, overshadowed the study of rock art in the wider landscape. Despite co-existing in the same or neighbouring territories (e.g. Loughcrew, Ireland), the relationship between the two is still largely unclear (Shee Twohig 2012: 131).

Figure 1 The Garboldisham macehead is a Neolithic artefact made out of red deer antler and decorated with spiralled motifs (Photograph by Marta Díaz-Guardamino).

Atlantic Art's repertoire (Table 1) is based on abstract and circular imagery, including classic designs of cup-marks, single circles, cup-marks surrounded by one or more rings,

penannular rings, wavy grooves, spirals, rosettes (Alves 2003; Bradley 1997; O'Connor 2006; RAPP 2000; Santos-Estévez 2008; Valdez 2010). Figurative and naturalistic images of animals and weapons are also included in the group, but are specific to Iberia. Iconography was the first element of this style to be studied, with the detailed analysis of individual motifs which led to the construction of numerous typological tables (e.g Obermaier 1923, 1925; Peña-Santos 1979). The subsequent assessment of its geographical distribution in association with the morphological similarities of motifs shared by the aforementioned regions, suggested that these would have been connected in the past (Lorenzo-Ruza 1952; MacWhite 1946; Simpson and Thawley 1972). The nature of the relationships, however, has never been fully explored or understood. Likewise, there is a generally accepted chronological currency, although the dating of the making and use of the symbols is still an open discussion. Similarly, it is not yet possible to outline a satisfactory social and cultural framework for Atlantic Rock Art.

The definition of a social and cultural context for Atlantic Rock Art will depend on the chronological period of use. Chronological ambiguity has hindered the integration of Atlantic Art within a social and cultural context. The dating of rock art is always controversial, in particular when situated in open-air locations with no other elements, but the landscape, to contextualise it. Atlantic Art's chronology has been a recurrent discussion, but is still an open debate. While there has been a tendency to ascribe the practice to the Bronze Age (BA) (e.g. Baptista 1983-84; Barnatt and Reader 1982: 33; Beckensall 1974: 8-9; Bettencourt and Sanches 1998; Eogan 1986: 221; Herity and Eogan 1977: 137; MacWhite 1946; Morris 1977: 15; Obermaier 1925; Peña-Santos 1980; Sobrino-Buhígas [1935] 2000; Tate 1865), the current general consensus is that the style originated in the Neolithic, with its use enduring until the 1st millennium BC (Alves 2003; Bradley 1997; Fábregas-Valcarce and Rodríguez-Rellán 2012: 252; Jones *et al.* 2011; O'Connor 2006; Santos-Estévez 2015). The chronology of Atlantic Art has been explored through a number of strategies, although none have included a direct dating approach. The lack of contexts and the nature of the rock art constitute obstacles to a clear definition of the time in which this iconography was in use. In this thesis I will offer a narrower chronological currency, enabling the assessment of regional variations of the tradition and the moment of its creation, ongoing use, and potential re-use of and abandonment.

The cup-and-ring forms are the main feature that unifies the Atlantic Art carving tradition (Bradley 1997). The present study, however, considers that iconographic similarities do not necessarily imply identical cultural frameworks. Furthermore, processes of transmission and adoption (Alves 2009: 172), as well as the apparent long diachrony of the style (Santos-Estévez 2013: 219) may have influenced its evolution, leading to regional

differences. The presence of a particular figure does not enable the identification of a composition's style, but rather a range of motifs in articulation with other factors such as shape regularity or the fashion in which elements are organised (Alves 2012: 202; Layton 1991) and deployed in their environment. Further investigation is required to fully understand Atlantic Rock Art, and whether it can consistently be considered a widespread, unified phenomenon that materialises cultural exchange in Prehistory.

DESIGNING RESEARCH QUESTIONS

The present work aims to contribute to a wider understanding of Atlantic Art, contextualising it and seeking answers to the most basic of questions: who was creating Atlantic Art, why and when? Avoiding the typological studies that flourish in the style's historiography, the following research questions were designed with clear objectives in mind. They intend to provide a social and cultural context to Atlantic Art, exploring the connections between the regions where it is found, merging the event with the developments of Prehistory.

1. *What is the character of Atlantic Rock Art?*

The realisation that the formal characteristics of Atlantic Art are repeated in a number of modern countries of Western Europe suggests that there is a common identity underlying the tradition. The striking similarity between the motifs, the media and the landscape location of the rock art, make a common origin undeniable, despite regional variations. The construction of a narrative for Atlantic Art requires a clear understanding of what the practice concerns. Its assessment and characterization includes parameters such as technique, motifs, and compositions. A small scale of analysis encompassing the study of motifs regarding their type, regularity of shapes, dimensions, distribution, organisation into compositions, superimpositions and the carving techniques employed, will be used to ascertain the graphic personality of the rock art. Complementing these observations, the study will determine the topographical features of the media and the placement of rock art in the landscape. This will allow the definition of the set of physical features and social practice common across all of the study areas that can be defined as 'quintessentially Atlantic Rock Art' (O'Connor 2006).

2. *What is the evidence for theme and regional variability?*

Despite observations that suggest there is a shared repertoire of motifs across the Atlantic seaboard (e.g. Anati 1963; Bradley 1997; Burgess 1990; Lorenzo-Ruza 1952, 1955; MacWhite 1946, 1951; Rodríguez-Rellán *et al.* 2015) regional deviations are thought to exist. The definition of Atlantic Art's character and its identification across the whole Atlantic region enables a discussion about connectivity at this level. The assessment of deviations from a common repertoire allows us to look at interregional connections. Once defined the concept of Atlantic Art and the set of the similarities and differences of the tradition in each study area, I will then be able to compare the regional data and identify regional variations in the motifs, their making and the setting of the rocks. This will allow the identification of unique variations within regions and those that are shared between particular areas, enabling a discussion about interregional contact.

3. *What are the implications of connectivity and knowledge transmission for Atlantic Rock Art?*

The presence of shared practices across such widespread regions, suggests the establishment of cultural relationships and consistent long-distance contacts during Prehistory. This presupposes a certain importance that Atlantic Art held, justifying its extensive and prevalent use. This thesis will explore the nature of these cultural relationships, connections between regions and how such a phenomenon could be dispersed over such a large area to ultimately comment on what role Atlantic Art played within the social context of these communities.

1.2. THESIS LAYOUT

This thesis starts by defining the main concepts upon which it will be based, outlining the current understanding of Atlantic Rock Art. **Chapter Two** analyses the published work for each study area, with an overview of how the phenomenon has been perceived in each country, drawing a historiographic evolution. Although Atlantic Art has an extensive bibliography, especially in England and Spain (Galicia), most of it is based on descriptions and analysis of individual motifs and the construction of typologies that contribute little to a broader discussion. Scrutiny of past publications has pinpointed common themes that led researchers to approach these carvings as a unified phenomenon, despite differences and a

widespread distribution. This critical review revealed the shortfalls of some approaches and how limited investigations introduced bias into the dominant interpretations, restricting the progress of research.

Chapter 3 sets out the criteria used for the definition of the study areas and briefly describes the main geomorphological character and archaeological context of the rock art of each region. The main concerns of the project include the inter-regional study of Atlantic Rock Art, often approached in isolation, dissolving modern administrative borders. As such, a study area was sampled from each country where Atlantic Art is known: the Machars Peninsula (Dumfries and Galloway, Scotland); Rombalds Moor (Yorkshire, England); Iveragh Peninsula (Co. Kerry, Ireland); Barbanza Peninsula (Galicia, Spain); Monte Faro (Valença, Portugal).

The general hypothesis explaining the uniform character of Atlantic Art is outlined in **Chapter 4**, exploring concepts of Developmental Psychology and Cultural Transmission. Because the concepts of Difference and Similarity seem to be intrinsic to Atlantic rock Art, these were discussed in **Chapter 5,** where the need for the creation of a categorical system and typologies is explained, in order to enable the identification of regional assemblages.

The strategies used to assess Atlantic Art's character and the basis used to compare the differences and similarities identified in the study areas is outlined in **Chapter 6**, where a detailed review of the methodology is provided. The methodology used to conduct the project was designed to meet the three aforementioned research questions and to be as unbiased as possible, whilst equally applicable across the different regions. The results of this approach are an important contribution of this thesis, since they encompass not only the formal analysis of Atlantic Art's iconography, but a number of associated variables that contribute for its social contextualisation.

Chapter 7 describes the overall results of the analyses, characterizing Atlantic Art according to the various components of its assemblage. It is organized conforming to the defined scales of analyses that guide the study, from the small motif to the wider landscape, and the final engagement of all the components exploring the relationships between the study areas.

Finally, **Chapter 8** renders my perspective on Atlantic Rock Art, beginning with a renewed understanding of its main characteristics, resulting from the overall study. It comprises a synopsis of the phenomenon based on the knowledge produced in this thesis, but it also engages the practice of Atlantic Rock Art with a wider social and cultural Neolithic

context, period in which its origin is placed. This is not only based on the slim archaeographical available data for its production, but also in a Neolithic worldview and its evolution in subsequent periods.

A few final words are provided in **Chapter 9** where the main achievements of the thesis are outlined, along with future directions and work that still can and must be done in order to improve our understanding of Atlantic Art.

This thesis complements Bradley's seminal work (1997) and updates it, through a relational approach between a larger number of study areas examined in detail and the introduction of dynamic methodologies such as Social Network Analysis (SNA). Furthermore, this work is fundamentally based on an empirical approach. In addition to other projects that have been developed, particularly in the last decade (e.g. Alves 2003; Enlander 2013; Fábregas-Valcarce & Rodríguez-Rellán 2015; O'Connor 2006; Santos-Estévez 2008; Sharpe 2007), the picture of Atlantic Art is being gradually completed.

CHAPTER TWO: ATLANTIC ROCK ART BASICS

2.1. IDENTIFYING ATLANTIC ROCK ART

'My subject matter will be one of the major groups of rock carvings in prehistoric Europe—the petroglyphs of the Galician-Atlantic style—and my discussion will range along the western seaways for 1,800 km, from the northern limit of this style in Scotland and Ireland to its southern boundary around the border between Portugal and Spain'.

(Bradley 1997: 15)

This section will outline the current understanding of what Atlantic Rock Art is and a brief definition of its main characteristics. Although originally coined by Bradley (1997), the expression 'Atlantic Rock Art' is not widely used by every rock art researcher, but it is generally accepted as a reference to a prehistoric tradition of carvings found along the Atlantic seaboard.

Atlantic Rock Art is typified by its cup-and-ring motifs and a predominantly circular iconography (Table 1) (Bradley 1997:6,34,50; MacWhite 1946; Lorenzo-Ruza 1952), which can be found across several countries of Atlantic Europe: Scotland, northeast England, Ireland, northwest Iberia (northwest Portugal and most of the Spanish region of Galicia) and western France. Some authors consider that Atlantic Art also features in areas such as southwest Britain, northwest France and the western Pyrenees (Abélanet 1986; Bradley 1997).

Its wide geographical distribution has led to the suggestion that Atlantic Art is a unified phenomenon that illustrates inter-continental connections (e.g. Shee Twohig 1981:122; van Hoek 1997).

Despite being included in this tradition, it should be noted that the evidence for open-air rock art in western France is vague, where studies tend to focus mostly on Megalithic Art, with which it shared some formal attributes (Bradley 1997:42; Shee Twohig 2012:131). The relationship between open-air rock art and Passage Tomb Art is not clear, but pursuit of a better understanding could potentially offer unique and important clues to the chronology of Atlantic Art (O'Connor 2006:53).

The 'quintessential' or 'classic' Atlantic imagery (after O'Connor 2006:1) is mainly composed by non-naturalistic abstract and geometric designs of circular variations (see Table

1). Animal figures and weapons are also included in this tradition, although occurring only in Iberia, with no direct parallels with the other regions of the Atlantic Group. Due to the inclusion of these figurative images in Iberia, some authors extend the Atlantic Art tradition to other parts of Europe such as Scandinavia (e.g. Bradley 1997:33-48), advocating similarities between the relationships of the animal representations (deer and horses) with simple combinations of circular motifs (Fredell 2010, 2013:30-31). Others establish comparisons with the European Alps where circles, weapons, labyrinths and idols are represented (Fredell 2013:33:32). Fredell (2010) suggests that the Galician circular motifs could epitomise sun depictions, alike interpretations of Scandinavian rock art from the 1st millennium BC. However, these assumptions are purely based on stylistic similarities and the chronological ascription does not fit with the Galician evidence, seeming precarious to establish such a connection. As this thesis demonstrates, style is not enough to define a tradition of rock art. Circular motifs are common in many parts of the world, created in many chronological periods, and it would be naïve to consider them all to be Atlantic. Furthermore, Galicia as well as Portugal display the widest range of motifs including imagery that is essentially absent from the other areas, such as riding scenes, humans, weapons (mostly daggers, halberds and shields), idols, *palletes*, shields, etc. (see Table 1 for details).

Table 1 General Types of Atlantic Art Motifs.

GENERAL CLASSES OF ATLANTIC ROCK ART MOTIFS			
TYPE OF MOTIF	**ILLUSTRATION**	**DESCRIPTION**	**WHERE IT CAN BE FOUND**
Cup-marks		Circular hollows worked into rock surfaces. They occur individually or in groups, can appear to have a random organization but may also be plotted in patterns. Occasionally conjoined by grooves. Two cup-marks joined by a linear groove are called	All regions.

		dumb-bells (RAPP 2000:30).	
Cup-and-Rings		This motif is a composition of a central cup-mark surrounded by a single or multiple circles. These occur in different sizes, varying layouts and the number of rings can vary (RAPP 2000:30). These too can be connected via a network of linear grooves, be carved individually or as part of complex compositions.	All regions.
Penannular Rings		Penannular rings are a variation of the previous motifs. They are cup-marks surrounded by one or more discontinuous curvilinear grooves, also called *gapped rings*, *penannular grooves* (Morris) or *horseshoe shapes* (Beckensall) (RAPP 2000:30). A radial line is usually carved from the central cup-mark, with which the circular grooves will meet.	All regions.
Wavy Grooves/ Lines		One of the defining characteristics of Atlantic Art is the existence of	All Regions.

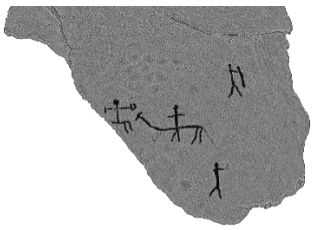
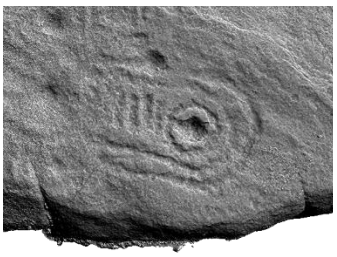
		multiple grooves, which can be linear or wavy, crossing the carved surfaces and connecting the main motifs. They are usually additions to compositions, never appearing on their own. In simpler designs, the combinations include, cup-marks.	
Labyrinths[1]		Circular motifs with similarities to the Penannular rings. However, the interior of the figures is usually more complex and makes what looks like a labyrinth. (Peña-Santos and Vásquez-Varela 1979; Santos-Estévez and Seoane-Veiga 2010:25).	Mostly Iberia. There are accounts of labyrinths in other regions but of dubious authenticity.
Spirals		Spiral motifs are curvilinear lines that curl outwards from a central starting point. They can be either sinistral or dextral. Usually carved alongside other circular combinations (Peña-Santos and Vásquéz-Varela 1979:26-32).	All regions, but not very common.

[1] Photograph by Manuel Santos-Estévez

Rosettes		Rosettes can be described as a cluster of cup-marks organized in circular patterns. More often, a central larger cup-mark is surrounded by smaller ones in the shape of a circle. The combination can also be enclosed within a larger simple circle.	Mostly British Isles.
Zoomorphs	 	Animals such as horses and stags are included in the definition of Atlantic Art in Iberia, where they occur alongside the circular iconography. In Galicia, they represent the second largest type of engravings, but they can also be found in the northern region of Portugal. These representations are far from homogenous, and several styles of depiction can be found. They occasionally feature in hunting and riding scenes, and serpents are also depicted in Galicia (e.g. Coto de Penalba, Campo Lameiro (Peña-Santos and	Spain (Galicia), NW Portugal

		Vásquéz-Varela 1979:62-64). Representations of animals in the British Isles are rare beyond the example of the deer in Ballochmyle (Ayrshire, Scotland) (Bradley 1997:59).	
Weapons[2]		The depiction of weapons such as halberds and daggers is also a characteristic of Iberia. Often depicted with much detail, they were soon used to date the rock art. They are less common than other motifs and often found in isolation (Bradley 1997:42). In the British Isles, such depictions of daggers and axeheads are nearly always associated with monuments (Bradley 1997:56), such as Stonehenge (Simpson and Thawley 1972) and Nether Largie in Argyll (Bradley 1993:91-93).	Spain (Galicia), Portugal (very rare)

[2] Photograph by Manuel Santos-Estévez

Anthropomorphs	 	Human figures are rare, but examples are known to Iberia. Mostly associated with and riding scenes (Fábregas-Valcarce and Rodríguez-Rellán 2012:254).	Iberia
Miscellaneous Motifs (circular)		Other motifs included in the tradition are rarer: e.g. *U-shaped grooves, key-holes, segmented circles, etc.* Their occurrence varies depending on the region.	Varying according to region
Miscellaneous Motifs (other geometries)	 	Motifs of angular configurations and other shapes: *crosses, chevrons, ladders, grids, lozenges, comb-like motifs, tridents*, etc. (Morris 1981:171), *pallettes, footprints, hooves, squares* (Peña-Santos and Vásquéz-Varela 1979). In general, these motifs are quite rare and do not feature in the core group of Atlantic Art motifs.	British Isles, Galicia (Spain), Portugal

Miscellaneous Motifs (Figurative)[3]	 	*Idols*, exclusive to Iberia, are a hard group to classify. Due to their shape, they are usually associated with their artefactual counterparts, mostly found in monuments in the South of Portugal, for instance (Peña-Santos and Vásquéz-Varela 1979:76-80). Apart from the depictions, no material idol is known to be found in the NW of Iberia. Another type of motifs are the so-called *Shields* (Costas-Goberna and Nóvoa-Álvarez 1993:157-81), alternatively interpreted as a kind of vehicle (Züchner 1992). Little is known about them, but they are often found with weapons.	Iberia

Traditionally, the iconography described above is found carved on shallowly sloping to horizontal surfaces on outcrops and boulders in the open landscape, with which they interact (Alves 2012:199; Fábregas-Valcarce and Rodríguez-Rellán 2012:254). The relationship between Atlantic Rock Art and natural elements such as watercourses is often considered relevant (e.g. Bettencourt 2009:141-142; Bradley 1997; Morris 1981). The geometric-abstract

[3] Photographs by Manuel Santos-Estévez

motifs may appear in connection with, and adapted to, the natural features of the rocky surfaces in simple compositions or complex groups of motifs occupying the whole workspace, frequently connected by grooves (Bradley 1997: 48, 56). Although, to our uninformed eye, these arrangements may look random and chaotic, on occasion the placement of motifs suggest a careful predetermination of spatial organization (Alves 2012:200; Valdez 2010:51). Such is the case of Bouça do Colado (Ponte da Barca) in Portugal (Figure 2), where a central composition of motifs has been described as forming a female anthropomorph, identified through the representation of breasts with concentric circles (Baptista 1981b, 1995:67). Despite the great number of motifs that can sometimes coexist on the same surface, superimpositions are very rare (Alves 2003:19; O'Connor 2006:53) and the few known exceptions (e.g. Shee Twohig 1972:225-226) contribute little to the understanding of chronological change in style and wider dating.

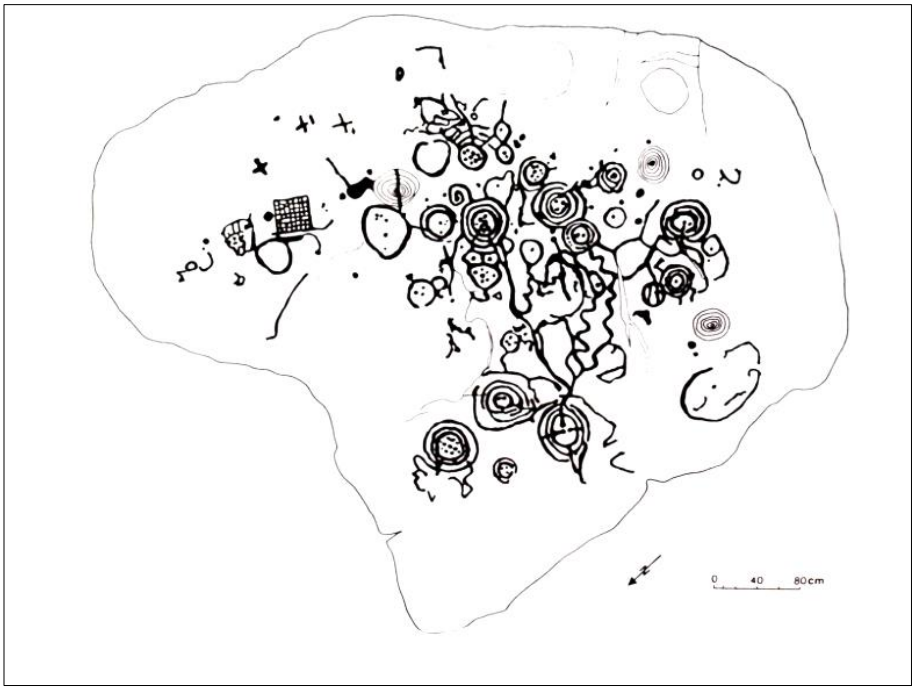


Figure 2 Penedo do Encanto bears an intricate and complex composition of circular motifs. The central arrangement has been interpreted as the representation of a female antropomorph (after Baptista 1981b, 1986, 1995).

Some authors argue that the selection of rocks to carve was based on their geomorphological characteristics namely colour, shape and texture (Alves 2003:19; Enlander 2016). It is agreed that the preferential location of the embellished outcrops was the mid-slopes (Alves 2003:19; Alves 2012:198; Bradley 1997; Valdez 2010:51) and upland areas (van Hoek 1997; RAPP 2000:38) from where they would command extensive views, occasionally overlooking areas of settlement and often associated with good pasture (Bradley 1997:3).

The carved rocks can be found both in isolation and large concentrations spreading over vast areas. Whilst the micro-topography of the engravings' immediate environs usually allows the movement of people (Alves 2003:19), recent studies and the finding of Atlantic Art in Galician shelters suggest that sometimes bodily restrictions in the visualization of the motifs point to a 'wish to hide' and a code of signs that was not at all supposed to be globally accessible (Fábregas-Valcarce and Rodríguez-Rellán 2012:253). The same study argues against the widespread idea that Atlantic Rock Art was intimately associated with pathways and movement corridors in the landscape (Bradley 1997; Purcell 2002; RAPP 2000:38; van Hoek 1997), since in Galicia it was located away from routeways to allow control over economically attractive areas (Fábregas-Valcarce and Rodríguez-Rellán 2012:253).

2.2. ATLANTIC ROCK ART STUDIES: LIMITATIONS AND POTENTIALITIES

Early references to post-glacial open-air rock art date to the 18th century in Portugal (Figure 3) (Correia 1916:117-118; Costa 1706) and Spain (Martin-Sarmiento 1750) and 19th century in the British Isles (Figure 4) (Hadingham 1974:136 cit. RAPP 2000:24). These were usually antiquarian studies that described and sometimes illustrated decorated rocks (e.g. Cachão da Rapa by Debrie in Portugal, Correia 1916:117-118; Old Bewick by Colingwood in Northumberland).

Some authors such as Simpson (1867) and Tate (1865) contributed extensive fieldwork campaigns or combined far-sighted illustrated texts (RAPP 2000), details about the surrounding geology and topography and even posited a Neolithic chronology to the engravings (O'Connor 2006:8).

In France (Brittany) and Ireland, the well-known megalithic monuments and their astounding decorations have also been sketched and described since the 19th century (Scarre 2011:3-5).

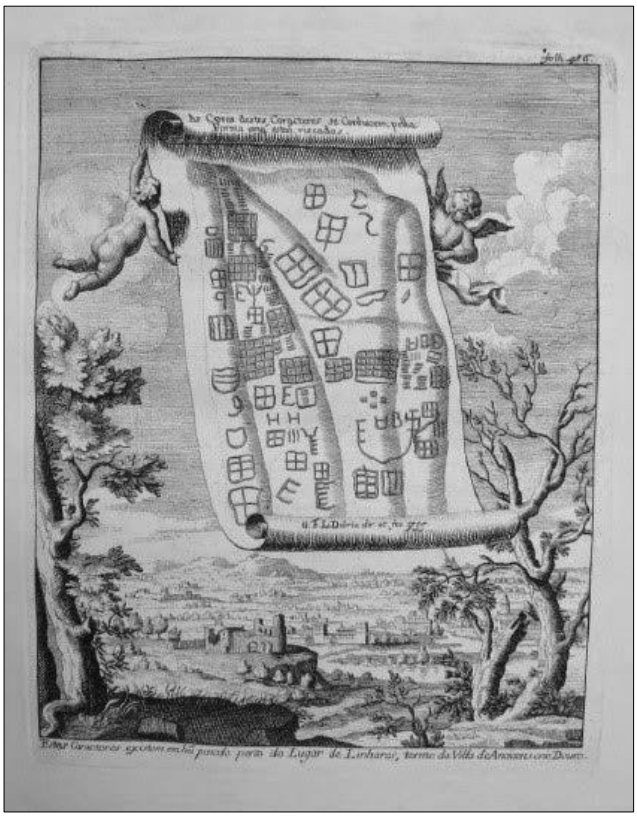


Figure 3 Debrie's illustration of Cachão da Rapa, in a joint publication with Contador de Argote (1738) (after Correia 1916: 117-118).

Only recently has Atlantic Rock Art been considered part of a wider Atlantic phenomenon, with studies being mostly regionally focused. This was stressed by the rise of Nationalism in the 19th and 20th centuries, providing an interpretative framework for carvings rooted in Celtic myths that would strengthen Galicia's autonomous identity, during the Spanish civil war. The engravings were part of a wider sphere of a heroic past connected to hillforts, megaliths and a very ancient origin, legitimizing its aspirations of independence (Santos-Estévez 2008:19). Iberia and Ireland share a number of foundational myths, to which the rock carvings have contributed (Lionain 2014).

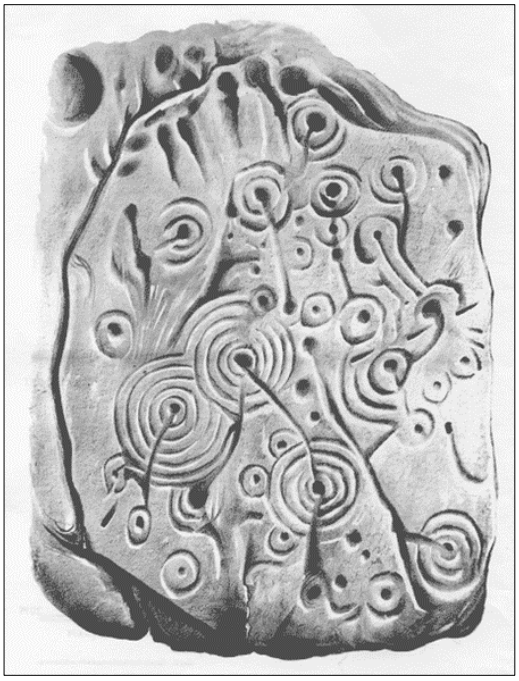


Figure 4 19th Century drawing of Old Bewick by Colingwood Bruce (Source: Web Access to Rock Art: the Beckensall Archive of Northumberland Rock Art[4])

The regional nature of early studies is evident in the terminology (Alves 2003:53). In Britain, a number of expressions (e.g. lapidary art, ring cuttings, cup-marked stones, cup-and-ring carvings) are typically used, but the tradition is currently best known as 'British Rock Art' (Sharpe 2007:17), a term that specifically contextualises the art geographically. In Galicia, this discrimination is even more striking, with evidence being unified under terms such as '*Petroglifos Gallegos*[5]', '*Grupo Galaico de Arte Rupestre*[6]' (Sobriño-Buhígas [1935] 2000; Peña-Santos and Vásquéz-Varela 1979), which largely ignore the real geographical extent of Atlantic Rock Art in Iberia, whose southernmost boundary is currently the Portuguese river Vouga, c. 150 km from the border between the two countries. Lorenzo-Ruza (1956), was the only exception to this trend, studying sites in both Galicia and NW Portugal and inferring about the relationships between Iberia and the British Isles, while using the term '*Grupo Galego-Atlântico*[7]'. The subject of Atlantic Art only entered the agendas of Portuguese scholars in the 1980s, with the acknowledgement of similarities between the rocks of NW

[4] http://rockart.ncl.ac.uk/panel_image_view_larger.asp?imageid=5890&pi=298 Accessed on the 13th of April 2016.
[5] Galician Petroglyphs
[6] Galician Group of rock art
[7] Galician-Atlantic Group

Portugal and Galicia. Terms such as "*Grupo do Noroeste*[8]" (Baptista, 1981a) and '*Grupo Galaico-Português de arte rupestre*[9]' (Baptista 1983-84; 1986) were then adopted.

Only after Bradley (e.g. 1997) was the word Atlantic recovered from MacWhite's work and continued to be used by a number of authors (e.g. Alves 2003; O'Connor 2006; Santos-Estévez 2008; Valdez 2010), although some still use regional nomenclatures. Due to the geographical and inter-regional scope of this investigation, the expression 'Atlantic Rock Art' will be used throughout without necessarily implying a homogenous phenomenon along the Atlantic seaboard, reflecting the geographical scope of the project.

THE CHARACTER OF ATLANTIC ROCK ART

Early studies of rock art research were theoretically grounded in Culture History, with agendas concerned with the classification of individual motifs, definition of styles, traditions, chronology and distributions. These approaches followed similar principles to those used to study portable artefacts with a focus on the meaning of decorations (Obermaier 1923; 1925; Sobriño-Buhígas [1935] 2000), regional context and, in some cases, the relationship with the styles of neighbouring regions (Breuil 1933-1935; MacWhite 1951). Comparisons between traditions led to the emergence of parallels between Megalithic Art and the open-air rock art of Iberia, the British Isles and Scandinavia (Breuil 1933-1935; MacWhite 1946, 1951; Lorenzo-Ruza 1952). In all regions there were periods of intense academic interest in Atlantic Rock Art and periods of hiatus. Local *corpuses* grew with the continued contribution of non-professional archaeologists, publishing in grey literature volumes, providing rich catalogues for later generations to build upon. The recording of sites was mostly a self-contained exercise, contemplating the carvings and ignoring the landscape setting, in general following Breuil's common practice, leaving little space for detailed interpretations (Bradley *et al.* 2001:496). Santos-Estévez argues that the lack of clear and systematic methodologies and theoretical principles within these studies proved harmful for the scientific study of rock art (2008:19).

[8] Group of the Northwest
[9] Galician-Portuguese Group

The work of some authors had long-lasting influences. Obermaier (1923, 1925) is amongst the most influential in 20th century Iberia, producing the first synthesis of Galician engravings. His typological classification (Figure 5) had many followers and enduring effects on the study of Atlantic Rock Art (see Table 16 Appendix 3, Vol. 2). The creation of classificatory tables dominated research strategies for many decades, contributing to the alienation of rock art by mainstream archaeology.

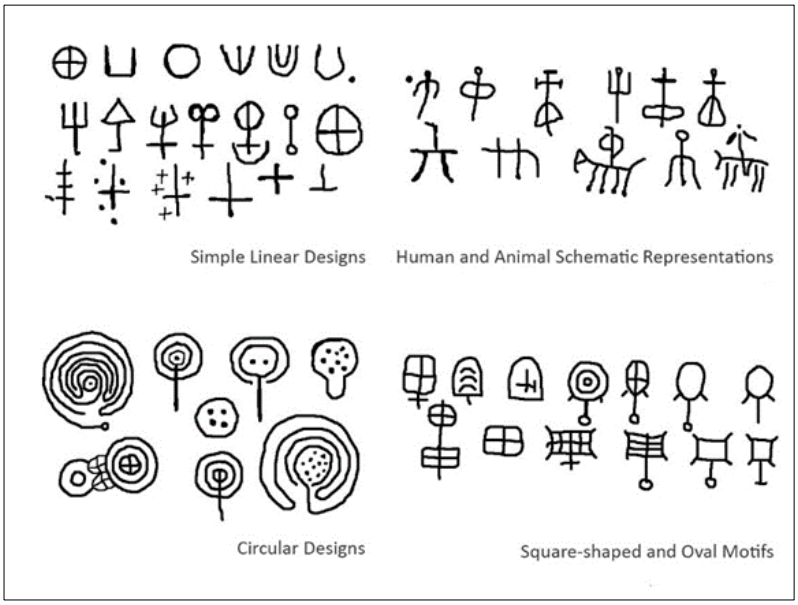


Figure 5 Detail of Obermaier's classification of Galician motifs (after Obermaier 1923).

Some of Obermaier's pertinent ideas have been retained by modern researchers, such as the relationship between Schematic and Atlantic Art (e.g. Baptista 1983-84; Bradley and Fábregas-Valcarce 1999) or the Late Neolithic chronology for the cup-and-ring art (e.g. Alves 2003; Fábregas-Valcarce and Rodríguez-Rellán 2012).

Abbé Breuil was also influential in the study of Iberian and British rock art, developing a categorisation of prehistoric art, linking analogous forms and motifs, and acknowledging that similar imagery can occur over wide areas and in different contexts (RAPP 2000:24). This idea was illustrated by his claims of connections between the evidence of Iberia, France and the Irish monuments, but also the relationship between Galicia's open-air engravings and those on both sides of the Irish Sea (Bradley *et al.* 2001:494).

In Galicia, initial work was mostly sponsored by local organizations and carried out by national scholars. An example of this is Sobrino-Buhigas' publication of the *Corpus Petroglyphorum Gallaeciae* ([1935] 2000), the result of the author's outstanding systematic survey of the region of Pontevedra, and the use of vanguard recording techniques (*Ibid*. XIX). It included, not only the engravings, but a) the characteristics of the outcrops which the author believed to have influenced the choice of media to carve, an idea still pursued today (e.g. Alves 2003); b) the local geology, concluding that the majority of carvings are located in areas of fine grained granite (*Ibid*. CXXVII), although lately examples in schist have been found in some areas; c) the orientation of the carved surfaces, concluding that most outcrops in Pontevedra and those further inland, were facing the coast; d) the fact that the rock art distribution may relate to natural routes across the landscape, leading to tin mines (*Ibid*. CXXXI). Sobrino-Buhiga's volume was thoroughly illustrated with good quality photographs, intricate drawings, and distribution maps and comprised detailed descriptions and inventories. Some of these ideas are still present in modern research and his work represented a change from the majority of studies. Despite the ground-breaking character of his work, it was written in Latin, accessible to only a few and hence had little influence in the overall picture of Iberian rock art research.

The lack of comprehensive *corpuses*, comprising information related to the archaeological sites and systematization of information continues to handicap studies across all countries, despite the decisive contribution of some to the national inventories (Beckensall 1974, 1986, 1991, 1992, 1999, 2001, 2002; Finlay 1973; Morris 1977, 1981, 1989; van Hoek 1987, 1988, 1995). Whilst this problem has started to be addressed in countries such as England with the NADRAP[10] or CSI: Rombalds Moor[11] projects and in Scotland with the recently launched ScRAP[12], it is a fact that rock art has been largely disregarded by wider studies, with only a few exceptions (e.g. Clark 1952).

In the 1960s archaeologists react against Culture History, infused with the essence of colonialism, whose experience was uncritically applied to societies in the past (Gamble 2001:23-24). Archaeologists began to describe data and its distribution, and the second half of the 20th century brought perspectives that, in the long run, decisively influenced the study

[10] Northumberland and Durham Rock Art Project.
[11] Carved Stone Investigations in a Watershed Landscape.
[12] Scotland's Rock Art Project.

and perception of Atlantic Art. The new paradigm of Processual Archaeology was increasingly concerned with spatial analysis and less with material details.

Some scholars attempted to abandon classificatory schemes (e.g. López-Cuevillas 1951; Lorenzo-Ruza 1955), instead looking for the origins of rock art. Following Vaufrey's diffusionist approach (1936, 1939 cit. Gomes 2002:150), MacWhite focused his work in the geographical distribution of Atlantic Rock Art and potential inter-regional connections, albeit still imbued within a Culture History paradigm and interested in rock art's cultural markers and their origins. He argued for the origin of motifs, such as spirals, in pre-dynastic Egypt from where they would have spread to Western Europe (1946), failing to acknowledge that similar motifs can be found in different chronological and geographical contexts. He refuted Breuil's suggestion that Passage Grave Art and open-air carvings are continuous, acknowledging the lack of animals depicted in British rock art as opposed to the Iberian evidence, but also that the wide-character of the latter complicated a chronological assessment (Alves 2003; Gomes 2002:150; MacWhite 1951). Distributional maps were used to argue for a homogenous iconography covering Galicia, Britain and Ireland (MacWhite 1946), an approach which conveyed an important change of perception, sowing the seeds for a paradigm shift, relying on descriptions of data and its distribution, spatial analysis and less on anthropogenic details. MacWhite's arguments for long distance connections echoed in the work of other researchers and the comparisons of rock art were extended to Scandinavia by Lorenzo-Ruza, who attempted to define a viable archaeological context for what he called 'Galician-Atlantic Rock Art' (1953, 1956). A similar premise led him to conclude that Atlantic Art originated from the Mediterranean Levantine Art, arriving in the northwest of the peninsula with the advent of metallurgy, but also with local branches of megalithic art (MacWhite 1946, 1951; Santos-Estévez 2008:20).

The emergence of Processual Archaeology represents a turning point in the discipline with more sophisticated interpretations borrowed from anthropological theory (Greene 2002:235). The introduction of an anthropological perspective, through the hand of Bradley (1997), himself influenced by Ingold (e.g. 1986) and Layton (1991), played an important role in rock art interpretation. Processual archaeology not only represented a major theoretical shift, but also a methodological one, introducing studies utilizing quantitative data and computerized statistical methods, enabling sampling and testing (Renfrew and Bahn 2000:39). Perhaps, because rock art studies were slow to engage with the new paradigm, the discipline continued being marginalized and isolated from mainstream academic discussions. Allied to the inherent difficulty in dating, the discipline suffered from a negligible academic

status (O'Connor 2008:9) and investigations continuing to be mostly conducted by non-academics (e.g. Morris in Scotland and Beckensall in England).

The decades of 1960 and 1970 brought a new impetus to rock art studies in Europe, with the development of long-term projects in Valcamonica (Italy), Mont Bego (France), the Levantine and Schematic Art in southeast Spain and the Tagus Valley (Portugal) salvage project. In some areas the structuralist ideas of Leroi-Gourhan (1965) and Laming-Emperaire (1962) were greater than the anthropological views being explored in the Anglo-Saxon world. Despite the importance of their work in the introduction of structuralist concepts such as spatial contexts and content, into rock art studies, based on their work with Palaeolithic cave art, Gourhan's seminal work *Gesture and Speech* was only translated into English in 1993 (Gamble 2001:37). On the other hand, in countries where French was a commonly spoken language, such as Portugal, researchers made wide use of structuralist theories and methods, and it can still be sensed in the work of various scholars (e.g. Bradley 1997; Santos-Estévez 2008), incorporated in a landscape approach that aims at the deconstruction of rock art cultural environments, in order to understand its function.

Structuralism had many followers in Portugal and its principles were directly applied to rock art. Regarding NW Iberia, Baptista was a primary critic of previous models (including that of Anati 1968), imbued of ideas stemming from this paradigm. He classified the rock art into 'Arte Rupestre Galego-Portuguesa'[13] (1983-84) and divided the carvings into two main groups differentiated in terms of style, technique and chronology: Group I later known as Atlantic, Group II known as Schematic (Baptista 1983-84, 1986). This division is still widely used and is the base of studies relating and investigating the relationship between the two rock art groups (Alves 2003; Bradley and Fábregas-Valcarce 1999; Santos 2013; Valdez 2010).

The gradual inclusion of rock art studies in the academic sphere and the growing interest in the subject led to deeper investigations which included excavations in search of contextualization (e.g. Fraga d'Aia in Portugal, Jorge *et al.* 1988). More attention was now being paid to the landscape location of the rocks and preliminary assessments of their spatial attributes were being recorded, namely views from sites, considered of great importance (e.g. Beckensall 1991, 1992a, 1992b; Clarke 1982; Morris 1977, 1979, 1981, 1989).

[13] Galician-Portuguese Rock Art Group.

Rock art began to be explored within its landscape context and in association with economically viable areas of the environment (Bintliff 1988; Stewart 1961; Walker 1970, 1977), but the first intentional landscape-oriented study of British rock art was conducted by Walker who developed what he named the 'Geographical approach' (1977). It was based on a predictive model comparing rock art, monuments and artefact distributions. The study included broad 'palaeoecological modelling', toponomy as well as general landscape observations aiming at the reconstruction of past environments (*Ibid.* 456, 467-8). Results suggested that decorated outcrops were located in intermediate altitudes between low-lying and mountain habitats, providing statistical correlations between location and other kinds of archaeological data. Walker suggested that territorial exploitation patterns could be deduced through the study of rock art, whether motifs were deciphered or not (RAPP 2000:25), and that it would have occurred in conjunction with domestic or agricultural activities (Walker 1977). The idea that rock art was part of a daily routine is re-explored by Johnston (1989) and O'Connor (2006), who apply the landscape premise to the study of rock art in Ireland. Their analyses, however, are more complex and involve a number of variables such as soil types, geology, elevation and water sources, arguing that a link between these and rock art could epitomize a role for the latter within ideologies associated with fertility and productivity (Johnston 1989: 272-3; 1991:94).

If rock art studies in Ireland were never very dynamic during the first half of the 20th century, the research that followed was ground-breaking and yielded interesting results. Ideas that became visible with Bradley's work, such as accessibility and visibility to and from the carved rocks, and explorations of the association between engravings and routeways, were also being explored by Irish authors in the 1980s and 1990s. Purcell tested some of Bradley's assumptions for Iveragh's rock art (1994). Whilst she identified a dichotomy between panels located in inaccessible or hidden locations and those along routeways, Purcell argued for a differential access to carved rocks depending on the audiences for the two types of panels, despite not recognizing iconographical variants. Nevertheless, Purcell failed to consider the local geomorphological characteristics, which in the Ring of Kerry are composed of steep mountain ranges and restricted pathways, and as a result some of the conclusion were rather obvious (O'Connor 2006:16).

By the end of the 20th century rock art is an established discipline with its own character. Renewed interest in prehistoric art led to the development of several local studies that increased the knowledge of the extent and content of the sites (Bradley 1997:38). Major surveys were carried out, greatly increasing local *corpuses*, although not without bias since

these were often constructed according to certain agendas (e.g. Morris 1979; O'Sullivan and Sheehan 1996; van Hoek 1987, 1988, 1995). For instance, datasets were often compromised by the deliberate disregard of rocks with simple cup-marks (Morris 1981:22), or the intentional neglect of less definable motifs not included in recordings (Fábregas-Valcarce and Rodríguez-Rellán 2012b). Debates on chronology were re-opened as well as discussions concerning the significance of images.

The development of rock art as a discipline was intimately connected with the emergence of Post-Processual Archaeology and its interpretative character deriving from post-modernist fluxes of thought, encouraging a diversity of approaches to the past (Renfrew and Bahn 2000:43). Rock art studies slowly engaged with the new post-processualist theories, emerging in mainstream archaeology. Approaches shifted from the simple documentation of rock art's nature and distribution, and emphasis was now placed on understanding the purposes and contexts of depictions (RAPP 2000:26).

RICHARD BRADLEY AND THE LEGACY OF LANDSCAPE ARCHAEOLOGY

Richard Bradley's work represents a theoretical and methodological turning point in rock art studies in general, and Atlantic Art in particular, championing a reflexive relationship with mainstream archaeology. Criticising the fact that archaeological methods were largely ignored by art researchers, he developed a more systematic methodology opening new avenues of investigation (Bradley 1997:7-8). 'Rock Art and the Prehistory of Atlantic Europe' (1997) is a landmark in Atlantic Rock Art studies and more extensive work regarding these engravings is yet to be done. Not only has he adopted the term Atlantic, followed in this thesis, but Bradley's contribution was determinant for a deeper knowledge and understanding of the carvings in a wider geographical spectrum.

The concept of landscape and its importance in the contextualization of rock art has been pivotal in the author's work since the early 1980s. The nature of the motifs, their visibility affordances and the spatial relationships between carved sites and their environs were main concerns (RAPP 2000:26). As a result, his work reflects a new theoretical framework that emerged with Processual Archaeology and impacted the following decades.

Landscape Archaeology evolved from the conceptual fusion between the principles of Humanist Geography, Processual and Post-Processual Archaeology. Since landscape forms the medium through which the relations between environment and human experience are articulated, it is a useful framework to study rock art, with which the latter is intimately tied to. Bradley's work was also underpinned by a series of principles adopted from Social Anthropology and Structuralism. He attempted to define regional groups according to which rock art compositions were supposed to have been created, assuming that motifs were 'systems of communication' (1991), employed according to specific conventions in order to convey information (1997:43). By means of a structuralist-based methodology, with binary oppositions, Bradley explored the relationship between the location of simple/complex motifs and panels in relation to the landscape and social activities that were divided into 'upland versus lowland; hunting versus agriculture; mobile versus sedentary; grazing versus home base; unproductive versus fertile; intermittent contact versus regular interaction; insiders versus outsiders; centre versus periphery' (O'Connor 2006:21). This distinction between simple and complex may be considered controversial, especially because it may not reflect the past artists/viewers judgements. It was based on motif types and conventions, considering how these interact with the rock faces and the association between the carved rocks with both the geomorphological features and other prehistoric monuments. In conclusion, Bradley ascertained that the carvings were often depicted in prominent settings, with extensive views over inland valley routeways or coastlines. Combining the location of rock art with its relation to ancient land-use patterns, he argued that it would be possible to draw a social and economic context for Atlantic Art (RAPP 2000:26). The signs would have been used to mark the movement through the landscape of communities with a seasonal pastoral economy (Bradley 1991, 1993, 1994, 1997). Using ethnographic evidence, Bradley studied the impact of rock art on past audiences, arguing that the more complex the imagery, the larger or more diverse its viewers would be (1993, 1996, 1997, 2003).

Bradley's innovative approach, including new field methods, was explored in its early stages, and even contrasted, by Irish scholars (e.g. Purcell 1994, 2002). The field experience acquired in Britain was directly and uncritically transposed to Galicia in the mid-1990s where, along with local academics, a five year fieldwork project was carried out (Bradley *et al.* 1994, 1995). This collaboration dictated a decisive change in Iberian rock art research. The new framework created a theoretical division with a group of local academics following Peña-Santos' historic-functionalist and processualist approaches, and another incorporating Bradley's influence, developing a landscape-oriented methodology, a perspective that had

already been developed locally (Criado-Boado 1993). Rock art was considered an integral part of a system through which mobile societies defined their rights of access to a territory, particularly in areas with a diverse ecology, fundamental for survival, where the motifs functioned as a means of spatial appropriation (Bradley *et al.* 1994a, 1994b; Santos-Estévez 2008:23).

The landscape approach to Galician rock art was initially criticized, mostly by Peña-Santos who condemned the methodology, arguing against the establishment of direct links between certain motifs and landscape features (e.g. Peña-Santos and Rey-García 1998: 24; Vázquez-Rozas 1997:195-198). Whilst these authors perceived the landscape as an entity with a functionalist role in which rock art had a practical purpose, followers of the new approach abandoned positivist views and focused on the organizational sense of the practice, 'creating sense' and generating a symbolic landscape that would be comprehensible to its inhabitants (e.g. Criado-Boado 1993, followed by Santos-Estévez 2008:23).

The concept of Landscape used in Galicia differed from Bradley's, being closer to the definition of Criado-Boado (1993). Whichever the perception, however, the premise succeeded and has thrived since then, being widely applied to prehistoric research in general (e.g. Fábregas-Valcarce & Rodríguez-Rellán 2012a, Santos-Estévez 1998; Santos-Estévez & Criado-Boado 1998). New methodologies and technologies led to multiscale studies that included the relationships between rock art and other types of archaeological sites, such as Iron Age settlements or tombs (Filgueiras-Rey & Rodríguez-Fernández 1994; Villoch Vázquez 1995), and an effort of regional and inter-regional contextualization (Rodríguez-Rellán *et al.* 2010; Fábregas-Valcarce and Rodríguez-Rellán 2012, 2015).

Landscape Archaeology and Bradley's influence also shaped rock art studies in the British Isles (e.g. Johnston 1989; Jones *et al.* 2011; O'Connor 2006; Purcell 1994, 2002; Sharpe 2007) and Portugal (e.g. Alves 2003, 2009; Valdez 2010). Despite the conservatism of many research agendas (e.g. Beckensall 1992), Waddington (1998), O'Connor (2006), Sharpe (2007) and Jones (Jones *et al.* 2011) developed interesting studies assessing the relationship between rock art and landscape, whilst challenging some of Bradley's assumptions. In some cases, the same study areas were addressed (e.g. Iveragh, Purcell 1994; Kilmartin, Jones *et al.* 2011). Kilmartin (Argyll, Scotland), for instance, features as one of Bradley's main case studies and it was later revised by Jones in a comprehensive project based on a 3 scale multi-disciplinary methodology that included excavations, lithic analysis, experimental archaeology, a wider

assessment of the surrounding landscape including palaeoenvironmental studies and landscape reconstruction. The result of this concerted approach suggested that the decorated rocks in Kilmartin held the purpose of mapping the movement of the living in and around the landscape, but also the transition from life to death (Jones *et al.* 2011a:223).

A landscape archaeology methodology to the study of rock art was introduced in Portugal by Alves whose approach to the Atlantic tradition incorporated wide temporal and spatial scales of analysis and a dialectical perspective aiming at the cultural and social contextualization of the evidence. The main rock art traditions – Atlantic, Schematic and Megalithic - of northwest Iberia were contrasted. Shee Twohig followed a similar line of inquiry with her comprehensive study of Loughcrew, Co. Meath, virtually the only region where passage tomb art and open-air carvings occur alongside in Ireland (Shee Twohig *et al.* 2010). The interest in contrasting different types of styles that co-exist in the same geographical space springs from Bradley and Fábregas work and the realization that not only geographical boundaries should be stretched, but stylistic borders too (1996). The two authors study the relationship between Atlantic and Schematic Art, a trend followed by other scholars applied to a landscape context (Alves 2003; Valdez 2010) but single outcrops too (Santos 2013:108-113).

Both Alves' (2003) and Santos-Estévez' (2008) studies of Iberian rock art began with the re-evaluation of Peña-Santos and Rey-Garcia's (1993) influential work. Despite sharing a landscape archaeology based methodology, results of these works differ significantly. Alves used a three-scale approach seeking a context for Atlantic Art through the assessment of sites, their position in the landscape and examining their spatial relationship with other types of archaeological sites. One of the key proposals is a timeframe for the tradition placing its origins in the early stages of the 4th millennium BC, at a time when it was typically ascribed to the Bronze Age (e.g. Santos-Estévez 2008). On the other hand, Santos-Estévez divided Atlantic Rock Art into two groups: Atlantic Rock Art Style (abstract motifs such as cup-marks, concentric circles and simple circular compositions, spirals and labyrinths) and Schematic Atlantic Rock Art Style (mainly animal figures and weapons) (*Ibid*. 2008). The latter is an unfortunate term since it may be mistaken for Schematic Art, an expression associated with a different Iberian rock art tradition. This approach relied heavily on stylistic analysis with the purpose of comparing particularities between each style that would lead to a clearer understanding of the changes which occurred during Late Prehistory (*Ibid*.). Santos-Estévez places his work within a structuralist paradigm with a main concern to deconstruct the dataset and the territory. His analysis contemplated parameters such as the definition of style,

the morphology of motifs, techniques, panel composition, themes, the construction of the landscape and the carved rock's surrounding territory.

Bradley's landscape perspective was complemented with emerging new technologies, such as GIS. Gaffney used viewshed tools to study Kilmartin's visibility affordances (Gaffney *et al.* 1996). O'Connor, in her comparative approach between the Irish Inishowen Peninsula (Co. Donegal), Louth/Monaghan area and the Dingle Peninsula (Co. Kerry), successfully engaged in a study of rock art from small motifs to their wider landscapes (2006). The use of multiple variables of analysis and a multi-disciplinary methodology (including geophysics) revealed that a complex range of geological formations, topography, wetlands and soil types have played an important role in structuring the general distribution of the engravings (*Ibid*.). More importantly, her study suggested that in some cases rock art was located in relation to prehistoric settlements, whilst removed from the contemporary monument complexes, and therefore many panels would have been accessible to various social groups and part of an everyday ritual activity (*Ibid*.), This idea had been previously suggested by Obermaier in Galicia (1923, 1925) and reiterated by Shee Twohig in the study of Loughcrew (Shee Twohig *et al.* 2010:21). Despite the little evidence for this specific area, Shee proposed that the carved rocks were situated in places where daily activities were taking place, drawing comparisons with similar situations from Druimirril, Co. Monaghan (O'Connor 2006), Hunterheugh Crag, Northumbria (Waddington *et al.* 2005), Torbhlaren, Kilmartin (Jones 2009; Jones *et al.* 2011a, 2011b) and Ben Lawers (Loch Tay), southern Highlands (Bradley *et al.* 2010; Bradley *et al.* 2012).

Bradley launched an irreversible turn in rock art studies, towards a less functionalist interpretation, attempting to incorporate people's perception and experience of the prehistoric landscape as they moved through it, looked over it and interacted with various natural and anthropogenic monuments. Landscape-based studies contributed significantly to give rock art a more prominent role in general prehistoric investigations (Sharpe 2007:1). As a result, the 21st century tells a very different tale about the study of Atlantic Rock Art. Innovative recording techniques and ever growing *corpuses* of data, contribute to the emergence of new avenues of investigation and interpretations. Important finds, such as the Atlantic imagery in shelters and vertical walls offer novel perspectives and question previously well-established facts (e.g. Rodríguez-Rellán *et al.* 2010). Rock art's research agenda is now not only interested in style and iconography, nor in landscape location alone,

but it is beginning to embrace a more involving perspective in which the artist itself plays an important role. There are concerns regarding the relationship between rock art and its surroundings, but also with features and elements that may have dictated the practice of carvings, the engagement of the artists and the observers, the role of imagery within dynamic and evolving landscapes. Multi-disciplinary approaches are often privileged, enabling the use of a range of methodologies that benefit from the introduction of an array of philosophical backgrounds that underpin the theoretical approaches, but also the development of technologies for spatial studies and digital recordings (e.g. Alves 2003; Alves *et al.* 2013; Enlander 2013; Jones *et al*. 2011; O'Connor 2006; Santos-Estévez and Seoane-Veiga 2010; Sharpe 2007; Valdez 2010; Waddington *et al.* 2005).

CHRONOLOGIES OF ATLANTIC ROCK ART

Chronology has always been a core subject in rock art studies, despite or perhaps because of its inherent problems, the lack of related archaeological contexts and the limitations of available methods. Since absolute dating is, in most cases, out of reach, relative dating methods are often used to place prehistoric art in time, providing an order for styles and traditions (Domingo-Sánz *et al.* 2009:20).

Chronology of the cup-and-rings tradition is still an open debate (e.g. Alves 2014; Burgess 1991; Criado-Boado and Penedo-Romero 1993; Fábregas-Valcarce and Rodríguez-Rellán 2012b; Hadingham 1974; Jones *et al.* 2011; Lorenzo-Ruza 1956b; Obermaier 1925; Peña-Santos 1980; Ramírez *et al.* 2007; Santos-Estévez 2005, 2013, 2015; Waddington 1998). The inability to neatly slot Atlantic Art into a specific time period, led Hewitt to talk of an 'identity crisis' (1991:9), which continues today.

The nature of Atlantic Art is itself a challenge for finer chronological definitions due to the lack of preserved adjacent dated contexts to relate the engravings with. The use of carving techniques instead of paintings does not allow for the use of direct dating methods. The abstract character of the motifs allied to their simplicity and the lack of figurative depictions make their interpretation and stylistic analysis difficult. Some of the main motifs are timeless and geographically widespread (e.g. cup-marks and circles) (Alves 2012a:210; Fábregas-Valcarce and Rodríguez-Rellán 2012b:252; O'Connor 2006:55) and the virtual lack of superimpositions does not allow for chronological and stylistic sequences. Issues of a more

technical order also contribute to the problem, such as the discrepancy of periodization (Table 2) between the study areas, demonstrating the complexity and diversity of European prehistory (Jones 2009:1). For example, the Neolithic period is considered to start c. 4000 BC and to finish between 2500 to 2000 BC in the British Isles, but in Iberia the date stretches back to 5000 BC, and lasts until 3000 BC. Furthermore, while in Iberia there is a well-established and long Chalcolithic period, some authors consider that '...there is no clear indication of a British Chalcolithic (Copper Age), since both the earliest Copper and Bronze Age tools here are dated to the same broad period of c. 2700-2000 BC' (Parker Pearson 2001:77). Controversy regarding the British Chalcolithic relates to its relatively short duration, although a common agreement of its existence is becoming widespread. In order to avoid misunderstandings and for the purpose of coherence, whenever possible in this thesis, chronology will be referred to through the use of millennia in determent of archaeological nomenclature, to facilitate the contextualization of the moments in time.

The definition of Atlantic Rock Art's chronology has not evolved much and is often based on circular arguments and inferences lacking archaeographical validation. Proposals are often accepted uncritically. Recently the debate is becoming more dynamic involving multiple variables of analyses (e.g. Alves 2014:17; O'Connor 2006).

Traditionally, Atlantic Art was placed in the BA (e.g. Baptista 1983-84; Beckensall 1974; Bettencourt and Sanches 1998; López-Cuevillas and Bouza-Brey 1929; MacWhite 1951; Santos-Estévez 1998; Tate 1865, see Appendix 3.2 of Vol. 2 for main chronological proposals). This assumption is being slowly replaced by a Neolithic date (e.g. Alves 2003; Fábregas-Valcarce and Rodríguez-Rellán 2012b; Jones 2006; O'Connor 2006; Waddington 1998) and the realisation that Atlantic Art may have its origin in the 4th millennium BC has important social and cultural implications (Alves 2014:24; Fábregas-Valcarce and Rodríguez-Rellán 2012b:257).

Table 2 Synchronization of the chronological systems of each of the countries included in the study. Correspondence between archaeological terminology and millennia.

	NORTHWEST IBERIA [14]	NORTHERN ENGLAND[15]	SOUTHERN SCOTLAND	IRELAND[16]
Mesolithic	10 000 – 5500 BC	9500 – 3800 cal BC	8500 BC - 3800 cal BC	8000 – 3850 BC
Early Neolithic	5500 – 4500 BC[17]	3800 cal BC[18] – 3400/3300 BC	3800[19]cal BC - 3500 BC[20]	3850/3740 cal BC[12] - 3600
Middle Neolithic	4500 – 4000 BC[21]	3400/3300 – 3000/2900 BC	3500 – 3000 BC[13]	3600 – 3100 BC[22]
Late Neolithic	4000 – 3200/2500 BC	3000/2900 – 2500/2200 BC	3000 – 2500 BC[13]	3100 - 2500 BC
Chalcolithic	3200/2500[23] – 2200 BC	2500/2200 – 2200/2150 BC	2500 – 2200 BC[13]	2500 – 2200 BC[24]
Early Bronze Age	2200 – 1950 BC	2200/2150 – 1600 BC	2200 – 1500 BC[25]	2200 – 1700 BC[26]
Middle Bronze Age	1950 – 1650 BC	1600 – 1200 BC	1500 – 1100[13]	1700 – 1200 BC
Late Bronze Age	1650 – 800 BC	1200 – 700 BC	1100 – 700 BC	1200 - 500 BC
Early Iron Age	800 BC – 500[27] BC	700 BC – 100 AD	700 BC – 100 AD	500 BC – 400 AD

[14] Due to the geographical proximity and the cultural continuity between the study areas defined for Portugal and Galicia, these were merged into Northwest Iberia category.
[15] Dates were taken from Whittle (2001:58-76) for the Neolithic, Needham (2012:1-26) for the Chalcolithic and Parker Pearson (2001:76-94).
[16] Some dates were taken from irisharchaeology.ie.
[17] Taken from Rodrigues 2011:341-350; Martins *et al.* 2015.
[18] This date was taken from Bayliss *et al.* 2011:839.
[19] After Bayliss *et al.* 2011:839.
[20] After Sheridan 2012:166, 171, 174, 179.
[21] Martins *et al.* 2015
[22] Cooney 2000
[23] From c. 2600/2500 BC in most regions of Iberia, the Chalcolithic period is usually associated with the Bell Beaker phenomenon (Roberts *et al.* 2013:33).
[24] Dates taken from Brindley 2007.
[25] Sheridan (2012:175-178) defines an '*earliest Bronze Age Activity*' that would take place during the 22nd and 19 centuries BC, while the *'subsequent Early Bronze Age'* would have developed between the 19th and the 15h centuries BC.
[26] Cooney and Grogan 1994

Early chronological proposals

The discovery of carved rocks overlain by Iron Age houses (e.g. at the Santa Tegra hillfort in Galicia, Calvo 1920; Ilkley Moor in England, Bradley 1997; Traprain Law in Scotland, Hunter 2013) were pivotal for determining the last moment of the engravings use (Calvo 1920) (see Figure 6).

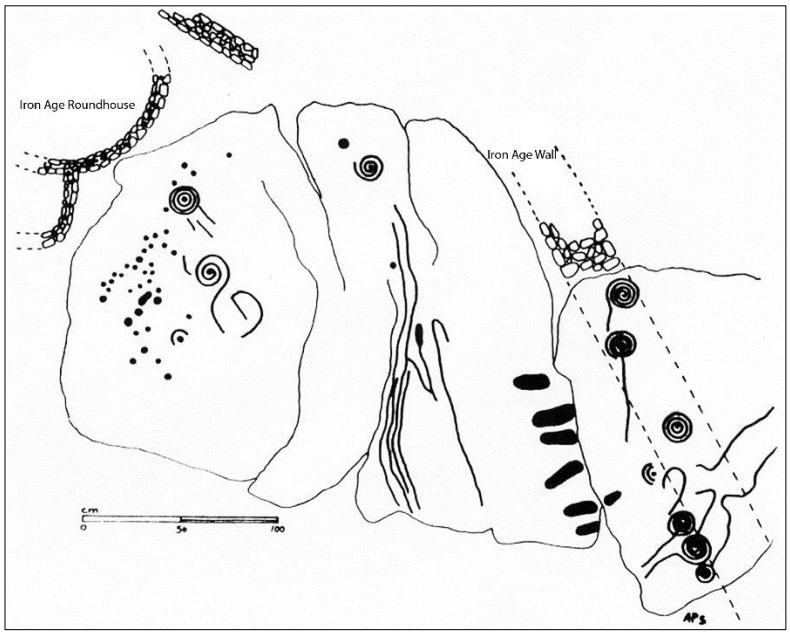


Figure 6 Plan of carved rocks overlain by Iron Age structures in Castro de Santa Tegra (Galicia) (Drawing by Peña-Santos and Vázquez-Varela 1979:29, after Alves 2003).

In Iberia, the carvings of weapons such as short swords, daggers and halberds, which would be related to material counterparts, corroborated the idea of a BA for the stone depictions, with a certain degree of confidence. Despite the small percentage of weapon carvings in the Galician *corpus* and an unclear relationship between these and the geometric designs, the chronology was extended to all iconography due to the fact that they shared surfaces (Bradley 1997:203; Burgess 1990:167).

The comparison between motifs depicted on open-air outcrops and those found in funerary contexts in the British Isles, became one of the main lines of argument in support of

a BA chronology for British rock art (e.g. MacWhite 1946; Tate 1865). The presence of carved rocks in British funerary monuments became evidence for a BA date of the burial themselves (O'Connor 2006:42). The proposal is initially forwarded by Tate (1865) and later accepted by MacWhite, who reinforced the argument advocating a coincidental distribution of rock art with copper sources, pottery food vessels and BA axes, along with the presence of engraved panels in EBA funerary monuments (1946: 62, 68-69). The argument was consolidated through a systematic comparison between motifs present in Irish megalithic tombs and Galician open-air rock art (1951). Sobrino-Buhigas ([1935] 2000) also stressed the relationship between metal finds (two copper axes) in the vicinity of carved rocks in Galicia to argue for a Bronze Age date of the engravings. He then compared the iconography from Galicia and the British Isles, namely Bryn-Celli Ddu and Clynnog-Fawr (Wales), Loughcrew (Ireland) and Clava (Scotland) (Alves 2003:66), to argue for a Neolithic date of the engravings, although the proposal was largely overlooked. MacWhite's scheme is followed by a number of authors, both in Iberia (e.g. Lorenzo-Ruza 1951) and the British Isles (e.g. Herity and Eogan 1977; Morris 1977:15, 1981:76-7). Although there is notice of hoards being found near carved rocks in Iberia, a direct association between the two would be dangerous and furthermore, one cannot establish a direct relationship between metalwork and the carving of weapons as contemporary facts (Fábregas-Valcarce and Rodríguez-Rellán 2012b).

In the absence of local evidence, the British framework was uncritically imported into Ireland (Lacy 1983:98), supported by distributional associations and spatial relationships between rock art, EBA monuments, artefacts and the dating of pre-bog field systems in southern Ireland, favouring a BA chronology (Cuppage 1986:17). Typically, classic examples of EBA monuments used in studies for dating Irish rock art comprise sites from England, including Westwood Bank (Beckensall 1999:147, fig. 2.1); Westwood Moor and Fowberry, (Beckensall 1999:142-7); Hunterheugh Crags (Beckensall 1999; Waddington *et. al.* 2005, fig. 2.2. and 2.3) (Figure 7). These sites were directly compared with Irish cases in which engraved slabs were incorporated within BA monuments and led to the conclusion that the carving practice was also contemporary of the monuments (Bradley 1997:136). The imagery depicted is, however, usually incipient and composed of simple motifs such as the undiagnostic cup-mark at Hunterheugh Crags (Figure 7). From Simpson and Thawley's list (for details see Simpson and Thawley 1972) only three sites feature both 'quintessential' rock art and pottery vessels with diagnostic features (O'Connor 2006:42). As Shee noted, when more complex, the few carved stones incorporated in Irish monuments display motifs that are morphologically closer to those of megalithic art (1972:231). Furthermore, a large percentage of the BA sites

that are associated with rock art, lack solid archaeological contexts and therefore precise dating.

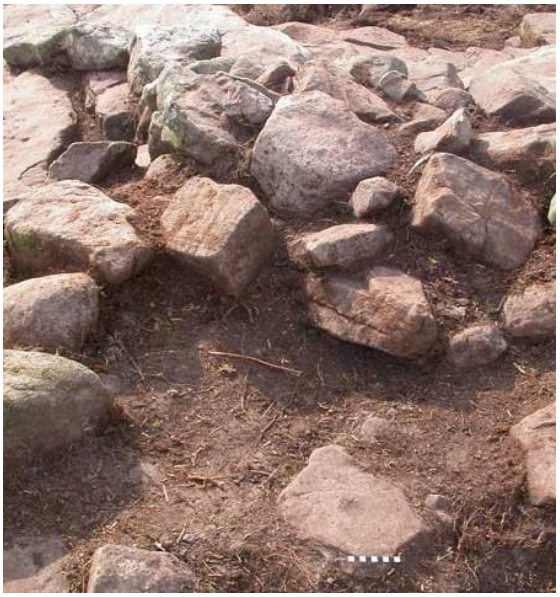


Figure 7 One of the *in situ* mobiliary stones from Hunterheugh Crags, displaying a carved cup-mark (Photograph by Aaron Mazel).

Anati's (1968) chronological suggestion for Iberia (see table 18, Appendix 3, Vol.2) introduced a new evolutionary scheme based on the analysis of superimpositions, which brought him much criticism, for extrapolating interpretation models devised for Valcamonica (Baptista 1983-84:71-72, 1986; Peña-Santos and Vásquez-Varela 1979). Although most of his suggestions were based on the analysis of a single rock in which he identified his whole chronological sequence (Pedra da Ferradura) (Figure 8A and 8B), it was adopted by some authors (e.g. Gomes 1987; Silva and Cunha 1986). Anati's sequence was fiercely opposed by local scholars, namely Peña-Santos, whose work also followed the general typological trend and established a number of categories to which he attributed specific chronologies (see Table 19, Appendix 3, Vol. 2). His chronological proposals, however, have been changing throughout time, although his arguments are mostly supportive of a Bronze Age chronology and have been adopted by authors such as Bradley (1997). Anati's work in Iveragh (Co. Kerry, Ireland) was similarly rejected by local archaeologists who criticized him for lack of accuracy in both descriptions and documentation of the decorated surfaces, as well as his

interpretative models and chronological relations (Finlay 1973; Purcell 1994, 2002; Shee Twohig 1968, 1971).

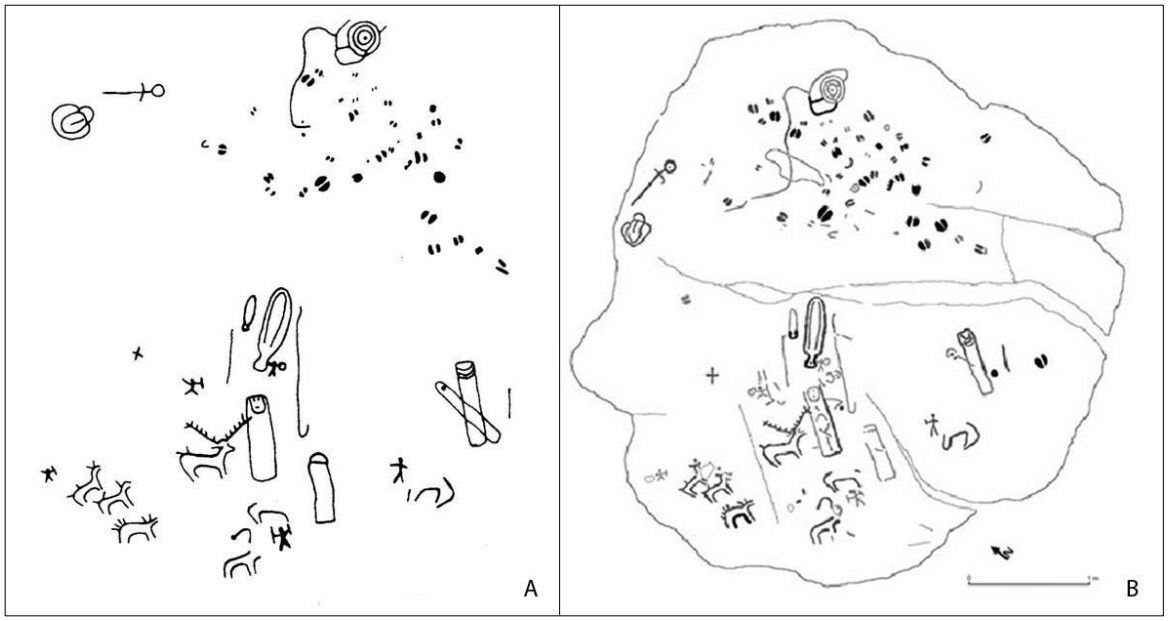


Figure 8A and 8B a)Drawing of Penedo das Ferraduras (Fentáns) according to Peña-Santos and Vázquez-Varela 1979; b) A more comprehensive interpretation of Penedo das Ferraduras displaying details absent from Figure 8A. (Drawing by: LAr, IEGPS, CSIC-LPPP, IIT, USC) (after González-García 2009).

The traditional argument of rock art as purely BA is a circular one. Whilst Iberian researchers sought support for their proposals in the British Isles and their contextualized carved elements, the same was happening in reverse, with British scholars arguing for the associations between carvings of circular motifs and BA metal artefacts (Childe 1935:116-7; MacWhite 1946). Support for a BA date has faded with the realisation that site distributional associations do not necessarily mean that they were coetaneous (Johnston 1989:22; O'Connor 2006:40) along with more critical analysis of the processes that led to this conclusion in the first place.

Transcending the Bronze Age Chronology

Despite supporting an overall Bronze Age chronology for Atlantic Art, Tate was the first suggesting that perhaps Atlantic Art would be as old as the Neolithic, reaching this conclusion through his studies of 'sculptured rocks' and their relationship with local landscape and geological features. Currently, this chronological proposal is gaining support and there are four main lines of investigation used to argue for a Neolithic chronology of Atlantic rock art: the decorations on Passage Graves and the re-use of carved blocks in funerary contexts; mobiliary art and recently, the results obtained through archaeological excavations.

Figure 9 Sign located by Big Balcraig 1 (The Machars, Scotland). This rock has been covered since 1986, in its place existing only a mound. Note the reference to the Bronze Age as the period of carving (Photograph by Andy Valdez-Tullett).

The relationship with Passage Grave Art essentially comes from iconographic similarities, although in the monuments the forms take more angular shapes, have greater variation and include carving techniques such as incision, which are not common in the open-air representations. The megalithic phenomenon started in Brittany and Iberia c. 5th millennium BC and it likely developed in parallel in these two regions (Bueno and Balbín 1998; Bueno *et al*. 2010; Cochrane and Jones 2012; Sanches 2008/2009). Alongside the Passage

Tombs, standing stones were being raised and decorated, but also broken and incorporated into other monuments (Calado 2002; Cochrane and Jones 2012; Sanches 2008/2009). The earliest Passage Graves of Britain and Ireland date to the late 4th millennium BC with best examples in Ireland, Anglesey and Orkney (Bayliss and O'Sullivan 2013; Bradley 1997; Cooney 2000; Scarre 2002). Their currency lasts until the 3rd millennium BC (Bayliss and O'Sullivan 2013; Cooney *et al.* 2011; Waddington *et al.* 2007) but the imagery seems to outlive the monuments (O'Connor 2006; Waddington *et al.* 2007).

The cup-mark is an emblematic characteristic of Atlantic Rock Art and virtually present in every panel of this tradition, either in isolation or combined with other images. Because of this overwhelming presence, some authors have used contextualized cup-marks, such as those of the long barrow at Dalladies (Kincardineshire) and the Pentre Ifan Dolmen dated to the 4th millennium BC (Piggot 1972), extending their chronology to the circles as well (e.g. Burgess 1990; Waddington 1998, 2007; Waddington *et al.* 2007). However, cup-marks are undiagnostic and their use to date the whole tradition of Atlantic Art overly optimistic. The finding of cup-and-rings, U-shaped motifs, circles, wavy lines, serpentiforms and parallel radial lines in some of the monuments at Loughcrew, provide better formal comparisons with the open-air rock art. Here, the monuments are dated to the mid-4th millennium BC and the position of many carved kerbs, indicating re-use, provide a more secure *ante quem* date for Atlantic Art (Shee Twohig 2012). Furthermore, in Newgrange and Knowth the re-use of carved boulders is quite obvious, and in the former a number of panels carved with 'quintessential Atlantic art' are known to have been placed in hidden parts of the monument, whilst the typical Passage Grave art is clearly visible (Bradley 1997; Cochrane and Jones 2012; Shee Twohig 1981; Waddington *et al.* 2007). This change of interpretation of the engraved motifs seems to embody an important shift of attitude, meaning and symbolism, pointing at their discharge and therefore capability of being re-used and incorporated in other contexts (O'Connor 2006:42; Waddington 1998). It is possible that the Neolithic art was made, used, decommissioned and later re-used within the centuries prior to the EBA (*Ibid*.). This sequence is visible in the incorporation of blocks carved with cup-and-ring motifs deposited in secondary contexts or BA monuments (Bradley 1997:169-71; Burgess 1990:162-3; Simpson and Thawley 1972:86). In some cases, the stones seem to have been re-shaped, but also reassembled in new compositions (Hewitt 1991:44-5).

The identification of re-used carvings is one of the main chronological indicators, setting a *terminus ante quem* for Atlantic Art in the Late Neolithic. Of course, the Loughcrew and Ballinvally cairns incorporating stones with sets of cup-and-ring motifs are an example

of this, dating to the late 3rd millennium BC (Shee Twohig 2001, 2012). Other clear examples include the re-use of decorated stones from Cronk yn How (Isle of Man) demolished in the 3rd millennium BC or the carved panels in Crumlin Cist (Co. Louth) (O'Connor 2006). There are also a number of instances where carved rocks were incorporated in secondary BA burials, which were initially considered to be part of the primary graves, but later re-interpreted. Blocks with Atlantic Art motifs were often inserted into BA cairns. The multiple cup-and-ring motif at Cairnholy I chambered cairn (Dumfries and Galloway, Scotland), for example, was found on top of packing stones in the secondary burial of the monument, alongside Peterborough ware (Piggott and Powell 1949:118). The Stoupe Brown monument at Flyngdales Moor (Yorkshire) has several decorated stones. One of them has a striking geometric pattern consistent with Passage Grave Art, but the other main stone depicts cup-marks connected by grooves. The assemblage was dated to the first half of the 3rd millennium BC, with an extended use until the beginning of the 2nd millennium BC (Vyner 2011). In this case the stones were clearly remodelled before re-incorporation in the monument, a pattern also visible in the burial cists of Craigie Hall (Midlothian, Scotland) and Carnwath (Lanarks, Scotland) (Simpson and Thawley 1972:92). The circular motifs depicted on the capstone of Carnwath are seemingly more weathered than the triangle pattern also present (Breuil 1934:305-306). In Witton Gilbert (Northumberland) another decorated capstone with cup-and-ring motifs is known, although in this case it has been suggested that the freshness of the grooves indicate that it was carved specifically for the occasion (Waddington 2007). Fowberry cairn provides one of the best examples of the incorporation of small blocks of previously carved rocks within a cairn, itself built on top of an outcrop engraved with cup-marks linked with linear grooves and a possible cup-and-ring. There are a number of other neighbouring carved rocks, including one with evidence of a quarried block, on which space a cup-and-ring motif was pecked (Bradley 1997). The Clava Cairns, at Balnuaran of Clava (Highland) in Scotland, are also a good example of the incorporation of cup-marks and cup-and-ring motifs into BA monuments with, at least, 17 carved blocks identified, some of them extensively decorated. These are often located on the outer ring of the monuments, but also re-used as kerbstones.

Figure 10 Carved block with cup-marks and cup-and-rings in one of the Clava Cairns (Balnuaran of Clava, Scotland).

Several examples of re-use are also known in Ireland, such as Teeromoyle (Co. Kerry) where a stone with a cup-and-ring and radial was identified in a cist (Connolly 1991: fig. 2-8). O'Connor engages in this discussion in depth, developing a relational approach based on the study of various 'rock art traditions' (i.e. cup-marks, open-air carvings, carved megaliths, passage tomb art, carved burial slabs, votive cup-stones) and their contexts, through what she called the 'Ardmore Effect' (O'Connor 2006:60). The analysis contemplated the freshness of the grooves, the relation between open-air and Passage Tomb Art imagery, the evidence of carved rocks found in sealed Neolithic and BA contexts, the analysis of motifs on megalithic monuments, and changing perceptions of the imagery (*Ibid*.). O'Connor contemplated the question of standing stones which has to be included in the chronological discussion of Atlantic Art, since often these monoliths have carvings and have been interpreted as re-appropriations of previous earthfast rocks. In this sense, the Ardmore standing stone of Inishowen and the Ardmore standing stone of Dingle Peninsula are good examples of decoration in these monuments, with the first one having clear signs of re-use (O'Connor 2006). Similarly, one of the stones at Temple Wood stone circle (Figure 11), carved with spirals is thought to have come from elsewhere. The motifs, however, appear to have a different carving technique and morphology to others known to open-air rock art. The monument is dated to 4313-3371 cal BC (Jones and Riggott 2011). Although standing stones are more commonly decorated with cup-marks, in some instances they can display complex designs

with affinities with Atlantic Art imagery (e.g. Long Meg and her Daughters (Penrith, Cumbria); Ballymeanoch and Nether Largie (Kilmartin, Scotland)).

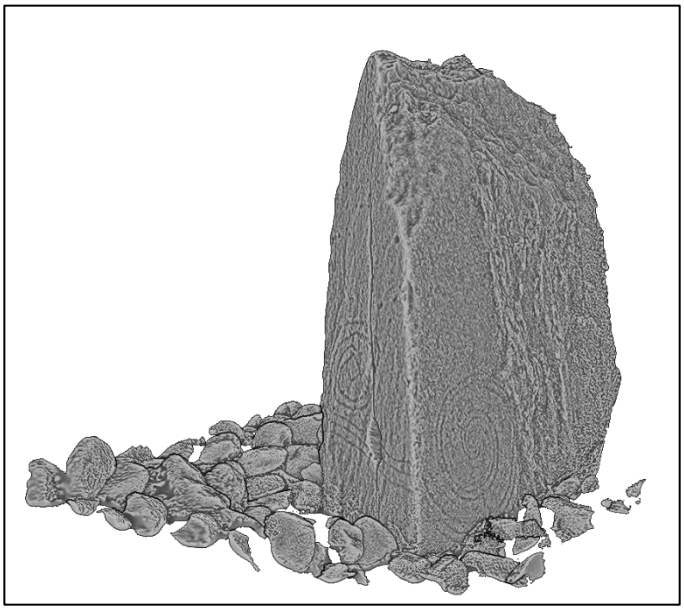


Figure 11 3D Model of carved standing stone at Temple Wood Stone Circle (Kilmartin). Representation of two double-lined spirals.

Archaeological excavations have been revealing good dating results, although more are needed to substantiate the rock art's context. In many cases there is little or no associated material (e.g. Alves 2003; Santos-Estévez 2013b), often due to the topographical location of the rocks and its interference with natural depositional processes. However, besides indication of daily activities in the surroundings of the rocks, e.g. at Hunterheugh Crag, Backstone Beck, Ben Lawers, Torbhlaren (Bradley 1997:60; Bradley and Watson 2012; Edwards 1986; Edwards and Bradley 1999; Jones *et al.* 2011a, 2011b; Waddington *et al.* 2005), in some cases good dating evidence has been retrieved. The excavations at Hunterheugh Crags, in the north of England, exposed a carved outcrop overlain by a BA cairn with a primary and secondary burials, suggesting that the Atlantic Art motifs were created in the Neolithic and used throughout the BA (Waddington *et al.* 2005). This conclusion was based on the analysis of differential weathering of the grooves and a series of events that are thought to have happened on the site, including quarrying. A first phase of carving was ascribed to the

Neolithic, characterized by very weathered motifs responsive to the natural topography and surface of the rock. On a second phase the grooves are seemingly fresher, deeper and more 'crude' (*Ibid.*). Similar observations were made by Connolly (1991:37-8), who identified two different styles in southwest Ireland: a) well-defined motifs, deeply carved and carefully organized in compositions; b) imagery produced in a broad, shallow manner, with flat grooves that revealed less care in the compositional organization. The archaeological excavations at Torbhlaren (Kilmartin) have also produced 3rd millennium cal. BC dates, suggesting that the rocks were being carved between c. 3000 and 1500 BC (Jones *et al.* 2011). The excavations yielded an assemblage of associated Late Neolithic pottery, quartz hammerstones and quartz scatters (Jones 2006: 214; Jones *et al.* 2011a, 2011b), a pattern repeated in Ben Lawers (Bradley and Watson 2012). The excavation of a number of rock art sites in Ireland by O'Connor, namely Druimirril, seem to have met similar conclusions resulting from a multi-scalar and interdisciplinary approach including several variables, of a Neolithic date to rock art (2006:66).

The find of mobiliary artefacts with similar iconography to that of Atlantic Art may also shed light on its chronology although direct comparisons should not be established. This is the case of the carved stone ball found in a domestic context at Eilean Dòmhnuil on North Uist (Scotland), bearing a 'crude cup-and-ring' (Armit 1988), but still used by Waddington to extend an Early Neolithic chronology to the whole carving tradition (Waddington 2007:15). A stone block with a carved cup-and-ring was found in a sealed Neolithic context of Structure 10 of the Ness of Brodgar (Card and Thomas 2012, Thomas 2016). Recently, the Garboldisham Macehead, an artefact made of red deer antler, and on which three spirals were carved, was radiocarbon dated to the Middle Neolithic, in the context of the 'Making a Mark' project (Jones *et al.* 2017). Finally, the decorations known to Groove Ware pottery have frequently been compared to rock art motifs (e.g. Bradley 1997, Vyner 2011) and this type of ceramic is commonly attributed to the Late Neolithic. Although none of these elements are directly associated to Atlantic Art they demonstrate that the iconography, or at least a similar imagery, was already in use during the Neolithic. It is significant that some of these were found in context, namely the carved stone of the Ness of Brodgar, whilst there is the risk of the macehead's raw material having been harvested during the Neolithic but only carved in later periods. Interestingly, the excavations at Backstone Beck (Ilkley Moor), initially directed at the prehistoric enclosure in close proximity to carved rocks, revealed Late Neolithic flint and associated Grooved ware pottery (average date of 2930-2610 cal BC) (Bradley 1997:60; Edwards 1986; Edwards and Bradley 1999).

For all the reasons explained above, in Britain and Ireland there is little doubt that Atlantic Art dates to the Neolithic, although opinions vary regarding more specific chronologies. Despite the underlying acceptance for a Neolithic date of Atlantic Art, it is difficult to pinpoint exactly when the emergence of the assemblage happened, and of course this is made difficult by the chronological discrepancy of the period in the different regions (Alves 2003; Fábregas-Valcarce and Rodríguez-Rellán 2012b; O'Connor 2006; Purcell 1994; Waddington 1998). When mentioning the Late Neolithic in Britain and Ireland, we are effectively talking about the Iberian Chalcolithic, and this distinction has important social differences. Bearing this in mind, Britain and Ireland present the best body of evidence for a clearer Neolithic date, and it is suggested that Atlantic Art emerged during the mid-4th millennium, continuing to be practiced into the BA and having its making and usage peak in the Late Neolithic/early Chalcolithic (Bradley 2009:113; Cochrane *et al.* 2015).

Figure 12 Panel 5 of Backstone Beck (Ilkley Moor, West Yorkshire).

In Iberia the evidence is not so strong and there is little archaeological data available to relate the rock art with, providing more robust proposals. Alves (2003) was the first author to suggest a Neolithic chronology for Iberian Atlantic Art, placing the event in the 4th millennium in association with the expansion of what Scarre termed the 'Atlantic Cosmology' (Scarre 2002). The conclusion emerged from a landscape archaeology based methodology,

contrasting Atlantic, Schematic and Megalithic Art traditions, thought to have been in geographical and temporal contact.

Similarly, to Britain and Ireland, in the NW of Iberia, Atlantic Art occurs alongside megalithic art, although only recently were the two considered to be contemporaneous. The megalithic art in Iberia is typically dated to the beginning of the 4th millennium BC (Bueno and Balbin 1998; Cruz and Vilaça 1994; Sanches 2008/2009). The decorations are believed to have been mostly created before the closing of the monuments (Sanches 2008/2009). Because Atlantic Art was considered to be independent to megalithic art, and stylistically the two share very few similarities, their relationship was only recently approached by Alves, who developed a critical appraisal to previous work, typically based on a correlation of cup-and-ring motifs with weapons, settlements and neighbouring carvings (e.g. Baptista 1983-84, 1986; Peña-Santos and Vázquez-Varela 1979; Peña-Santos and Rey-García 1993). She concluded that a wide symbolic system of abstract representations and multiple conventions could be in action, one used in funerary contexts and the other as a 'geographical art' in the landscape (Alves 2012; Bradley 1997). Based on this dichotomy the abstract iconography would have been originated in the 4th millennium BC associated with a mechanism of rejection that would have avoided the penetration of Schematic paintings closer to the western edge of the Galaico-Duriense mountain-range (Alves 2003, 2008, 2014:23). Alves' chronological proposal was audacious, particularly since suggested at a time when most Iberian authors were still wedged in a BA or later date for the rock art. Her premise is similar to that of Santos-Estévez (2008) who, at the time, dated Atlantic Art to the BA and IA, however not discarding its origin in the 3rd millennium BC. This author has demonstrated a deep reflection and constant re-organization of thought leading to a clear evolution of chronological proposals. Recently, Santos-Estévez re-defined his chronological scheme for Atlantic Art arguing for its origin in the Late Neolithic, with an extended use until the IA (2013). These stages, however, were not phases of succession supressing previous ones, rather a differential regional evolution, resulting in the absence of certain motifs in some areas (e.g. weapons to the south of the river Minho) (Santos-Estévez 2013:33). This chronological scheme was later challenged by Fábregas-Valcarce and Rodríguez-Rellán who, although cautiously, admit the possibility that the Atlantic tradition may have originated sometime in the mid-4th millennium BC, lasting until the 2nd millennium BC (2012b).

This section described the rollercoaster of chronological proposals (see also Appendix 3.2 of Vol. 2 for main chronological proposals) that have been put forward by a number of authors, regarding the time of Atlantic Art. It highlights the difficulty that the definition of a

chronological period may entail and the obstacles that need to be overcome for a clearer definition. Despite being a recurrent theme in rock art studies, there are no clear contexts to provide accurate and direct chronologies to Atlantic art. The issue could eventually be clarified in the event of a sealed carved rock find that could be archaeologically excavated. Unfortunately, such a discovery is yet to be made and until then, we have to find other ways to approach chronology and try to better understand timeframes. Knowing when it was created and used is pivotal to understand rock art in its social and cultural scope. What many authors seem to agree is that there is a profound regional variation, not only in terms of the rock art itself, but also the monuments generally associated temporally and spatially with it (e.g. Bradley 1997; Bueno and Balbin 1998; Alves 2012a; Santos-Estévez 2013; Sharpe 2012; Shee Twohig 1991; Waddington *et. al.* 2007). These differences may occur due to preferences, given the multi-faceted character of the Neolithic period, but also different stages of adoption of the assemblage.

CHAPTER THREE: SAMPLING ATLANTIC EUROPE – THE CASE STUDIES

3.1. DEFINING THE STUDY AREAS

Atlantic Art enjoys a wide geographic distribution and the number of known carved rocks in each modern country, can ascend to many thousands. Whilst it was never an aim to study the integrity of each country's record, it was crucial that the tradition was significantly sampled.

Sampling in archaeological projects depends on the type of, or lack of, available data. The selection of data from large datasets may pose problems as to which criteria to use, whereas the lack of data may also limit the study's range of possibilities. The source of data to use is an important point to reflect upon, when there are specific requirements and interrogations of the datasets. As such, when using data bodies collected by third parties, it is crucial to examine them critically to ensure that the data is appropriate and meets the needs of the project. In this study, a scheme of *unintentional samples* was defined, since the data used derived from previously recorded material (Orton 2000).

The definition of the case study areas underwent a number of strategies. Due to Atlantic Art's widespread distribution, and the objective to develop an inter-regional investigation, a study area from each modern country in which Atlantic Art can be found was defined. Within the wider regions in each country, a smaller area was delimited, from which the sample of carved rocks was collected. The boundaries of a study area should be clear and unequivocal and since this definition is not straightforward, specific standards were established to outline what should be included or excluded from the targeted areas (Orton 2000:19). The availability of a reliable and consistent dataset was pivotal. To meet the objectives of the project and to establish differences and similarities between the regions, precise criteria were defined for the selection of the study areas. These guaranteed coherence and an unbiased selection process, with all regions complying with the following conditions:

- Regions must have Atlantic Art;

- Available evidence should be able to yield a sample with a minimum of 30 carved rocks;
- There must be accessible and/or published data;
- The study areas should be geomorphologically or topographically defined: natural features such as valleys, basins or mountains to be used as units of selection.

The resulting study areas should have different natural and environmental characteristics and as a result enable the investigation of Atlantic Art in a variety of contexts, as well as the manner in which the decorated rocks interact and behave in local landscapes. Detailed maps on the study areas can be found in Appendix 1, Vol.2 of this thesis.

3.2. CASE STUDIES

SCOTLAND: THE MACHARS

Geomorphology

Machars is the name of a peninsular located in the county of Dumfries and Galloway, southwest Scotland. The word 'Machars' derives from Gaelic to describe 'lowlands'[28], reflecting the overarching flatness of the landscape. In general, the landforms are smooth with gentle undulations and occasional knolls, resulting from glacial activity.

Most of the inland is characterized by 'Drumlin Pastures', composed by extensive and repeated patterns of small, rounded and elongated mounds, occasionally interrupted by higher and irregular shaped hills, as well as low-lying areas of flat drained land, wetland, flood plain and small lochs (Anderson and Grant 2011). These are particularly located in the northern area where, combined with Plateau Moordland (at Mochrum), give the coastline its particular character, with a rim of slightly higher ground in places (*ibid.*). The coastal area is in general exposed, only interrupted by small inlets and bays, whose waters often have strong tidal and estuarine flats (*Ibid.*). Luce Bay and Wigtown Bay dominate the peninsular, to the west and east respectively. The western coastal edge is indented and forms a narrow rocky shore with occasional broader sand, shingle beaches and extensive mud flats. To the east, the

[28] Local oral information.

hills of Cairnharrow and Cairnsmore rise abruptly from the coast, forming a backdrop to the bay, and can be seen from many points in the Machars (*Ibid*.).

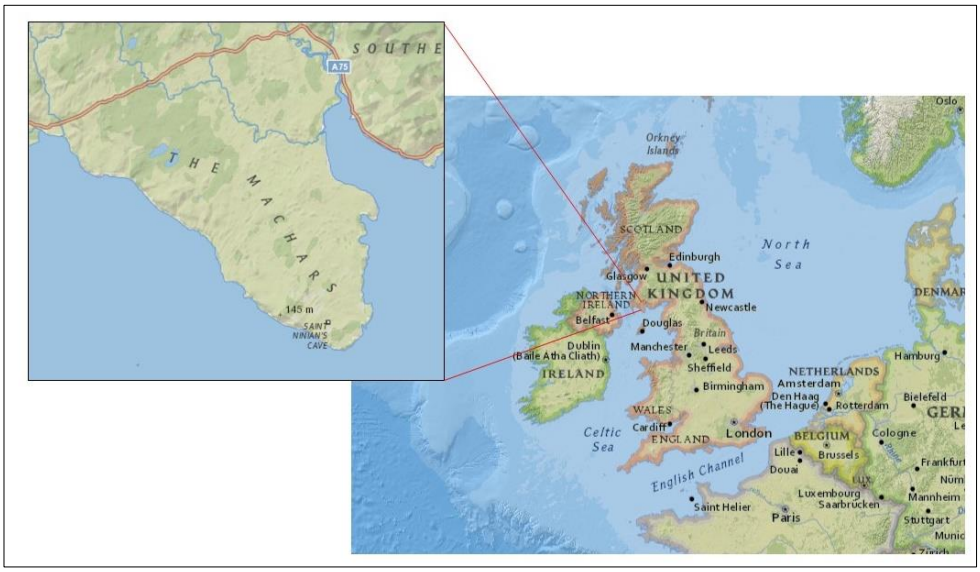


Figure 13 Location of the Machars in the context of Great Britain (Source: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp).

Burrow Head dominates the southernmost point of the peninsula, located to the west of the Isle of Whithorn. Here, the coast is rather exposed but consists of rugged cliffs only occasionally cut by inlets with long pebbled beaches, exposed to high tide (*Ibid*.). The coast is quite inaccessible. In general, the predominant character of the Machars' landforms afford great visibilities, with only a few exceptions.

The main geology of the Machars is based on Silurian metamorphic slates, also called greywacke. The majority of the inland consists of Brown Soils, common to hills and lowlands, with gentle to steep slopes, that are slightly to moderately rocky. The areas of Mochrum, Port William and Whithorn, to the west, are composed of Flays soils, which in essence are brown clay drifts containing Ordovician and Silurian greywacke stones. The landscape has a strong undulating character which results in alternating slopes, varying from simple to complex, gentle to strong, with the presence of rocks. The northern inland of the peninsula is mostly composed of semi-confined peats, with patches of peat and regosoils, drifts derived from

lower Palaeozoic greywackes and shales (British Geological Survey). The surfaces of outcrops that punctuate the landscape are often fractured, displaying glacial striations and high numbers of solution holes. In general, there are only a few available rocks to carve, with exception in areas such as Glasserton, but it is possible that a great number of rock surfaces are currently overgrown or covered.

Archaeological Context

Dumfries and Galloway is one of the Scottish regions with a high density of rock art. One of the earliest mentions of that rock art was in 1841, about Caulside, near Creetown (van Hoek 1995:9), although it is possible that this site has been known since 1684 (RCAHMCS 1914). The interpretation of this site has varied with initial illustrations depicting a spiral later interpreted as a cup-and-ring (Morris and Bailey 1964), to then be re-settled as a spiral again (Hadingham 1974).

Studies of rock art were hardly systematic although there are a number of occasional references, namely published in *The Proceedings of the Society of Antiquaries of Scotland,* where carved rocks were mentioned and briefly commented. Coles authored the first comprehensive catalogue of rock art, compiling descriptions and illustrations of many carved surfaces of Kirkcudbright (1895). The drawings are quite interesting although, following a trend at the time, tend to focus on the motifs, ignoring the characteristics of the rocks themselves.

In 1927 Anderson published a small section about Drummoral and Gallows Outon (1927), and suggested that there was a pattern to the rock art distribution of the Machars. He argued for the existence of a 'corridor' running northeast across the peninsula, from Luce Bay to Wigtown Bay, where all the carved rocks would seem to be located (*Ibid.* 119). This perception was, however, erroneous, since rock art is dotted across the whole of the Machars peninsula. In his investigation Anderson concluded that that there was enough evidence to 'prove that the race of cup-and-ring culture, if it did not occupy the whole of the southern Machars, occupied at least a deep fringe of the coast from Monreith in the west, southwards to Burrow Head, then up the east coast as far as Balfern, where they would have easy contact with another settlement of their people immediately across the narrow waters of Wigtown Bay' (*Ibid*.121). In his appraisal of Wigtownshire's rock art, Anderson also mentioned the existence of 3 engraved spirals (Balfern, Gallows Outon and Knock), contributing to an

ongoing discussion of the subject, with a number of other authors arguing that the Machars holds the highest number of this motif in Britain (van Hoek 1993).

Ronald Morris carried out an impressive amount of work, surveying a number of Scottish counties including Berwick, Clackmannan, Fife, Kinross, East Lothian, Midlothian, West Lothian, Peebles, Roxburgh, Selkirk, Stirling and most of Argyll. In many areas he drew on the work of Marion Campbell, whose name was largely forgotten by History (Morris, 1968). Despite the intensive research, Morris' work is mostly published under the form of catalogues (e.g. Morris 1968, 1977, 1979, 1981, 1989), with little interpretative contribution, although touching upon important matters that inspired other authors. Morris' work was closely followed by van Hoek with whom he later collaborates (Morris and van Hoek 1987a, 1987b, 1987c). Van Hoek produced the most extensive and detailed survey of rock art in Dumfries (1995). This volume was the base of Bradley's work in Galloway, one of his case studies (1997), but also of the present thesis.

Although comprehensive, both Morris and van Hoek's approaches are flawed as cup-marks were largely ignored, perhaps due to the simplicity of the motif. Despite the cataloguing character of these approaches, the authors have drawn on certain landscape features, namely visibilities to and from rocks, a trend that was developing at the time. The idea that carved surfaces were located at viewpoints is a major theme of Morris' work (1979) and his analysis served as a starting point to Bradley's assessment of Galloway's rock art, as discussed below (1997).

> *'[The motifs] were nearly always carved on fairly smooth and nearly horizontal surfaces. Sedimentary rock was usually used, probably because it is easier to carve. The carved outcrops are nearly always situated where they can be seen from quite long distances all around, or – perhaps one should say – where the sun can reach them for most of the day. Copper has been worked and streams have been panned for gold in the past, only in the parts of Galloway where these carvings are found, and a little further eastwards.'*
>
> (Morris 1979:14)

Following ideas current at the time, Morris suggested that the carvings were created by early metal prospectors in search of copper and gold ores, although these suggestions lacked archaeological validation (Morris 1979; Bradley 1997).

Morris (1979) and van Hoek's (1995) division between simple and complex carvings in Galloway inspired Bradley's binary system of rock art classification, which he used in his major assessment of Atlantic Art (1997). Van Hoek takes the study of Galloway's rock art further by developing simple statistical analysis considering the local topography and motif details such as the orientation of radial lines. The carved rocks were grouped and compared and he attempted to contextualize them in terms of British, Irish and other European traditions (1995).

Bradley developed these ideas further proposing patterns of well-defined simple and complex carvings, the former seemingly located in settled areas, in or around shallow valleys and near the coast, where modern farms sit (1997:73-74). The more complex designs appeared to be located in conspicuous places and higher grounds (*Ibid*. 86). The association between the motifs and landscape location would translate the significance of the message being conveyed but tailored according to specific audiences. Complex carvings, located at the edges of settlement patterns, were potentially visited by larger audiences. (*Ibid.*). Exploring in depth Morris' suggestion that carvings are located at viewpoints and places with extensive views, Bradley used Fraser's (1988) methodology to investigate their visibility affordances, concluding that the carvings were somehow organizing space, marking the outer limits of valley territories leading to the sea, whilst relating to the movement of people and animals (*Ibid*.).

Although more than sixty carved rocks are known in the Machars, there is a sense that the region has more to offer. It is likely that many more rocks will be found in the future, as a large area of the peninsula's hinterland remains largely 'blank'. It is possible that a great number of carved rocks are overlain by turf, making the task of finding and re-locating them very difficult. Also, it is notorious that most of the known rocks are largely located within short distances of the dairy farms or pathways, suggesting that an intense survey into 'wilder' areas is yet to be done (see Appendix 1.1, Vol.2). Knowing the location of these rocks and being able to relate them with other known sites would certainly contribute for a better understanding of the phenomenon in the area, and a holistic narrative of local prehistory.

ENGLAND: ILKLEY MOOR

Geomorphology

Rombalds Moor, to which Ilkley Moor and Baildon Moor belong to, is an extensive plateau located in West Yorkshire, between the valleys of Wharfedale and Airedale. It rises to 402m OD, and during the Carboniferous was part of a swampy sea area, fed by a number of watercourses. A distinctive lower ridge of Millstone Grit, it is separated by the wide U-shaped valley of the Aire river, where the retraction of glaciers deposited alluvia and gravel (Boughey and Vickerman 2003:6; Natural England *no date*). The northern slopes of Ilkley Moor comprise three steps of higher terraces before reaching the summit near Thimble Stones (IAG 1986; Boughey and Vickerman 2003). The lower terraces can be quite sheltered and Prehistoric settlements, such as Barningham Moor, were established here (Bradley 1997:96). The upland pastures are largely limited to livestock grazing, whilst dairy farming takes place in the valley bottoms (Natural England *no date*).

The hill is characterized by a flat top affording extensive views over the valley and the plains, while the moorland slopes gently from north to south (Boughey and Vickerman 2003:5). The exposed upland moorland contrasts with the number of deeply incised valleys cut in the landscape, composed of many small fast-flowing streams joining the main river systems. The Wharfe, Aire, Colne and Calner flow eastwards, whilst the Roch and Irwell flow west (Natural England *no date*). The Aire and Wharfe are broader valleys, with fertile valley floors where pastures and meadows develop.

The local geology is formed of Millstone Grit and Coal Measures, both dating to the Carboniferous (*Ibid.*). A large part of the strata is covered by clay and alluvial deposits, as well as peat. A great number of gritstone and sandstone boulders are scattered in low and high areas with little disruption, some originating from land slips and others are erratics brought here by glaciers (Boughey and Vickerman 2003:5). The majority of motifs, however, are carved on sandstone surfaces.

Most of Rombalds Moor's vegetation is composed of typical moorland species such as heather (*Calluna vulgaris*) and other heaths (*Pteridium aquilinum, Erica cinerea, Erica tetralix*), bilberry (*Vaccinium myrtillus*) and crowberry (*Empetrum nigrum*), but also bracken (*Pteridium aquilinum*) and holly (*Ilex aquifolium*) (*Ibid*: 6).

The carved rocks included in this study are mostly located in the northeast of the plateau, in Ilkley Moor, with another group situated to the southeast in Baildon Moor.

Archaeological Context

The region of Yorkshire has a long biography of rock art research. Prehistoric evidence in Rombalds Moor testifies for an occupation as early as the Mesolithic.

A number of carved rocks in Rombalds Moor were known since the 19th century, namely a few large boulders which were described and illustrated by antiquarians, featuring early publications: e.g. Panorama Stone, Pancake Stone, Haystack Rock, Barmishaw Stone or Badger Rock (e.g. Allen 1879, 1882, 1896; Collyer and Turner 1885; Forrest and Grainge 1867; Speight 1900). Some of these stones are quite iconic of Rombalds Moor and have been present in popular memory since early times (e.g. Badger) (Raistrick 1962).

Although the majority of rocks bears quintessential Atlantic Art, Badger Rock in particular has had a considerable amount of attention due to a peculiar motif (Figure 14). The Swastika Stone, an image which in fact is repeated on two rocks, is probably one of the most famous in Ilkley Moor, described in the 19th century (Collyer and Turner 1885). This picture has been compared with similar examples of Tossene (Sweden) and Valcamonica (motif known as Cammunian Rose) (Figure 15) (Speight 1900), and a very similar motif also exists in Portugal, as part of a building in Castro de Guifões, an IA settlement (Figure 16) (e.g. Coimbra 2001) .

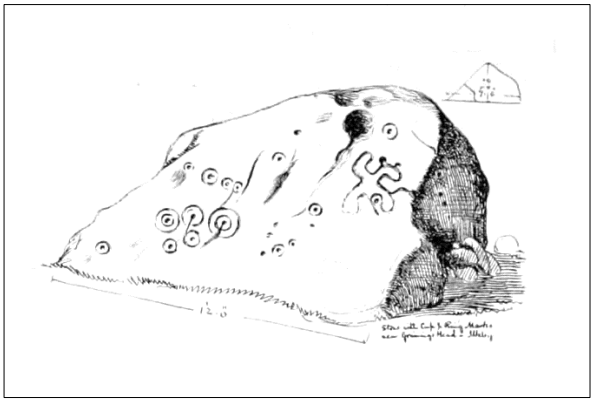


Figure 14 Badger Stone. Drawing by J. R. Allen (1879).

Figure 15 A comparison between Ilkley and Tossene (Sweden) swastikas. Drawing by Allen (1879).

Figure 16 Swastika at Castro de Guifões Iron Age settlement, in Matosinhos (Portugal) (after Coimbra 1999).

The rock art of Rombalds Moor was occasionally mentioned and published in grey literature, sometimes with basic illustrations. Besides Allen's (1879) more systematic work, only so often were the carvings referred to. Interest in the area was mostly directed to the excavation of monuments sitting in a relatively well preserved prehistoric landscape, from where a number of artefacts were retrieved (Boughey and Vickerman 2003). Eric Cowling offered an interesting interpretation of the area, arguing that Rombalds Moor, situated on a major communication route between the Lake District and the Irish Sea, was used as a trade route during prehistory, to exchange flint, stone axes, metal, people and ideas, in which he included the cup-and-ring carvings (1946).

In the 1970s a series of classes organized by the Ilkley College in West Yorkshire inspired a group of non-professional archaeologists to seek for rock art on the moors, calling themselves Ilkley Archaeology Group. Their work and publication in 1986, was the base of other future research projects, building on their initial record (e.g. Bradley 1997; Boughey and Vickerman 2003). Hundreds of sites were documented in Baildon, Ilkley and Skipton Moor. It was updated and published in 2003, with additional numbers of newly discovered carved rocks, in many cases illustrated with a simple plan. Later, Rombalds Moor was systematically surveyed and documented with new technologies, within the CSI: Rombalds Moor Project, and a large number of rocks made accessible through an online database (England's Rock Art).

The majority of carved rocks on Rombalds Moor are located either on the lower terraces of the moors, or the flat moorland lying immediately behind them (Boughey and Vickerman 2003:5). Bedrock, boulders and erratics of gritstone and sandstone were preferred media. A few rocks are located in dramatic positions on outcropping edges, such as Pancake Stone or Hangingstones. The latter survived extensive quarrying, a fact that also contributes for its peculiar positioning. If, in many cases, the rocks are located in open areas, subjected to the weather others, like Green Crag, are located on the plateau, and sheltered from the winds. It has been suggested that a small lake existed in this area during the Neolithic/Early Bronze Age. Furthermore, environmental data disclosed the presence of hazel, birch and pine, and it is possible that this was a settlement area (Boughey and Vickerman 2003: 9), since archaeological evidence shows the presence of Bronze Age structures and even Neolithic pits with stone tools, not far from Backstone Beck carved stones.

The study area in Rombalds Moor include carved rocks located in Ilkley and Baildon Moors (see Appendix 1.2, Vol. 2, particularly Fig. 9).

IRELAND: IVERAGH PENINSULA

Geomorphology

Iveragh is a large peninsula in southwest Ireland, extending c. 70 km into the Atlantic Ocean. It is bordered by Dingle Peninsula and Beara Peninsula, to the north and south respectively. Geologically, Ireland offers a great variety, reflected in the environmental character of the landscapes. Extreme climatic conditions of the Paleogene and Quaternary

have intensely moulded the territory and Iveragh's landscape is dominated by glacial lakes and U-shaped valleys with much altered poor quality peat soils (Crowley and Sheehan 2009:31; Lynch 1981:6; Nevill 1963: 89; Purcell 1994). Features such as the Gap of Dunlow, the Black Valley, Glencar, Ballaghbeama Gap, Ballaghisheen Pass, Moll's Gap and Winfy Gap, pointy mountains and great numbers of scattered erratic boulders are witnesses to the outcome of glaciation (Crowley and Sheehan 2009). In addition, bog-covered lowlands extend over the northern area of the Reeks and the western end of the peninsular, whilst sandy and gravelly beaches occur to the northwest in the bays of Ballinskelligs, Derrynane and Kenmare (*Ibid*:2). The impressive mountain range of Mcguillycuddy's Reek, a central and dominant feature, runs in a E/NE – W/SW direction, along with a dense network of watercourses (Purcell 2002:72). The 20 mountains of Iveragh, are separated by valleys which extend towards an irregular and indented coastline of cliffs and bays on its western side. They feature '*cliffs, deep pockets, rocky coombs, glens and narrow passes such as the Ballaghbeama Gap*' (Crowley and Sheehan 2009:25), resulting in a contrasting landscape.

The underlying geology is Old Red Sandstone (ORS), from which most of the mountains are composed, with subdivisions into Ballinskelligs and Saint Finan's sandstone, interrupted by occurrences of slate to the southern areas of the peninsula (Gardiner and Radford 1980:5; Higgs 2009:17; Holland 1981:136-137). Limestone formations can also be found to the eastern part of the peninsula, in areas of transition of continental to marine sedimentary rocks. These host both copper and lead deposits (Higgs 2009:19-20). In fact, copper mines (chalcopyrite) explored during the Bronze Age have been identified in Ross Island (*Ibid.*).

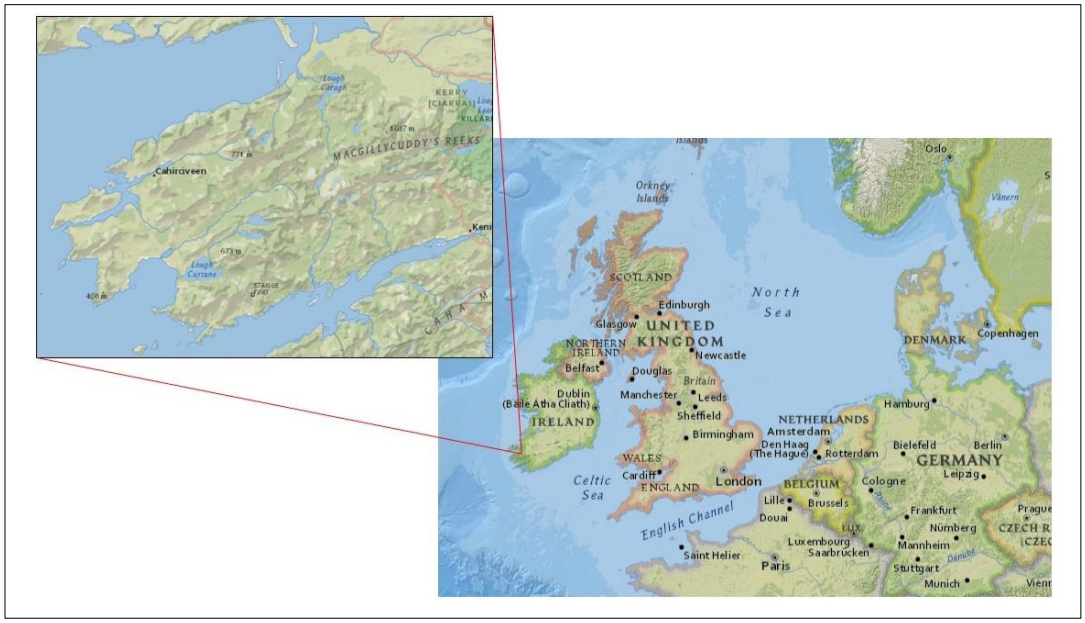


Figure 17 Iveragh Peninsula in the context of the British Isles (Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.).

Archaeological Context

The first reference to Iveragh's rock art, and indeed one of the first ones regarding prehistoric art in Ireland, was published by Charles Graves in 1860 after he became acquainted with the examples near Staigue Bridge. Despite dating the cup-and-rings to the Early Christian periods due to formal parallels with carvings in cemeteries, the resulting analysis yielded good descriptions and illustrations (Finlay 1973:4; Purcell 1994:7). Graves (1860) viewed the motifs as depictions of settlements. Other authors, like Lynch, applied this idea to Caherlehillan and Gortnagulla, associating the carvings with the numerous forts, clochans (circular stone huts) and ring forts nearby (Lynch 1906:282; Purcell 1994:8). A number of simple publications followed, focusing on isolated rocks (e.g. Kinahan 1879; Price 1934; Tempest 1931, 1933, 1939), until O'Connell's publication of 'Kerry Archaeological Survey' (O'Connell 1939).

In the 1940s, MacWhite's work on rock art became quite influential, being one of the first authors to draw a distinction between open-air carvings and Passage Grave Art. He termed the former Galician or Galego-Atlantic Art, arguing for an Iberian origin of Atlantic carvings but attending to the similarities with the regions of Ireland, Britain and Portugal (MacWhite 1946:62), including motifs of Passage Tomb art (e.g. Loughcrew) (e.g. Shee

Twohig and O'Kelly 1971). These connections were described through a diffusionist model explaining the dissemination of Atlantic Art into the Western Atlantic coast, originating in the Eastern Mediterranean (*Ibid*.75). The suggestion that rock art distribution was connected to metal deposits in Kerry and Wicklow, and particularly a possible Iberian origin of the rock art, was questioned by Shee (1968).

Previously, Anati had also suggested that Irish rock art was a result of exogenous influences but related to 'megalithic invaders' (1963). Particularly interested in Derrynablaha, his contribution to the study of Iveragh was rather unhelpful due to inaccuracies in his drawings, but also site locations, some of which were never found again (Purcell 1994). In this perspective, open-air carvings derive from Passage Grave Art, an argument that is used to explain the differences in Galician and Irish rock art, given local iconography discrepancies (Anati 1963:14-15). His approach was criticized by local researchers refuting the argument for Atlantic Art's origin in Galicia and considering that the relationship established between Passage Grave and open-air carvings and the parallel cultural development between the two areas, does not translate the Irish evidence, ignoring local distributions of these types of sites (Finlay 1973; Purcell 1994; Shee Twohig 1968).

Finlay made an important contribution to the study of Iveragh's rock art with an academic project, which was significant for its catalogue with detailed descriptions and very accurate graphic records of a great number of rocks. This formed the base for important intensive surveys carried out in Co. Kerry (O'Sullivan and Sheehan 1996; Byrne *et al.* 2009) and other academic projects (Cussen 2009; Purcell 1994; O'Connor 2006), including the present one. Purcell's dissertation in particular is an important systematic study of Iveragh Peninsula, with a landscape approach which closely follows Bradley's footsteps and even challenges some of his ideas. Although not one of his main case studies, Bradley looks at Derrynablaha to establish comparisons with Duncroisk (Perthshire) for their topographical characteristics in relation to the rock art (1997:136). Purcell considers that Bradley's division of rock art into simple and complex compositions does not seem to apply in Iveragh, instead concluding that their landscape location was influenced by local environmental knowledge and accessibility (Purcell 1994:30; 2002:90). Nevertheless, Purcell failed to consider the natural topography of the landscape, which in Iveragh naturally restricts movement (O'Connor 2006).

Irish Rock Art lacks a comprehensive and systematic study. Nevertheless, it has enjoyed the interest of many researchers. Iveragh holds the largest concentration of rock art in Ireland and important surveys have been conducted, with results published in comprehensive catalogues (1996, 2009). Nevertheless, new carved rocks are still being found on a regular base, namely in areas such as Caherdaniel and Kealduff Upper[29].

This study contemplates several carved rocks located in different locations of the peninsula: the groups of Derrynablaha, Derreeny and Kealduff Upper, but also the isolated panels of Liss and Dromtine (see Appendix 1.3, Vol.2).

SPAIN: BARBANZA PENINSULA

Geomorphology

The geomorphology of northern Iberia is largely dominated by the Iberian Massif, a remnant of the Hercynian continent. This event had an intense impact on the local landforms, which were also highly affected by glaciation. As a result, a large number of different superficial surfaces emerged from these processes, giving place to a mountainous landscape cut by valleys of different sections, accompanied by spurs, cliffs, plateaus and steep slopes. In some areas, such as the Rías Baixas in Galicia, the relief forms a series of inlets and estuaries. Barbanza is precisely located in this context, being the northernmost peninsula of Rías Baixas, with a general SE – NW orientation. It is located on the western coast of Galicia, delimited by the Rías de Muros-Nóia to the North and Arousa to the South and it belongs to the geological Zone of Galicia Trás-os-Montes, one of the areas of the Iberian Massif (Matte 1968).

The peninsula's topography is dominated by the imposing Serra da Barbanza, located in a relatively central position and dividing the territory into two main areas, one facing NW and the other SE (Fábregas-Valcarce and Rodríguez-Rellán 2012a:19). Despite the limited area of the peninsular, the peaks of the mountain range reach altitudes of over 600m OD, creating an impressive landscape (Monte Iroite reaches 687m OD) in particular to the NE, since the landforms decrease to 300m OD in the SW. Whilst the summits of the peaks can be relatively

[29] Pers. Comm. Aoibheann Lambe.

plain, the slopes are occasionally quite steep, especially in the NW where these are particularly fragmented (*Ibid*. 20). The coast has an extended flat area ranging from c. 1 to 3 km wide, more extensive in the west. Here, the flatness of the land enables the existence of lakes, such as Lagoa de Muro and, beaches interrupted by cliffs (*Ibid.*), as well as granite spurs on top of which Iron Age settlements were sometimes located (e.g. Castro de Baroña).

The main rivers of Barbanza are Río Tambre flowing into Ría de Nóia in the northeast, and Río Ulla with its mouth in Ría de Arousa to the south. The hydrological network is composed of smaller watercourses which seem to run relatively independently from these larger rivers (Fábregas-Valcarce and Rodríguez-Rellán 2012a: 23).

Local geology is essentially granite based, a characteristic of the Iberian Massif, although this is subdivided in a number of sub-types with different characteristics, namely in terms of their grain size and components. The most common is the two-mica granite. A smaller area to the E of the peninsula also features mafic rocks such as schists and orthogneiss. The majority of rocks included in the study are located on the NE-NW area of the peninsula, experiencing a straight relationship with the coast (Appendix 1.4, Vol. 2).

Archaeological Context

The earliest mention to the carved rocks of Barbanza was published in 1927 referring to Axeitos (Ribeiro) and Pedra da Cabra (Boiro) (López-Cuevillas and Bouza-Brey 1927-1928; Bouza-Brey, 1927), both with animal depictions. A large hiatus in rock art research meant that only in the 1980s investigations were resumed (e.g. Calo and Reboredo 1980; Agrafoxo-Perez 1986), and intensified in the 1990s with a number of new sites emerging (e.g. Gil-Agra and Concheiro-Coello 1993; Concheiro-Coello and Gil-Agra, 1994; Soto Barreiro and Rey-Castiñera 1994). The rock art in the area was revealed to be quite complex and led to the development of dedicated studies. Some of these followed traditional methodological and iconographic approaches whilst others introduced innovative statistical, spatial and interpretative methods (e.g. Guitián-Castromil and Guitián-Rivera 2001; Rodríguez-Rellán and Fábregas-Valcarce 2015). Although some of the rocks in Barbanza were used in global studies of Atlantic Art (Bradley 1997), it is only investigated holistically by Fábregas-Valcarce and Rodríguez-Rellán who conducted an intensive survey, identifying and recording a great number of rocks, that were later compiled in a comprehensive volume (2012a). The detailed observation of the carved surfaces led to the identification of previous unknown, or

disregarded, motifs (e.g. Os Mouchos and Foxa da Vella, Rianxo), in addition to their spatial context and conservation issues (*Ibid*.30, but see Chapter 4). The spatial investigation was done through GIS and statistical analysis in which the rocks were articulated with a number of variables such as geology, altitude, distance to watercourse, slope, aspect and visibility, which seemingly influenced the location of rock art, creating a heterogeneous pattern (Rodríguez-Rellán and Fábregas-Valcarce 2015).

This study comprises a selection of the carved rocks catalogued by Fábregas-Valcarce and Rodríguez-Rellán, namely those with cup-and-ring motifs. The grouping organisation defined by these authors was kept, and the panels are spread across eight areas (see Appendix 1.4, Vol. 2).

PORTUGAL: MONTE FARO

Geomorphology

Similarly to Galicia, the landscape of NW Portugal was also shaped by glaciation. Monte Faro is one of the mountains formed through such action. Located in the northernmost edge of the Iberian Massif, and part of Serra do Extremo mountain range, it is located in a privileged position overlooking the river Minho, the natural border dividing Portugal from Spain. The river is navigable upstream for about 20 km beyond the study area, after which it becomes embedded in the mountains (Alves and Reis 2017a).

The region is characterized by a contrasting landscape shared between alluvial plains on the coastal area and banks of the river Minho, and the high relief forms developing from NW-SE and S-SW (Plano Director Municipal de Valença, *undated*). Local geology has been impacted by erosion, producing alluvial valleys, and 'U' and 'V' valleys, flanking the terrain. In some places slopes can be steep whilst in others landforms such as spurs and plateaus create easy access to these vales. In general the study area is most accessible from north and northwest, along the valleys (Alves and Reis 2017a) (Appendix 1.5, Vol. 2).

Monte de Faro has recently been the subject of an intensive survey project in which a great number of new rocks were found. The area used for this research is the same, as data was kindly shared by the managers of said project (*Ibid.*). As such, the Monte Faro study area 'includes the western slopes of an adjacent hill 'Monte dos Fortes' (…), the wide amphitheatre

that opens between the two mountains and the succession of platforms that extend from the higher ground to the alluvial plain' (*Ibid*.).

Local geology is mostly composed of eruptive fine-grained granites, with a predominance of two micas, quartz and some feldspar, bordered by gneiss. Schist and greywacke can also be found. In general, the rocks are quite hard (Carta Geológica de Portugal).

Archaeological Context

Unlike the other study areas where carved rocks were known since the late 1800s, it was not until 1979 that the first rock was identified in Monte Faro. Archaeologists were following a reference in a local newspaper, mentioning a site in Gandra with 'rock paintings', which was never found. Instead, informed by locals, they were shown three carved panels: Monte dos Fortes, Tapada do Ozão and Monte da Laje (Figure 18) (Cunha and Silva 1980). Due to the profuse character of the decorations and in some cases the presence of unusual motifs to the region (e.g. idols in Monte da Laje), these sites became iconic in the area, for what was then known 'Galician-Portuguese rock art', a term coined after Baptista (e.g. 1983-84, 1986). From these rocks, only Monte da Laje (Figure 18) was studied in detail and published in an article including a very thorough plan of the motifs (Silva and Cunha 1986). The other carved rocks were briefly mentioned in a paper (Cunha and Silva 1980) and a conference in 1979. Here, the authors also comment on the existence of 7 other rocks and the intentions of pursuing an in depth investigation that never took place (Silva and Cunha 1986). These rocks were never sought nor found due to a number of reasons, but principally the lack of grid references (Alves and Reis, 2017b).

The main sites of Monte Faro were later recurrently mentioned in other studies (e.g. Alves 2003; Baptista 1983-84; Bradley and Fábregas-Valcarce 1998; Bueno-Ramirez and Balbin-Behrmann 2000; Peña-Santos *et al.* 2005; Valdez 2010; Valdez and Oliveira 2005/2006), although the area seemed to be of more interest to Galician researchers who, in the 2000s, visited the area a few times identifying a number of new rocks (Alves and Reis 2017a; Novoa-Álvarez and Sanromán-Veiga 1999; Novoa-Álvarez and Costas-Goberna 2004).

The region of Monte Faro was finally the object of a systematic study, between 2013-2015, conducted by Alves and Reis. The methodological approach was in line with principles

of Landscape Archaeology and aimed at relocation and identification of sites and the production of an extensive catalogue comprising a graphic record and descriptions of the rocks. The present study will build on this record. Probably due to the lack of systematic studies, the idea in force was that Atlantic Art was dotted in the landscape in individual or small clusters of carved rocks. Although there are a few exceptions, in which groups of more than 20 rocks were found in close proximity (e.g. Valdez and Oliveira 2005/2006), the Monte Faro project results yielded the first large concentration of Atlantic Art engravings, more in line with British and Irish evidence, with over a hundred new finds in a specific geomorphologic unit, demonstrating the previous bias in investigation (Alves and Reis, 2017b). The research methodology included the 3D modelling of the rock surfaces, complying with the most recent techniques of rock art recording and visualization.

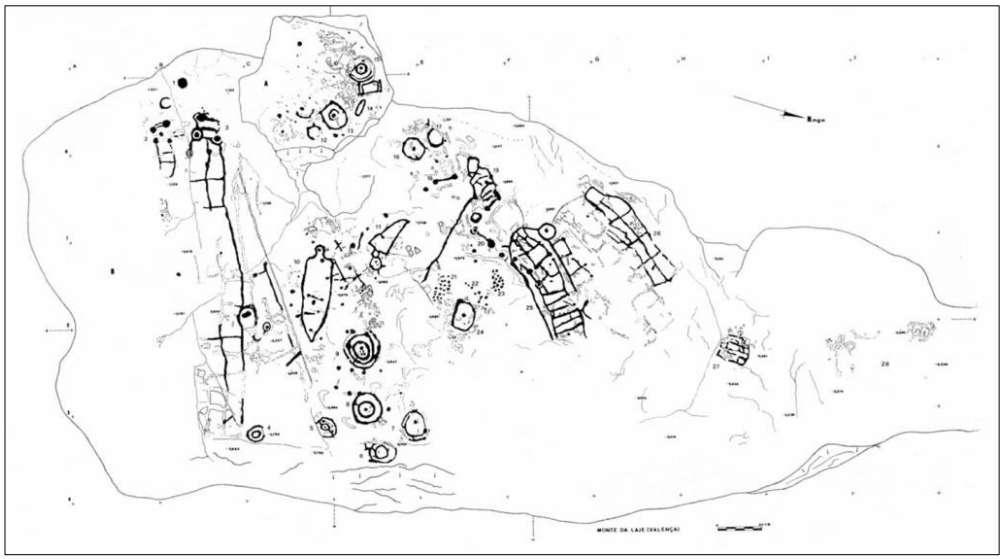


Figure 18 Drawing of Monte da Laje (after Silva and Cunha (1986).

For the sake of spatial organization and study of this area, the carved rocks were divided in groups, according to their proximity and placement in the landscape (usually in natural hillocks or plateaus), following what was established by Alves and Reis (2017a). As such, the groups of rocks included in this study are the following: Escaravelhão I, V, VI, Fonte Formosa, Fonte Volide, Monte da Laje, Monte dos Fortes I, Monte dos Fortes II, Pinhal do Rei, S. Tomé, Santo Ovídio and Tapada do Ozão (see Appendix 1.5, Vol.2). However, there are many others within the study area of Monte Faro, not included due to the lack of necessary data.

CHAPTER FOUR: CULTURAL TRANSMISSIONS

4.1. THE HYPOTHESIS

At a large scale, Atlantic Rock Art is seemingly very identical in all study areas. The iconography, but also the landscape location, the type of rocks used, their possible function and relationship with natural and cultural features such as route-ways, viewpoints and monuments has been generalized and extrapolated into the many regions, often without a critical analysis of the motifs and their environment.

One of the main strengths of this project is its empirical nature. The *in situ* analysis of many examples of Atlantic Art in five different regions revealed that there is a core-group of motifs, which can be called 'quintessential Atlantic' (after O'Connor 2006). Cup-marks, cup-and-rings, wavy grooves, penannular rings, are amongst a group of motifs apparently represented in every region. Other images are also present, but in smaller percentages. The techniques with which the shapes were cut in the rocks are also fairly similar. Due to local geology, in areas such as Scotland and Ireland, details of the grooves can be well preserved and therefore it is possible to trace the carving technology. Similar carving methods were identified between Ireland and England, whilst in Spain and Portugal the granite geology fails to preserve such details. Nevertheless, despite being often considered a common phenomenon due to similarities in motif morphology, the carvings also reflect differences. A few studies have attempted to tackle regional preferences, but have mainly focused on motif variation, assemblages of rocks and motif compositions (e.g. Cussen 2009; van Hoek 1989, 1993; Sharpe 2012). No doubt these contribute to the tradition's regional personalities, but other variants should be considered. Datasets suggest that regional preferences extend well beyond the iconography, including traits such as surface types and textures as well as environments (Jones *et al.* 2017:204). As such, the rock art's location in the landscape is another characteristic that appears to be shared by all regions. There is a general preference to carve horizontal to slightly sloped surfaces. Very few exceptions show that the motifs were also occasionally depicted on vertical faces of outcrops, boulders (e.g. Derrynacoulagh, Co. Kerry), cliffs (e.g. Ballochmyle in Scotland) or even shelters (e.g. Abrigo de Calderramos III, Barbanza, Galicia). Exceptions could also be extended to the great monuments of Ireland and Brittany, as well as some mobile stones from cists (e.g. Badden, Scotland) and standing stones

(e.g. Ballymeanoch and Temple Wood, Scotland; Long Meg, England; Ardmore, Ireland). A great number of these, however, are marked only with simple cup-marks which are quite undiagnostic and may not be significant or representative of the style on their own).

Atlantic Art was seemingly practiced in a similar fashion in all study areas, when considering iconography, technique and landscape location, suggesting a global comprehension of the style. This perception stretched beyond the understanding of the motifs, evident in the way they were executed and deployed on the rock surface and the wider landscape. The widespread distribution of the style was not achieved through mere visual transmission or verbal communication. Being familiar with a shape does not necessarily mean being able to replicate it and does not ensure an accurate reproduction of the images. In the case of Atlantic Art, however, the similarities are incredibly striking and one could say that some rocks or motifs from a particular region fit well with the local tradition of another. This seems to imply a structured transmission of knowledge, which would go beyond the shapes. Information on how to use and reproduce them also needs to be passed on. Details such as the type of tools to use, techniques, preferred characteristics of the rock surface and the logic underpinning location patterns were probably transmitted too. In order to obtain a specific result, prior knowledge and experience of the media behaviour whilst being worked, as well as appropriate tools to use was required (J. Valdez-Tullett 2016:60).

Developmental Psychology studies have demonstrated that there are a number of ways in which knowledge and culture can be transmitted, each of them with different results (Huang and Charman 2005). This topic was recently explored by Stade in relation to cultural transmission in the Palaeolithic (2017). There are three main methods for cultural transmission which are relevant for the case of Atlantic Art. *Emulation,* is where a final result is copied without a discussion about the process to achieve the goal, which is devised by the observer (Huang and Charman 2005; Stade 2017). Alternatively, *Imitation* is process-oriented, copying the behaviour that originated the final product and, therefore, the method used to achieve a certain goal, requiring theorising a relationship between the intended actions and goals (Stade 2017; Tomasello 1996). Finally, cultural transmission can also be actively sought by *Teaching*, the intentional conferring of knowledge to an individual, who should be able to think about the teacher's thoughts (Stade 2017). These notions were employed by Stade in an archaeological study empirically assessing linguistic ability during the Palaeolithic. Each of these transmission methods were explored through experimental archaeology, with sample-groups of people with no previous experience of knapping, producing hand axes. Each group was given a different set of instructions, depending on the transmission method being tested.

To some, no additional information was give, apart from a biface to copy and the raw material, whilst others were instructed to imitate a teacher and others fully orally taught how to produce the artefact, through a set of verbal directions. A fourth group was shown the making process but through silent teaching. Groups producing hand axes through imitation had better results and less copy error than those working through emulation (*Ibid*).

Although no experimental archaeology has been carried out to test these options in regard to Atlantic Art, it seems likely that it operated in a similar way. Stade's conclusions conform to the idea of a 'package' which included motifs, technique and specific landscape settings that was transmitted through cultural exchange. The simple observation of a motif and an attempt to replicate it on another nearby rock or in a different region, was probably not enough to re-create a systematic, consistent, relatively standardized and widespread practice of carving rocks with specific motifs in specific places, that constitutes the phenomenon of Atlantic Art. The coherent character of the style suggests that some degree of instruction was involved in the process of replication. This idea is even more striking when small details of the motifs, namely related to their making, are contrasted. An active process of imitation corroborates the argument that structured cultural exchange was happening during this period, instead of mere spontaneous contacts. For Atlantic Art to have travelled such long distances and to have been adopted in so many different regions, suggests that it was intentionally taught and learned and that style/tradition was meaningful and important enough for people to use it consistently, during a long period of time. The fact that the techniques, the way of using them and where to locate the designs travelled alongside the motifs, shows that the ideology underpinning the use of Atlantic Art was understood by the societies inhabiting the different regions. Should the reasons for copying the motifs be purely aesthetical, then one would probably find them in more diverse contexts, although it must be acknowledged that they may have been used in perishable media. Furthermore, the reproduction of motifs by emulation would certainly result in significant morphological differences, as shown by various modern re-productions of the motifs.

At this point, it seems clear that Atlantic Art was culturally transmitted and have travelled across the Atlantic façade. But how do ideas travel and how does a specific type of rock art linger in time and space for so long? What was so important about Atlantic Rock Art which led to such a wide adoption of the tradition and predominance in time? Would only a long prevalence in time justify the presence of Atlantic Art in such distant areas and a wide use?

CHAPTER FIVE: APPROACHING ATLANTIC ROCK ART

5.1. SIMILARITIES, DIFFERENCES AND REPETITION

Atlantic Art iconography displays a remarkable regularity of forms, widely used across an extensive geographical scope. Not only are the images carved on open-air outcrops and boulders, but similar forms are known in passage tombs, standing stones, pottery and a number of other decorated artefacts (Bradley 1997; Jones *et al.* 2011; Cochrane *et al.* 2015). Whilst archaeologists have incessantly looked for similarities in the record, differences and differentiation have been disregarded.

Studying evidence from different regions often involves comparisons. Contrasting similarities and differences between the rock art of the study areas, was a primary objective of the project. The aim was deconstruction, or contribution towards, the notion of homogeneity that underpins Atlantic Art and that has seldom been questioned. In fact, at a large scale Atlantic Art seems to be a standardised, global phenomenon emerging during Prehistory in Atlantic Europe. The parallels between motifs and the ways they were used has suggested that there were connections throughout Western Europe, and 'it is because of such long-distance links that we are entitled to consider "Atlantic" rock art as a unitary phenomenon' (Bradley 1997:67-68). However, as the following chapters will disclose, observations at detailed scales reveal variations that may reflect regional identities or different time scales, materialized in distinct motif types, location, sizes and combinations. Some carvings bear isolated figures whilst others display intricate and intertwined arrangements of motifs. This realization, made obvious during fieldwork, meant that direct comparison of motifs, medium characteristics and landscape location was not enough to question the homogeneity of Atlantic Art. A holistic approach was developed to overcome the inherent limitations of direct comparisons. It was designed to contrast a type of material culture that when zoomed out looks intrinsically similar, but when zoomed in exhibits important structural gradations. The introduction of parameters beyond motif morphology was essential, providing context for the images. This was complicated since cultural and social backgrounds, clear evidence of cultural contacts and chronologies are scarce for Atlantic Rock Art (O'Connor 2006:211).

A starting point began with the untangling of Deleuze's concepts of Difference, Resemblance and Repetition. Deleuze says that 'Repetition is not generality [and] Repetition and generality may be distinguished in several ways' (2004:1). Similarities may be polysemic, which is an interesting idea when thinking about Atlantic Art. The notion of similarity has not been widely discussed. In this study it stretches beyond the geometry of the iconography, including important elements such as landscape location, the type of rocks selected, human experiences, events and actions such as the making of the motifs. Similarity may be achieved through repetition, although for Deleuze this concept has little connection with the re-production of physical copies. On the contrary, repetition is the beginning of new things, a case of co-existence instead of succession. The mechanism of repetition promotes creative activity and transformation, destabilizing habit and convention and therefore opens possibilities for reinvention and change (Parr 2010:225-226). The core group of quintessential Atlantic motifs represent resemblances as they compose the main strand of the style. However, when copied, they could have experienced *differentiation,* a concept that Deleuze draws from Bergson (1988). For Deleuze, differentiation is a continuous open system, producing new directions and connections, repeatedly divided and combined. The consequent emergence of creative flows promotes variation, more than identity and resemblance. Creativity provides differentiation with a sense of novelty which is being constantly renewed and transformed, within a certain timeframe (Colebrook 2002:63; Parr 2010:78). Differentiation does not necessarily equate physical similarities. Whilst an object may be faithfully repeated in material terms, and resemble the original, the two can be quite distinct, due to 'hidden forces of difference' (Deleuze 2004). These are the ones producing repetition, which is both sameness and difference (Colebrook 2002:120). In terms of the rock art, the symbols may be repeated extensively but have different meanings depending on a variety of factor, such as the places where they are carved, or the different combinations of motifs.

Atlantic Art fits well with this concept of repetition and differentiation, being a tradition of similar and shared morphological features, but whose differences may reside in the way it was used, and the messages conveyed. The repetition of cup-and-ring symbols in the Atlantic region may display similarities in terms of their geometries but result from the 'forces of difference', making them inherently different. Repetition is not, therefore, the simple copy of an object previously experienced, but the transformation of a tradition, in which difference resides in 'the power that over and over again produces new forms' (*Ibid*.:122), which of course does not have to be physical. The repetition of Atlantic Art

symbols in different contexts, with various techniques and in a number of combinations, may account for these differences. Furthermore, the copying of the motifs in later periods, even when following the 'protocol' could have had varying meanings, functions, new oral traditions attached, etc., matching the cultural and social backgrounds of the carvers.

5.2. ATLANTIC ROCK ART: A DISCUSSION ABOUT STYLE AND TRADITION

Similarities are often discussed under the concepts of style and tradition. These terms have been used throughout previous sections indiscriminately. Whilst this is mostly a matter of vocabulary, there is effectively a discussion as to whether the *corpus* of cup-and-rings and derivatives are part of a wider trend, which some classify as a style (e.g. Bradley 1997; Santos-Estévez 2008) and others as a tradition (e.g. Alves 2003).

As a group of elements sharing morphological and typological similarities, rock art is often referred to as style. Historically, the concept of style has been defined as a component of material culture, 'that is, as formal variation not determined by technological constraints' (Hegmon 1992:518). Together with typology, style is a core concept in archaeology, providing the backbone of investigation as well as a means to organize and differentiate materiality, according to temporal and spatial divisions, types and cultures (Alves 2012; Fairén-Jiménez 2004a:110). Currently, the notion of style is imbued with a culture-historical stigma and consequently there is reluctance in its use. There are issues with this notion, particularly a difficulty with its definition, its association with art history and its widespread uncritical use (Hegmon, 1992:517, 1998:265). Style was primarily used as a diagnostic tool, to identify groups of material culture (e.g. Bell-Beaker culture) and only in the 1970s was it given an active role as a means of communication and information exchange, and in the maintenance of social boundaries (Hegmon 1992:517-518; Wobst 1977). When style was accepted as 'a way of doing things' and since it 'involves a choice among various alternatives' (Hegmon 1992:517), a turn in perspective acknowledged it as an informative value of artefacts, but also as a functional component of cultural systems acting over human groups and their social practices, rejecting the idea that style is a passive by-product of cultural systems (Hegmon 1998:265).

The renovated perspective of style as a 'way of doing' (Hodder 1990:45), prompted new approaches. On one hand, style was imbued with a sense of functionalism and worked

as a means of communication and social identity (Wiessner 1983, 1990), on the other it had a more passive character involving the reflexive relationship between an event and a common type of practice (Hodder 1990). In this perspective, '*doing*' 'includes the activities of thinking, feeling, being' (1990:45) and style had many natures beyond its functionalism. In this sense, the notion of style becomes more useful to archaeology, bridging a gap between style as a component of human activity and an important tool in the assessment of material culture variation (Hegmon 1992:519).

The active role of style has been applied to studies of technology – technological style, which is best understood within social and cultural contexts (Hegmon 1992:525; Lechtman 1977). The relationship between style and technology has important implications, as the latter is thought to play a key role in the expression and maintenance of ideological concepts (Hegmon 1992:525, 529). Style is intricately related to social and cultural contexts and works as a means of social cohesion (Alves 2012:203), guaranteeing the maintenance of symbolic meanings across generations. The notion involves technological choices (e.g. gestures) which are the result of social learning processes and may indicate social distinctions (Lemonnier 1993). The preservation of formal resemblances, ensue the continuity of past forms (Alves 2012:203). This endurance, however, is mostly perpetuated by the implication of sequences of gestures, which are the 'physical rendering of mental schema' and a direct outcome of learning processes (Lemonnier 1993:3). It has been argued that technologies are able to cross-cut social boundaries, since they are easily transferred, as opposed to style which is merely a channel of social expression (Wright 1985:22 cit. Hegmon 1998:275). However, a number of ethnographic studies have documented the association of types of styles with intra-societal groups (Hegmon 1992:527).

Although style stands as an inheritance of the Culture-History paradigm, it is commonly applied to rock art studies where, despite the detachment with original contexts, is used to identify specific iconographic assemblages, as a reference of region, culture or people when applied to general spheres of society, but also to establish timescales (Conkey and Hasltorf 1990:2; Meskin 2005:493). However, it is clear that stylistic similarities do not equate chronological equivalence and the direct relationship between time periods and style is risky (O'Connor 2006:56), as shown by past schemes (Anati 1968). Furthermore, the use of style in rock art studies constitutes a challenge and can contribute to a divide between approaches to symbolism and landscape-led research, ignoring the information provided by the motifs (O'Connor 2006:205). Attempts to manage this dichotomy are evident in the work of Bradley (1997), Purcell (2002), Alves (2003) and O'Connor (2006), where experiential

landscape approaches have integrated distributional and settlement studies alongside motif analysis. Nevertheless, the conceptualization of Atlantic Art as a global phenomenon is, in fact, mostly based on its style (repetition of formal similarities) of motifs. But one should question 'to what extent does the presence of images which are formally alike mean that rock art assemblages relate stylistically to each other, or are stylistically influenced by each other' (Alves 2012:202). Considering motif variation there are obvious stylistic similarities amongst the carved rocks across Atlantic Europe, but is this criterion enough to deliberate that we stand before a style?

Archaeology has also seen the introduction of the concept of tradition, to explain the prevalence of material culture. This implies inheritance and historic continuity (Robb 2008:332), involving the transmission of information, ideas, techniques and practices through an individual learning process (Roberts 2008:355). This perspective however, imputes a passive role to the human agents, regarded as simple receptors of this ancient baggage, and limits the possibilities of research questions. It does not allow explorations in terms of the relationships between traditions and an individual's actions or their cultural contexts, nor does it question the homogenous or heterogeneous character of certain traditions or their regional patterns (Robb 2008:333). Robb investigates the issue of tradition by looking at the archaeological record in terms of creative and fluid action, and the adoption of ontological categories of analysis (*Ibid*. 333-334). The author argues for an approach to prehistoric art, through the application of a range of analytical scales and a method which enables the relation of a number of entities that structure material processes (e.g. material qualities, styles, traditions, social relationships) (*Ibid.*). For its apparent continuous and long-lasting practice, homogenous character and coherence, Atlantic Art seems to be well described as a tradition. However, the creation of a tradition may imply the maintenance of an artistic style, and traditions may have their own tempos of stylistic evolution (Alves 2012:203).

What seems to describe Atlantic Art most effectively, is the concept of 'assemblage' according to new definitions of the term (DeLanda 2006; Fowler 2013, 2017; Hamilakis and Jones 2016:77; Lucas 2012), implying a dynamic perception of its multi-layered components. Atlantic Art's assemblage incorporates features typically defined as dimensions of style, such as form and motifs, regularity of shapes and the relationships between these, the range of motifs depicted and their organization into compositions (Layton 1991; Shapiro 1953). Following Alves, it also comprises the interaction between the motifs and the natural

surfaces, as well as the relationship between the site and the wider landscape (2012:202). These parameters are all reflected in the scales of analysis defined in the methodology section. However, Alves disregards the specific techniques used to create the motifs, arguing that studies overemphasising form through technical and morphological analysis may be misleading and consider technique as an element of stylistic differentiation, which may lead to the association of particular motifs with specific chronological periods or cultural backgrounds (*Ibid*.202). Technical behaviour and techniques have been used to define a study object's style, including that of Atlantic Art (Connolly 1991; Johnston 1989; Waddington *et al.* 2005). In the approach taken here, techniques are also part of the assemblage, and play an important role in the study of gestures and making of rock art.

The main benefit of thinking about Atlantic Art as an assemblage is that it includes and relates all the relevant aspects of the rock art's characteristics, style, tradition, performance, ideas, techniques in a dynamic and inter-relational approach to the subject, which will determine how Atlantic Art came to being. In order to explore Atlantic Art in such a way, a typological assemblage was devised, in which a number of types were organized in relational categories (Lucas 2012:195).

CATEGORIES, TYPOLOGIES AND ASSEMBLAGES

Classificatory schemes are controversial despite their presence in a wealth of archaeological subjects. Categories and categorisation have often been seen as an imposition by archaeologists on the material culture. Classification described as both culturally and individually arbitrary (Layton 1991) and accused of being mere aesthetic devices that do not represent intrinsic properties of the study objects (Francis 2001:226). Nevertheless, typologies have been extensively used in rock art studies and still underpin many approaches. They have been at the centre of several Atlantic Art investigations, focusing on motif shape and the establishment of relative chronological sequences which, in general, lack archaeographical confirmation (e.g. Anati 1968; Breuil and Macalister 1921; Obermaier 1923, 1925; López-Cuevillas 1951; Peña-Santos and Vázquez-Varela 1979). Typically, typologies were the production of classificatory tables of artefacts or sites, grouped under similar characteristics in rigid schemes. With Processual Archaeology, the interest in typological schemes dissipated, as they were considered 'tyrannical' and thought to reduce 'or even "erase" differences, homogenizing diversity among artefacts' (Fowler 2017:95). Despite fierce

criticism and being seen as a handicap in the development of research and archaeological interpretations, typologies maintain an active role and tend to be regularly used, representing deliberate similarities between study objects, which are connected to past practices of production (Lucas 2012:196).

The informed use of typologies is capable of opening new avenues to a more energized application of these schemes, which are undeniably useful. There seems to be a resurgence in the application of typological systems, under a more dynamic spin, particularly when associated to Assemblage Theory (e.g. DeLanda 2006; Fowler 2017; Lucas 2012). 'Assemblage' is a main concept of Deleuze's work (Fowler 2013:20) and is intricately related to art practice, reminding us that 'the making of assemblages is a dynamic but also deliberate rather than random process' and that 'the juxtaposition of distinct elements can be transformative, generating new entities, new possibilities and new ways of understanding' (Hamilakis and Jones 2016:79). It also derives theoretically from Actor-Network-Theory (ANT) (Latour 2005) where agency between humans and things is reciprocal, using notions of entanglement (Hodder 2012) and meshworks (Ingold 2007). Under this perspective, an important shift was introduced and types, once viewed as static things (e.g. objects, persons), are now conceived as 'events' (e.g. actions, gestures, memories). Typologies become essential relational and dynamic entities, capable of evolving through time and useful in the identification of past actions and moments. These relations are largely sustained by assemblages, which in essence are 'arrangement[s] of diverse, heterogeneous, interacting components that [have] specific effects' since 'an assemblage acts (…) in such a way that none of its components can without being in such a configuration' (Fowler 2017:96; see also Fowler 2013). Assemblages are constituted and articulated by types, which in essence are objects produced through the iteration of technique, encompassing gesture, matter and memory, linked through a process of enchainment. Assemblages function at various scales, and therefore have spatial parameters constraining the types, but are also temporally confined (Fowler 2013, 2017; Hamilakis and Jones 2016; Harris and Cipolla 2017:139; Lucas 2012:195).

Two main developments of assemblage theory are those of DeLanda (2006) and Latour (2005). In both cases the social effect of assemblages and networks are explored (Hamilakis and Jones 2016:79). DeLanda's theory approaches assemblages as self-subsistent entities defined by their relations with the exterior, that is, 'by their relations to their environment (…) other bodies and assemblages' (2006:10), placing emphasis on becoming

(Fowler 2017:98; Hamilakis and Jones 2016:79). Latour's theoretical stance lies with ANT and a definition of society based on people and objects sharing agency, distributed through networks (Hamilakis and Jones 2016:79).

Resonating this idea, my concept of Atlantic Rock Art is built on a network of dynamic relationships established between entities such as the motifs, rock media, locations, affordances, execution techniques and making, as well as other processes which contribute to the identity of rock art, enabling its long duration. Atlantic Rock Art is here viewed as an assemblage because as a phenomenon, its various parts interact with each other and cannot be considered in isolation in order to understand the wider picture. Motifs, rock type, landscape location, carving techniques, are articulated events, part of the assemblage. In practical terms these entities were studied through a classificatory scheme composed of dozens of categories and hundreds of attributes. A large number of these explore the visual character of the engravings, the most tangible characteristics of the tradition, but others express less physical aspects, like actions or affordances. The multi-scalar character of the assemblage means that the categories were articulated in order to explore contextual relationships between the many facets of the rocks within each group, but also the connections between clusters and ultimately comparing the study areas, providing a real inter-regional character to the study.

BUILDING A CATEGORICAL SCHEME

The perspective taken in this thesis, is closer to that of Lucas (2012) and Fowler (2013, 2017), seeking a comprehensive understanding of Atlantic Art through its practice and the articulation of its components. However, where the terms 'type' and 'typology' are used, I will be referring to 'attributes' and 'categorical scheme', following paradigmatic systems of classification, well adapted for the investigation of stylistic variation (Dunnell 1971). The classes are defined according to the intersection of a number of features that are problem-oriented, allowing its application to new assemblages (O'Connor 2006:216). The lack of known attributes to Atlantic Rock Art, beyond the use of 'simple' and 'complex' as a signifier for audience, is a handicap in the construction of a paradigm for this prehistoric tradition. Each class should be defined according to the same criteria and weighting the same importance (Allen 1996). Intrinsic problems to rock art, such as the definition of what is a panel or a composition can make classifications very arbitrary. It seems difficult to establish

a categorisation following the premise of paradigmatic classifications, that may be more specific than defining the composition, motif range, motif type working together in order to convey different messages (O'Connor 2006:217). These attributes may change over time and differ depending on the regions, roles and panels and therefore the significance of the classes rely partly on their spatial behaviour.

The lack of dates does not allow for the identification of stylistic variations that may reflect chronological differences (Alves 2012a; O'Connor 2006). Furthermore, the presence and frequency of certain types of classes may vary according to the study area where they are found, possibly demonstrating regional identities, but also at smaller scales amongst different locales, reflecting diverse roles or associations with distinct social groups (O'Connor 2006:217). The creation of a classificatory system to investigate Atlantic Art contributes to the identification of these regional identities, often through the analysis of similarities, differences and differentiation.

Categorization in Atlantic Rock Art

Atlantic Rock Art has seen a number of attempted forms of classification throughout its historiography (e.g. Bradley 1997; Johnston 1989, 1993; O'Connor 2006 Purcell 2002). Criteria for the definition of these schemes have varied considerably. A popular trend is the investigation of certain types of motif associations across space (Lorenzo-Ruza 1951; Morris 1977; Santos-Estévez and Criado-Boado 2000; van Hoek 1988, 1989, 1997). These methodologies enabled the identification of regional preferences (e.g. van Hoek 1987, 1988), which were defined through the comparison of the frequency of motifs and investigating the distributional variation of specific images (e.g. Morris 1977). At smaller scales, results were occasionally able to demonstrate the shifts in motif occurrences across space, emphasizing different spatial behaviours of various types of iconography. Nevertheless, these approaches generally focused on individual motifs and did not encompass variations in both the combination of motifs displayed on individual panels or their compositional 'grammar' (O'Connor 2006:213).

In her approach to Irish rock art, Johnston defined four primary categories, whose frequency she compared across the country according to the presence of i) cup-marks, ii) cup-and-rings/circular motifs; iii) linear/rectilinear motifs, iv) 'other' unclassifiable motifs (Johnston 1989:58-97, 1991:86-89, 1993:261) in an attempt to understand the main objectives

of the practitioners, the intentionality of motif compositions and degrees of variation (Johnston 1989:94). The result of this simplistic categorisation scheme is that 'in general, none of the observed variation in motifs or in surface configuration seems to have any consistent spatial patterning' (Ibid.317).

Following Tilley's work at Namforsen (1991), Purcell's study of rock art clusters in Iveragh Peninsula (Co. Kerry) highlighted the importance of composition and grammar. Her approach treated rock art as 'text', comprising syntagmatic chains almost comparable to sentences. The methodology comprised the definition of twenty-four motif types and the recording of their absence and presence pattern in each panel within particular valley groupings, followed by the comparison of their occurrence and associations (Purcell 1994:107-109). Final results emphasised local differences and idiosyncrasies between rock art assemblages, and the exclusivity of certain motifs in specific areas (*Ibid*.142-143). Purcell's approaches contrasted to that of Bradley's (1991) demonstrating that a binary classification applied to the reality of Iveragh represented an oversimplification of the rock art's variation. Furthermore, it showed that motif variation was greater between different valley systems than particular zones of the landscape (Purcell 1994:145; 2002). Perhaps this conclusion reflects specific characteristics of the valley systems, to which types of iconographic grammar would correspond, potentially representing different meanings.

Bradley's approach integrated a landscape and motif analysis, sensitive to subtle patterns in the rock art corpus, and the dynamic relationship with cultural and natural contexts (1997). His approach to patterns of rock art location and design variation led to the consideration of audience and its importance (*Ibid*.9, 78, 120). The association of decorated outcrops and the specific parts of the landscape where these were located were characterized according to a binary system. Bradley's work was largely based on a simple/complex dichotomy of the panels. The first category included panels featuring single or double ringed motifs, and lacking any elements and motifs from megalithic art, whilst the complex panels would feature motifs with three or more concentric rings, being also more likely to display designs and motifs more common to megalithic art (*Ibid*.128-131). The binary system was complemented with details such as the exact number of rings and cup-and-ring motifs (Bradley 1991). Perhaps attempting to overcome the simplicity of the scheme, Bradley later developed the category of 'Complex', in order to acknowledge more subtle variations of motifs. He defined six panel types, based on their design grammar, stressing the degree of connections between the motifs as key criteria (1997:128-129). Bradley's classification was not considered to be strictly a typological division of the motifs, but encompassed the objective

of describing the grammatical rules that apparently underlie the panel compositions, seemingly restricted or directed towards particular kinds of motifs' arrangement (1997:128). Bradley's approach had repercussions in Atlantic Art studies, prompting similar analytical criteria in other projects in several geographical areas (e.g. Alves 2003) and even other types of rock art.

CREATING MEANINGFUL CATEGORIES

Categories assist archaeologists in the assessment of human behaviour, placing related data into specific time and space contexts (Adams and Adams 1991:9). These can imprint biases and limitations and researchers must ensure that the classificatory system used will not prevent the development of an all-encompassing study, based on solid theoretical and practical grounds, and that it will reflect the reality of the material culture in question.

In this study, a classificatory scheme was devised incorporating a number of variables described by categories which are characterised by attributes (see Appendix 6, vol. 2). Each category is composed by a number of attributes, which are exclusively defined by the researcher and do not intend to represent anything meaningful to the artisans, nor reflect chronological or cultural differences. The scheme is based on the four scales of analyses devised to approach rock art, ranging from the individual motifs to the wider landscape (see Chapter Six and Figure 24). The categories contribute to a detailed characterization of the range of motifs, compositions and the media, encompassing other features such as rock art's behaviour through the assessment of the relationship between the motifs and the rock surface, the latter and the landscape.

Units, Categories and Attributes

Defining structural concepts can be an ambiguous task. The definition of what constitutes a motif, a panel, an assemblage or a site is often problematic with variations from researcher to researcher. The panel is the main unit of evaluation in this study, referring to an individual rock, or may be used to define several surfaces that are naturally broken and evidently separated in a wider outcrop (e.g. Drumtroddan, Machars). Often, individual motifs

continue across major breaks in the stones and are normally confined to the edges, suggesting that perhaps the criteria we use today to define panels, may have also held some kind of significance in the past (O'Connor 2006:218).

Figure 19 From left to right: Panel 5, 6 and 6A at Drumtroddan 1, Machars.

The identification of motifs is not always straightforward with some being spatially parted, but others entangled in clusters, engaging in several combinations and variations, increasing the ambiguity of classification. For this reason, identifying the presence/absence of simpler elements seems to be a more concise strategy of motif analysis, avoiding subjectivity.

Greater scales of analysis include the media on which the motifs are carved, whether an earthfast boulder, an outcrop or even a culturally transformed stone, e.g. standing stones. Characteristics such as the distance of the carved surface to the ground, orientation, texture of the rock, are taken into account. There is a pre-conceived idea that Atlantic Art was deployed on flat/horizontal panels flush to the ground and therefore it is important to assess whether this is in fact a characteristic of the style, as widespread as the motifs.

The larger scale in this classificatory scheme is the landscape and the position of the rocks in their wider backdrop, assessing the assumption that Atlantic Art is usually located on hillsides, half-way up slopes, often facing west and commanding extensive views. The relationship between the character of local geomorphology, the orientation and inclination of the slopes are included in this parameter, contributing to potential social interpretations.

Figure 20 Detail of Drumtroddan 3A: using the edges of the rock surface to confine the motifs.

There are a number of issues, rightly pointed out by O'Connor (2006:219), regarding the classification of rock art. In a first instance the surface being analysed may be merely a small part of the exposed panel, and may therefore differ to the one the artists were dealing with. Furthermore, the carved panels are the final result of an action or multiplicity of actions that may have been carried out either in single or multiple events separated by time. This is particularly relevant in Atlantic Art, as we are still unable to identify different chronological stages through a specific style of motifs. The weathering of the figures may increase the difficulty in their identification which often results in incapacity to identify subtle variations. Meteorological conditions and the time of day that engravings are observed, strongly influences the visualisation of motifs, since the lightning conditions are imperative for observation, as well as the action of the microbiology and the rock face morphology, whether smooth or irregular. Ultimately the researcher's 'eye experience' is fundamental, often assisted by the sense of touch.

The classification conducted here combines a somewhat classic method, in which observations of the compositions and the quantitative assessment of the motif range enables the identification of the classes, promoting high and different levels of variation. Each rock was individually evaluated, preferably through 3D models, but also photographs and plans.

Figure 21 **O**uteiro dos Cogoludos I (Campo Lameiro, Galicia): detail of a profoundly decorated panel with a complex assemblage of interconnected motifs.

Figure 22 Kealduff Upper 2 (Iveragh). An example of spatially separated motifs on a surface.

Figure 23 Culscadden 1B (Machars): a typical flat/horizontal, low-lying rock with carved Atlantic motifs.

CHAPTER SIX: METHODS AND PRACTICES

'As dobras, e as cores do chão onde firmo os pés, foram sempre no meu espírito coisas sagradas e íntimas como o amor. Falar duma encosta coberta de neve sem ter a alma branca também, retratar uma folha sem tremer como ela, olhar um abismo sem fundura nos olhos, é para mim o mesmo que gostar sem língua, ou cantar sem voz. Vivo a natureza integrado nela. De tal modo, que chego a sentir-me, em certas ocasiões, pedra, orvalho, flor ou nevoeiro. Nenhum outro espectáculo me dá semelhante plenitude e cria no meu espírito um sentido tão acabado do perfeito e do eterno'[30].

Miguel Torga (Diário, 1942)

The above citation describes a deep connection of the Portuguese poet Miguel Torga (1907 – 1995) to the land. One that reflects the human being and the landscape as one. Just a few decades ago, people's lives were intrinsically interwoven with the soil they stepped on and the land that supplied their sustenance. This relationship meant that people were familiar with their environs, providing references, landmarks and creational beliefs. As an archaeologist, I have often come across people in rural areas, describing the landscape in which they dwell almost as a living entity, where areas of economic significance merge with ancient monuments and their legends, natural elements such as conspicuous outcrops or particular trees and their inhabitants. They do not need to walk the landscape to know what is in it. They can easily circumnavigate it in their minds. I would argue that this is the kind of understanding of the landscape that people in the past had. Of course, even if we approach the landscape under a phenomenological perspective, our personal social and cultural backgrounds will prevent us from seeing it through the eyes of a Neolithic individual. There are many centuries of sedimented layers of change in the landscape between our times, translating to a variety of physical transformations and losses of intangible features.

[30] Free translation from Portuguese: The folds and colours where I ground my feet have always been, in my spirit, sacred and intimate things, like love. To speak about a snowed hillside without having a white soul, to depict a leaf without shaking with it, to look at an abyss without depth in the eyes, is for me the same as appreciating without tongue or singing without voice. I live nature integrated in it. So much so that in certain occasions I feel as if I am stone, dew, flower or mist. No other spectacle provides me such plenitude and creates in my spirit an accomplished feeling of perfectness and the eternal.

Nevertheless, the use of different variables in the study of the past, being material culture, landscape locations, or natural features, enables a closer understanding of the prehistoric physical world, even if the mind-frames are permanently gone.

The methodology described below bears the objective of assessing the relationships between different elements that facilitate a better perception and interpretation of rock art: motifs, rock surfaces, landscape locations, processes, fabrication, actions and networks.

6.1. DESIGNING A METHODOLOGY: A 3,5 SCALE APPROACH

Whilst the construction of typologies added little information to the understanding of Atlantic Art, landscape archaeology has opened new avenues of investigation enabling an environmental, social and cultural contextualization of the representations and the reconstruction of associated social practices (e.g. Alves 2003; Bradley 1998; Fairén-Jiménez 2004b; Jones *et al.* 2011; O'Connor 2006; Purcell 1994; Santos-Estévez 2008). All-encompassing methodologies were informed by ethnography that rock art is not an isolated component but rather bears a social role and can be part of a multiplicity of social and cultural spheres, always associated with the values and beliefs of a social group (Leroi-Gourhan, 1975; Morphy, 1991; Alves, 2003; Fairén-Jiménez, 2004a). The use of dialectical scales of analysis, zooming in and out from the landscape to the rock surface, facilitates access to these spheres of human life, connecting funerary, ritual and domestic scopes, despite some of these links being controversial (Alves 2003:20; Fábregas-Valcarce and Rodríguez-Rellán 2012b:255).

Considering the large amount of data involved in this project and the geographical disparity, the creation of a methodology adaptable to all the study areas was crucial. The scales of analyses devised vary from small details to the wider landscape that contribute to Atlantic Art's internal logic, when entangled. Variables such as the motifs, conventions by which these were incorporated into the decorated surfaces and the placing of carvings in relation to the local topography are explored within this scheme. The inclusion of multiple parameters should avoid limitations derived from our modern conceptions (Fairén-Jiménez 2004:107-108), although one can speculate about their relevance to the prehistoric artist. The combination of these features should facilitate the reconstruction of patterns that would have underpinned the selection of places to carve, functionality and social context (*Ibid.* 108).

Since the regions in which these carvings occur can often bear hundreds or thousands of carved outcrops, a sampling strategy was necessary. These were selected according to pre-defined criteria (see Chapter 3). The project's dataset is mostly composed of *Informal Samples*, clusters of rocks and others selected due to convenience, and a small percentage of *Unintentional Samples* (Orton 2000: 1-2), formed by a number of new carved rocks found. Occurrences that were known not to be *in situ* were excluded, regardless of their pictorial compositions, with some exceptions used in the Presence/Absence Matrix. The target population was expected to comprise a minimum of 30 carved rocks per study area, to be evaluated *in situ*, a goal that was not always achieved for a number of reasons (e.g. lack of precise co-ordinates to find the rocks, weather conditions, terrain accessibilities, time restrictions).

The fieldwork methodology included four main scales of analysis, focusing on the fine details of the motifs, their interaction with and the characterization of the media, as well as a broader perspective encompassing the situation of the rocks within the wider landscape. A threefold scheme of scales of analyses has been used by other authors, creating correlations between archaeological sites, local environments and topographies (Adler 1996; Butzer 1982; Hyder 2004:87), also applied in rock art research (e.g. Alves 2003; Bradley 1991, 1993, 1997; Jones *et al.* 2011; O'Connor 2006; Purcell 1994; Santos-Estévez 2008). These create a dialogue between the motif, rock and landscape, in contrast with previous traditional studies based on typological schemes. O'Connor introduced a deviation in this threefold scheme, by conceiving a methodology based on a site, local, inter and intra-regional assessment (2006:205). A local perspective is also featured in the present study, included in the Environmental Scale, safeguarding the necessary analysis of the carved rock's immediate surroundings.

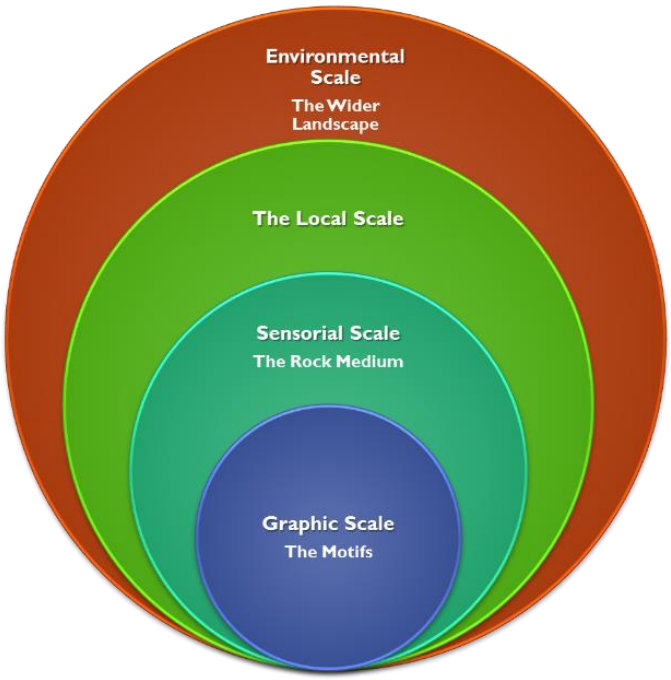


Figure 24 The four scales of analysis.

GRAPHIC SCALE: THE MOTIFS

The motifs were studied through a detailed scale of analysis looking at their morphology, techniques, appearance and patina. The thorough observation of the rocks scrutinized the existence or absence of superimpositions, juxtapositions and convergence amongst the carved images, which may be crucial for the understanding of a panel, its stages of use and the establishment of a relative chronology.

The study of rock art involves many hours of attentive observation of the carved surfaces. Motifs are not always obvious, often weathered to the point when they become practically invisible and to define accurately what is depicted can be time-consuming and require a 'trained eye'. A combination of the documentation of the rock face, the visualization under several lighting conditions and body positions may provide different readings of the carvings in addition to touch, often an important sense in this assessment, since 'tracing the outline of an image with the hands may be as significant as seeing it' (Tilley 2008:45). Our capacity to 'read' the rock carvings may be influenced by 1) *Time*. The older the carvings, presumably the more difficult it will be to identify the grooves due to long lasting weathering processes (e.g. Knock 4 in the Machars. See 3D Models in Appendix 5.2, vol. 2). Often these have heavy patinas that camouflage the motifs against the surfaces and the growth of moss,

lichen and other bio-organisms; 2) *The Material Medium*. Some types of rocks suffer more from erosion than others and this will influence the conservation of the carvings and details of execution techniques; 3) *The technique*. Pecked carvings are necessarily more visible than fine lined scratches, regardless of their age, due to their inherent morphology. It should, however, be noted that perhaps in some cases there was an intentionality in keeping the motifs less visible by portraying them with a minimum impact technique, when other more intrusive ones could have been used (see Table 24, Appendix 6.1, vol.2 for more details on carving techniques). This last point is particularly important. Fowles and Artenberry, for example, argue that the Comanche would create their rock art with fine lines that 'move in very horse-like way across the rock surface' (2013:14) as opposed to pecking, 'since this technique with its "repeated staccato impact", does not have any quality of the horse about it' (*Ibid.* 74).

This scale of analysis aims to bring the researcher's attention back to the rock surface, recently overlooked due to a stigma imprinted by landscape archaeology and the criticism of static typological approaches. A deep engagement with the motifs is crucial to understand variation. Whilst, Atlantic Art, in the different regions, seems similar, merely displaying differences in terms of motif compositions, the identification, definition and description of images contribute to establish important distinctions. Thorough observations of the designs facilitated the identification of significant structural differences in the conception and execution of the forms, revealing regional stylistic identities. The study of the design grammar or the conventions by which the motifs were created may shed light upon the identification of local rock art traditions (Bradley 1997:43).

SENSORIAL SCALE: THE ROCK

The motifs hold a strong connection with the medium in which they were deployed. Although the imagery could have been used on other types of surfaces, the fact that they were carved on hard durable rock faces suggests an intention to endure. As such, the medium upon which the designs were created is in itself an important source of information and its evaluation constitutes an intermediate scale of analysis. Studying the boulder or outcrop surface involves sensorial interaction between the observer and the rock itself. At this level, one can speculate about what kind of characteristics attracted prehistoric artists towards an

outcrop: the colour, texture, roughness, smoothness, heat, cold (Tilley 2008:39) or brilliance (Bradley 2009:45). Other qualities such as the sounds produced whilst hammering the rocky surfaces may had importance (*Ibid.*45). More obscure factors may have appealed to the carvers, including intangible elements such as legends, memories or tales from the communities' cosmogonies, along with other more functional justifications.

Previous studies have demonstrated that the relationship between motifs and the micro-topography of the carved surfaces (i.e. irregularities of the rock, natural features such as crevices or solution holes are often incorporated into designs) may yield interesting views on the conception of rock art and promote interpretations (e.g. Bradley *et. al.* 2003; Clottes and Lewis-Williams 1996; Helskog 1999:91; Lorblanchet 1989; Jones and Tipping 2011:17). Approaches to Atlantic Art have incorporated this idea in order to unveil intentional associations between the imagery and rock surfaces (Alves 2003; Beckensall 2001:42; Bradley 2000:67-68; Jones and Tipping 2011:17; Nash and Chippindale 2004:3-4; O'Connor 2006) as well as stylistic variation (O'Connor 2006:207).

The rocky surfaces were assessed according to their natural morphologies but also the ways in which the motifs embrace the panels and interact with their natural features (i.e. fissures, cracks, crevices, quartz veins, concavities and convexities, etc.), being transformed and/or adapted into a composition.

ENVIRONMENTAL SCALE: THE LANDSCAPE

'Human interventions are done not so much to the landscape as with the landscape, and what is done affects what can be done'.

(Bender 2002:104)

Landscape archaeology introduced the awareness that the setting of archaeological sites is important and can facilitate relevant information regarding their social and cultural contexts. Despite the many definitions of the concept of landscape, for the purpose of this study it is only important to retain the idea that landscape is a natural-cultural continuum, characterized for its interaction between 'cultural and natural' spheres, instead of the mere naturalistic view conceiving it as a neutral, external backdrop to human activities (Bender *et*

al. 1997:165; Ingold 2000:189; Knapp and Ashmore 1999:6). Landscapes are active entities, playing a dynamic role in the social lives of past communities and individuals, who shaped and transformed them (Knapp and Ashmore 1999). It becomes incorporated in peoples' lives, being the extension of their senses. Not only do individuals interact with the landscape, but the landscape acts back, arguably possessing a degree of agency, providing familiar landmarks, orientation, heritage and memory, besides natural resources essential for survival. As a result, landscapes are never static but always incorporating tasks, activities and interactions, materializing time at a series of tempos and rhythms (Jones 2006:211).

For this reason, and because rock art is so intrinsically related to the landscape (Tilley 2008:20), the former not being intelligible without the latter, the study of this relationship is pivotal. It is explored in this approach at various geographical and topographical contexts. This assessment is inevitably entangled with our personal experience and modern practices of landscape archaeology (Conkey 1997:353-358; O'Connor 2006:5).

Since social spaces are fabricated according to a set of socio-cultural rules which regulate the kind of activities acceptable at different points in the landscape (Engelmark and Larsson 2005), it is unlikely that rock art was randomly located. When viewing an encultured landscape, it is inevitable that we identify 'meaningful' relationships between people and their environments (O'Connor 2006:5). Indeed, according to Knapp and Ashmore, 'while we may never know the precise content of stories told from ancient landscapes, we can increasingly infer some of the contours of their telling and the social impact that they had' (1999:8).

In essence, methodologies applied to landscape studies are either based on field observations or the development of computational spatial analysis. The use of GIS enables the simultaneous examination of a series of locational parameters that could have influenced the selection of places for carving, as well as other flexible technicalities such as an easy zoom in and out of scales, re-sampling or modelling data at various spatial levels (e.g. Fairén-Jiménez 2004; Lock and Molyneaux 2006; Bevan and Conolly 2006; Rennell 2012).

A combination of these two perspectives was used in this study in order to evaluate rock art's wider context, exploring the relationship between the carved rocks and the landscape whilst taking into account the local topography, geomorphology, natural features or anthropogenic elements, somehow part of this context. The experience of the landscape is

essential to establish a database of human-scale perspective, whilst GIS provided results of a computational assessment, including variables such as visibilities from and to the rocks, their prominence and location. Merging landscape experience with GIS enabled an engaged multiscalar perspective involving a mathematical representation of the landscape and its affordances, contrasted with a nuanced human experience.

In order to capture the highest degree of detail possible, the Environmental Scale was subdivided into 'wider' and 'local' landscape, capturing the rock's background as a whole (i.e. a peninsula, a valley or a mountain), but also their contiguous territory (i.e. the immediate surroundings of an assemblage). This intermediate scale is important since, the wider landscape may at times be blurry and not allow for much detail to be captured, tending to distort elements such as livestock or natural outcrops (Rennell 2012). This is particularly true in visibility analysis in which results may encompass very wide computational viewsheds that do not necessarily correspond to the *in situ* experience since, although vision can reach great distances, the perception of details is limited to the human eye. A local perspective may not facilitate the recognition of people, but features such as houses and field systems will be identified, and therefore this scale conveys a certain degree of deeper familiarity within the landscape (*Ibid.*).

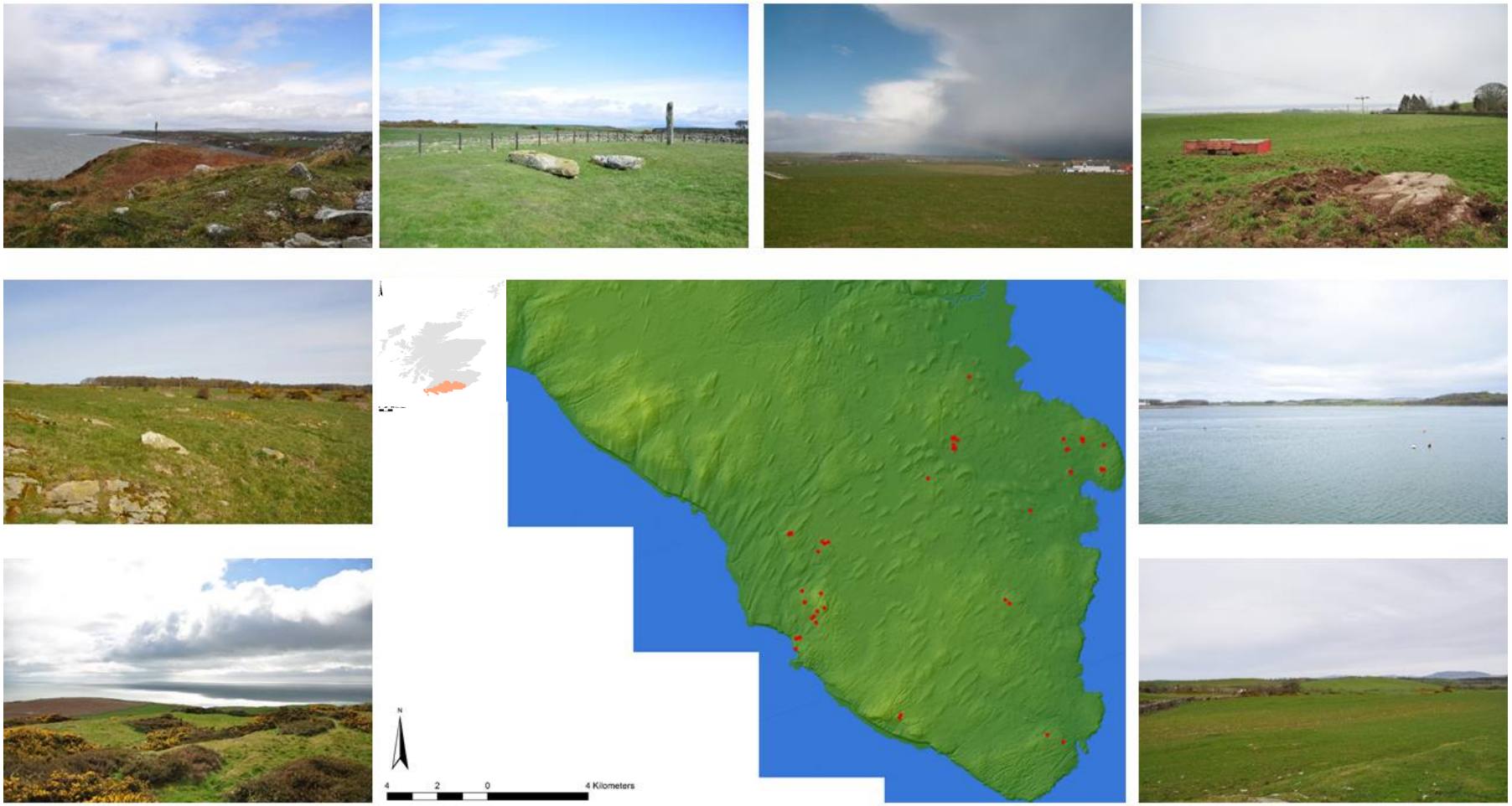


Figure 25 Site distribution and landscape types in the Machars (Dumfries and Galloway, Scotland).

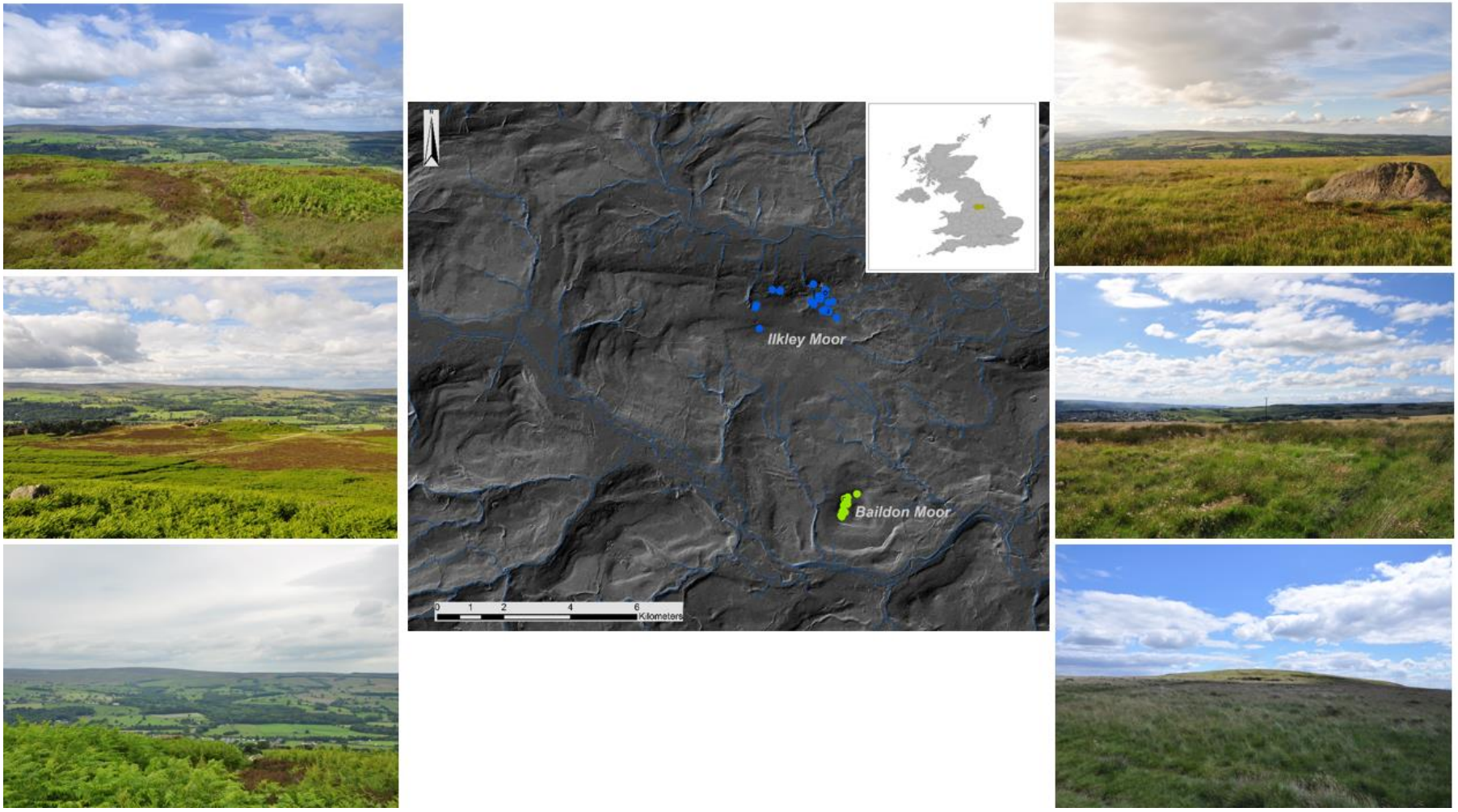


Figure 26 Site distribution and landscape types in Rombalds Moor (Yorkshire, England).

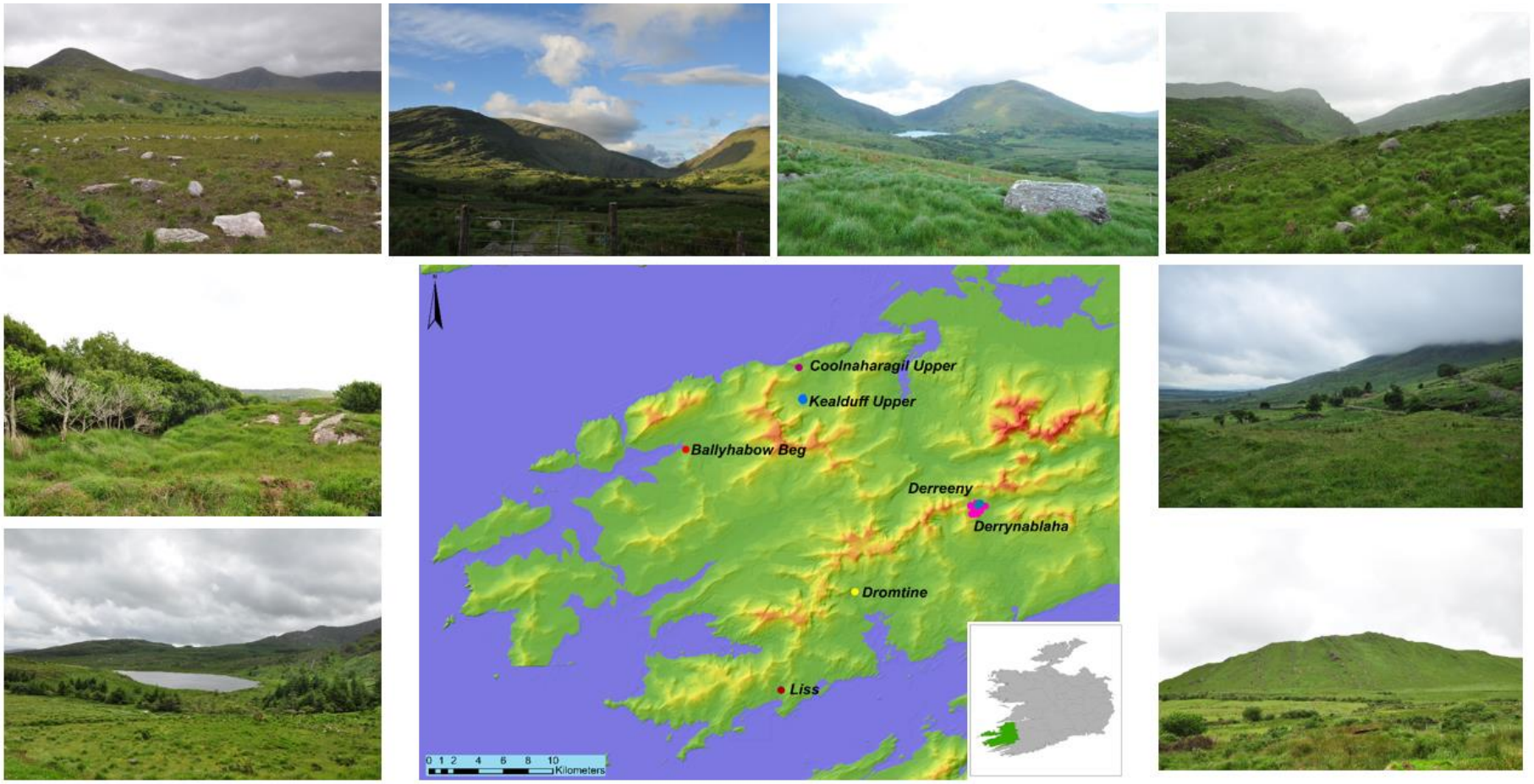


Figure 25 Site distribution and landscape types in Iveragh Peninsula (Co. Kerry, Ireland).

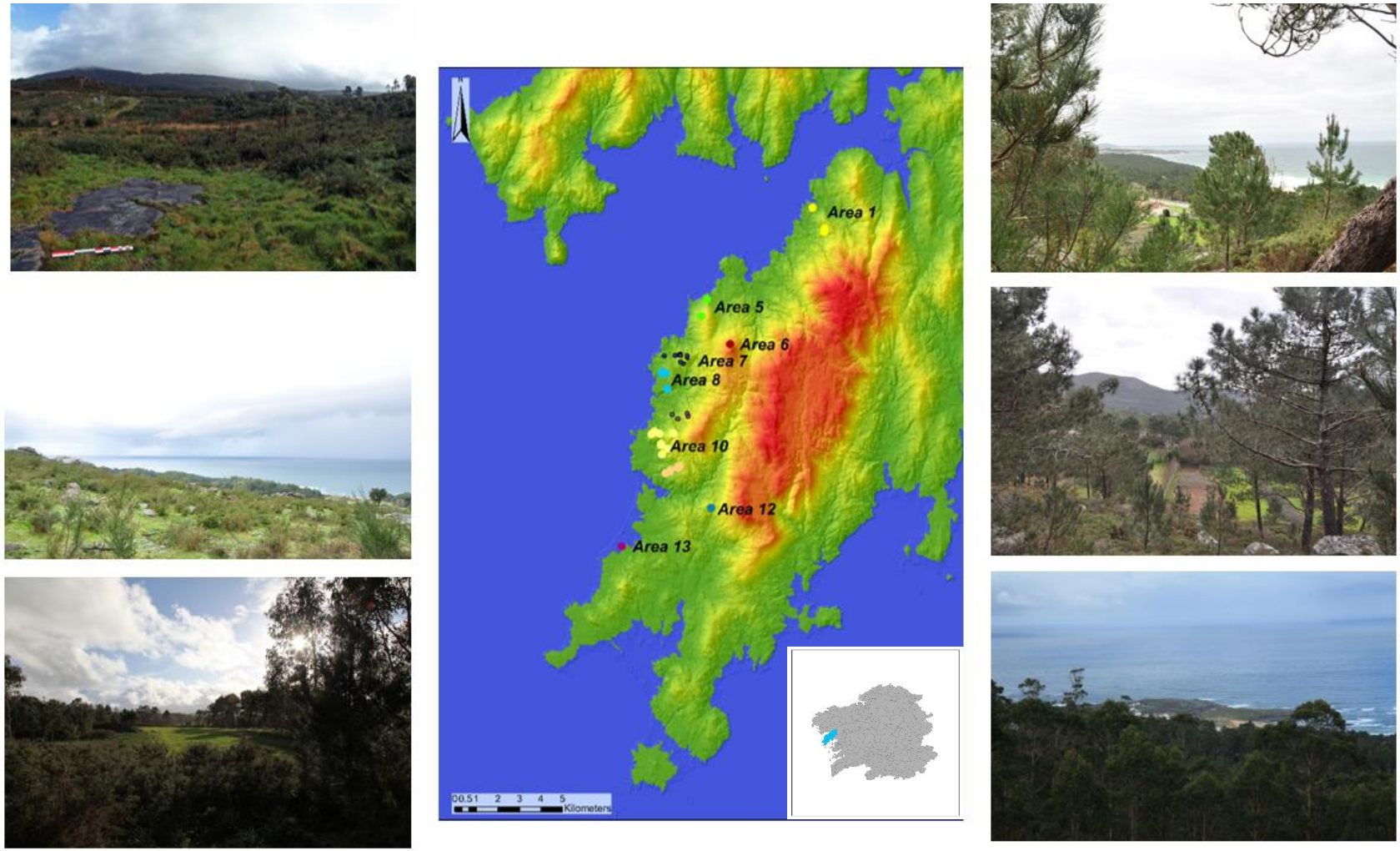


Figure 26 Site distribution and landscape types in Barbanza Peninsula (Galicia, Spain).

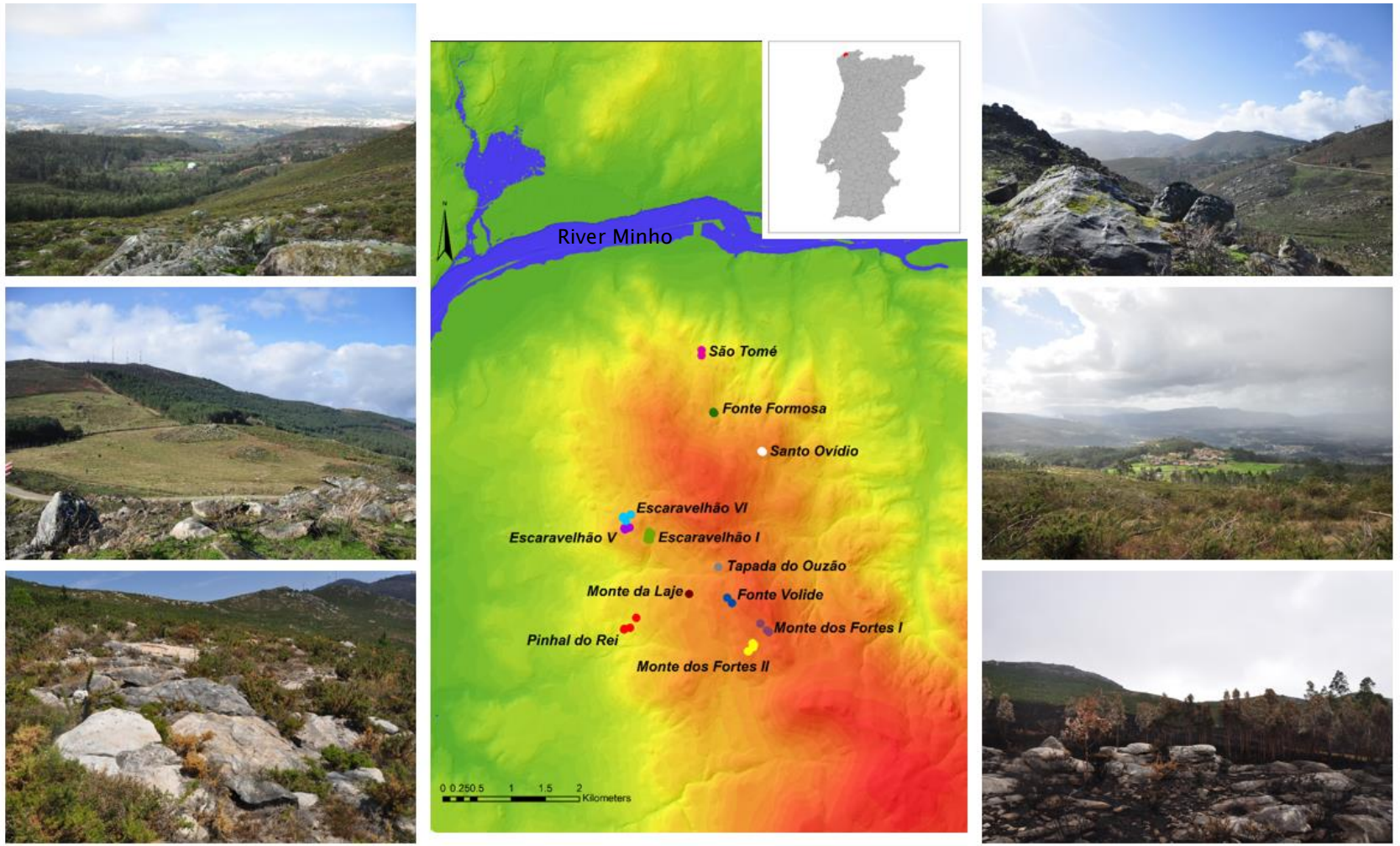


Figure 27 Site distribution and landscape types in Monte Faro (Valença, north of Portugal).

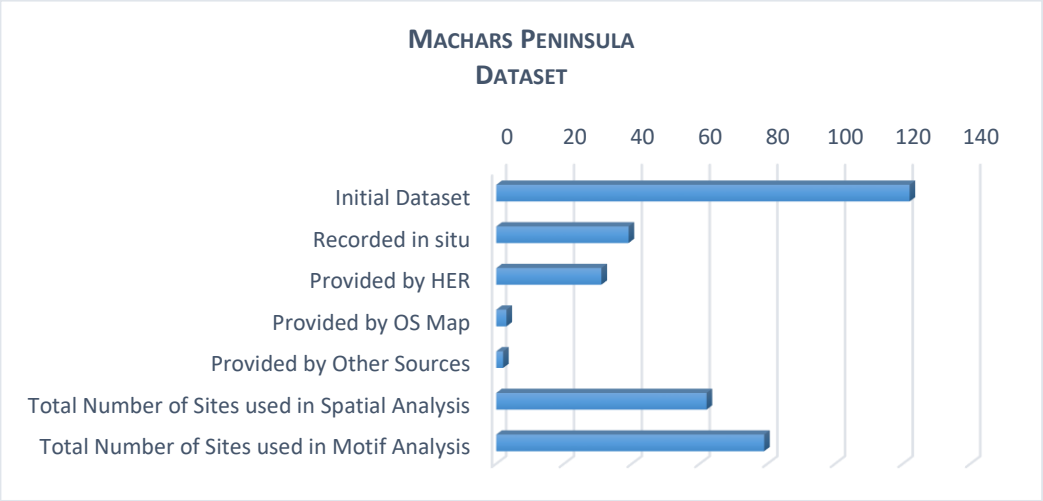
6.2. THE DATASET

Considering the timeframe available to carry out the project, the study areas for each country needed to meet the geomorphological selection criteria (see Chapter 3 for details) and have available and/or published datasets. These should include grid references, descriptions and drawings enabling relatively easy access to the carved rocks and the *in situ* acquisition of the data.

In most cases, the datasets resulted from a combination of data from different sources such as institutional bodies (e.g. HER in England and Scotland; National Monuments Service in Ireland), private researchers (e.g. Maarten van Hoek in Scotland) or ongoing projects (e.g. data for Monte Faro, provided by Lara Alves and Mário Reis). These were complemented with data recorded in the field.

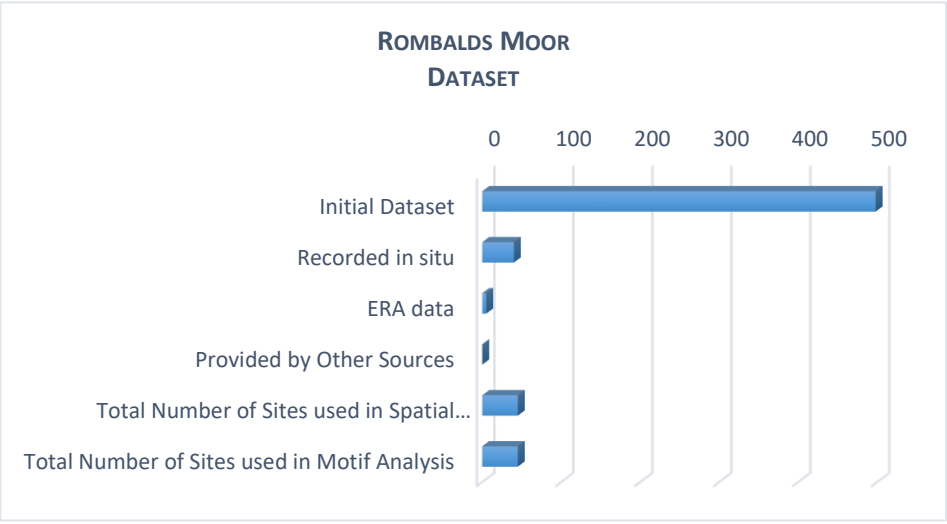
Considering the type of studies to conduct in order to meet the research questions, it was essential to ensure that the available data was as accurate as possible. Regarding the Environmental Scale of analysis, using accurate co-ordinates was essential to reduce spatial errors. It was also important to have a good perception of the carved compositions for the motif analysis. The fieldwork proved to be important in this regard, since in some areas the grid references had large errors (e.g. Iveragh and Barbanza peninsulas) and in other cases the existing drawings were not always very accurate (e.g. Byrne *et al.* 2009 in Iveragh). The grid references were rectified *in situ* and 3D models were processed for the majority of the rocks (3D models of many panels in Appendix 5.2, vol.2).

A list of known rock art sites was compiled for the Machars (Scotland) featuring the information gathered from the HER and published work by Morris (1979) and van Hoek (1995). These authors extensively surveyed the area and published descriptions, plans and detailed locations of the rocks. In addition, the OS Maps proved useful, displaying the accurate location of numerous rock art sites and more information was retrieved from '*The Machars: an Archaeological Survey*' (Douglas *et al.* n.d.). Synchronisation between the different sources led to an initial list of sites that was then amended after fieldwork verification, despite not all the rocks having been observed *in situ (*Graphic 1*)*. Having details and accuracy validated by the HER officers or other reliable sources, allowed the inclusion of a wide number of outcrops in analysis such as the Presence/Absence Matrix (PAM). This is the study area with the largest sample.



Graphic 1 Details about the sources of information composing the dataset of the Machars.

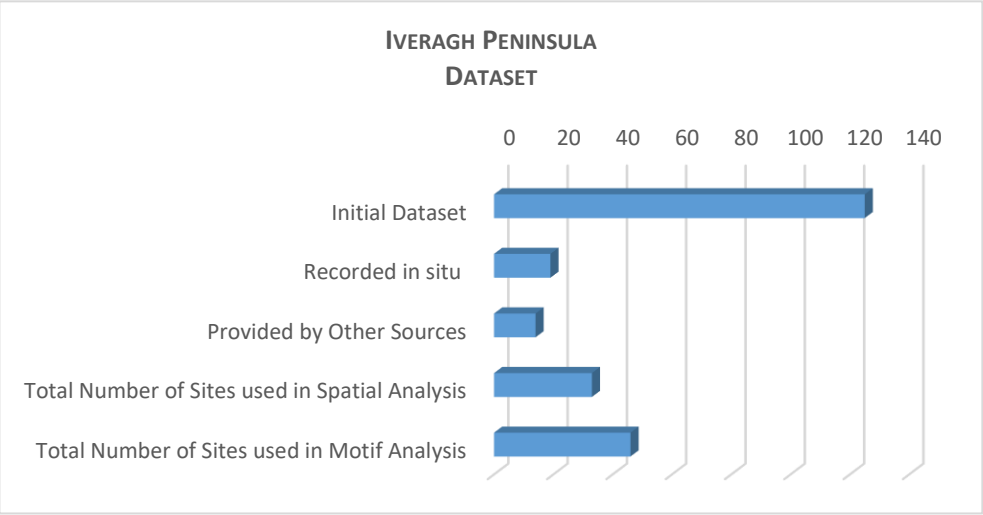
In England, the dataset was mostly extracted from the recently concluded volunteer-led project CSI: Rombalds Moor[31]. The results of this work should be highlighted for the accuracy of the information, including co-ordinates, and detailed descriptions, available online on the ERA website along with a few 3D models of the slabs. Complementary details were provided by publications and members of the Ilkley Archaeology Group (IAG) (e.g. Boughey and Vickerman 2003) (Graphic 2).



Graphic 2 Dataset details for Rombalds Moor.

[31] http://archaeologydataservice.ac.uk/era/

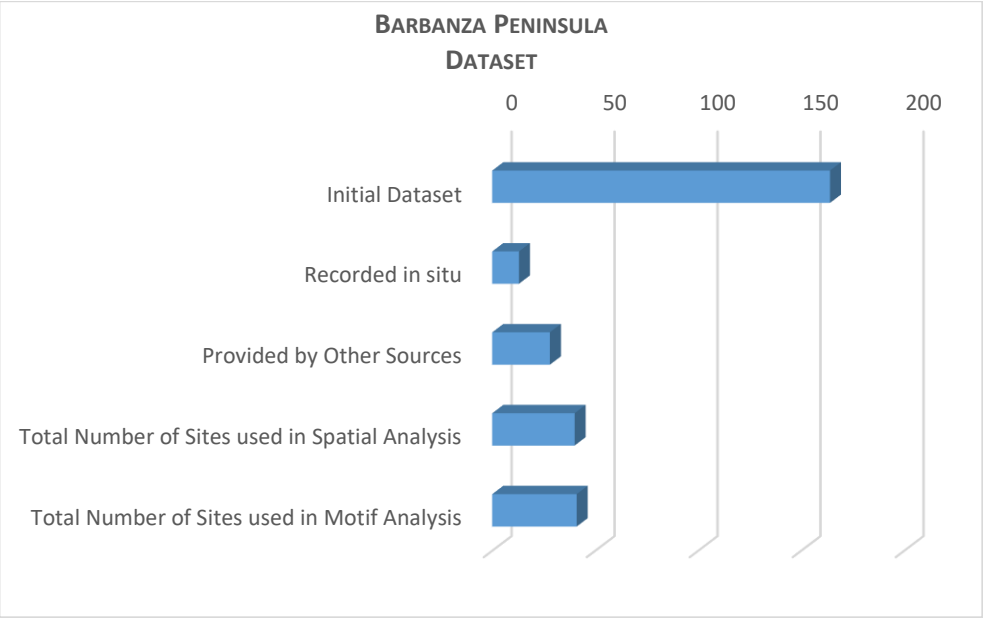
The dataset for Ireland was mostly gathered from existing catalogues of archaeological sites for Co. Kerry (O'Sullivan and Sheehan 1996; Byrne *et al.* 2009) and the National Monuments Service website (Graphic 3). Descriptions, coordinates, photographs and drawings were available. However, most of the grid references in these sources was innacurate, a fact which greatly affected fieldwork. The dataset was complemented with details of previous projects (e.g. Finlay 1973; Purcell 1994, 2002) and personal comments from other researchers[32].



Graphic 3 Dataset details for Iveragh Peninsula.

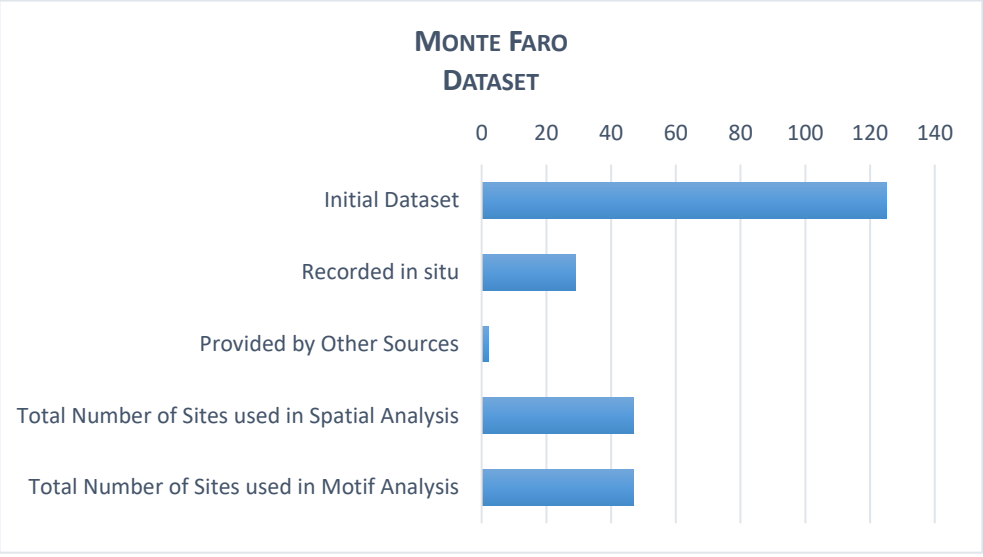
The work of Fábregas-Valcarce and Rodríguez-Rellán, in a published volume (2012) was the core dataset for Barbanza Peninsula. This comprised a theoretical and methodological framework alongside a catalogue with descriptions, a few drawings and photographs, although not extensively. Despite the density of carvings in this area they were difficult to find due to errors in the grid-references and as a result, only a small number of sites were inspected *in situ*. The dataset was complemented with more accurate data later provided by the authors (Graphic 4).

[32] Finola Finlay, Avril Purcell, Ken Williams, Rose-Marie Cussen.



Graphic 4 Dataset details from Iveragh Peninsula.

Finally, the Portuguese dataset is based on the intensive field survey conducted by Alves and Reis' in the area of Monte Faro and is largely unpublished. The finds resulted from a systematic research project which increased the number of decorated rocks from 12 to over 120 (Alves and Reis 2017a) in the region (Graphic 5).



Graphic 5 Dataset details for Monte Faro.

For every region a minimum number of 30 carved rocks was sought for each type of analysis. Only those rocks for which the grid references were correct, provided from reliable sources or acquired with a hand-held GPS in the field, were included in the spatial analysis. The Presence/Absence Matrix included all those rocks for which there were good photographs, plans or 3D models revealing clearly the motifs and their details. Rocks which may have been displaced were not included in the spatial analysis, but could be part of the motif analysis, should there be a good record of their iconography available.

6.3. THE FIELDWORK

"...to attempt archaeological work without doing field-work is exactly the same as to try to make a map of a country without going there."

(Crawford 1953:233)

The initial design of the project predicted extensive campaigns of fieldwork that would include visiting known sites, fieldwalking, registering and recording the rock's designs. Due to time management restrictions, the initial plan was changed and published data was privileged. Nevertheless, fieldwork was an important stage of the project, since close observation of the carved rocks provided an important input on the motifs, the techniques applied in the making process, rock morphology and landscape location. A threshold sample of thirty rocks was expected for each study area, although this number was not always achieved. The quality of the published datasets varied considerably, and in some cases their accuracy determined the success of the fieldwork campaigns. In Ireland and Spain the co-ordinates provided by the data sources were inaccurate which hampered attempts to locate the rocks, with errors ranging between 50 and 250 metres from the actual sites. As a result, only 14 sites were recorded *in situ* in Galicia and 19 in Iveragh. On the other hand, data provided by the HER of Dumfries and Galloway and the mentioned published volumes for the study area of The Machars, allowed the re-location of 42 rocks (Appendix 1.1, vol.2). A similar number of sites was recorded for Rombalds Moor (40), where the data extracted from the ERA website and the IAG volumes (Boughey and Vickerman 2003) were extremely accurate and the rocks were all found relatively easily (Appendix 1.2, vol.2). In Portugal twenty-nine rocks were documented during fieldwork (Appendix 1.5, vol.2). Despite the

accuracy of the co-ordinates, in this area the re-location of the rocks was, at times, challenging, due to a combination of weathering and the granite nature of the rocks, not ideal for the preservation of grooves.

Other factors such as weather conditions (Figure 27), vegetation and the terrain itself would pose limitations to the fieldwork, naturally constrained by time. Heavy rain, fog and forest fires were only some of the difficulties faced by the team, in addition to inaccurate co-ordinates.

Figure 28 Rain, fog and dark skies at Derrynablaha, Co. Kerry (July 2015).

In landscapes such as Iveragh's, with abundant outcrops and boulders, the weather conditions contributed to the invisibility of the carvings in the landscape, making it necessary to scrutinize in detail a great number of surfaces. Difficulty increased with very weathered examples, such as Derreeny 3, whose motifs were only fully assessed after the 3D modelling process.

Meteorological conditions also affected the type of documentation possible, since some recording techniques, such as photogrammetry surveys or Reflectance Transformation Imaging (RTI), could not be applied efficiently on wet surfaces.

Figure 29 Derreeny 3 (Iveragh Peninsula). Field photography (left) and 3D model (right).

When located, a site sheet was filled out for each rock (see Appendix 4, vol.2). These were specifically created for the project and encompass several levels of information, to meet the needs of the scalar approach described above. The site sheets included basic identification information for each rock and the synchronisation with other catalogues, inventories and national references, where existing.

At a large scale, a number of details were collected regarding landscape location, relationship with natural features, landmarks, viewsheds and description of visibilities. The large scale analysis is interested in the rock's locational attributes, whether it stands out, if it maintains relationships with other archaeological sites and carved rocks, if these are intervisible, but also if the decorated panels are accessible, evident or secluded, what kind of audiences could observe them and how. The 'Individual Site Description' section, corresponded to a medium scale analysis, describing the rock in terms of its geology, colour, shape, presence or absence of inclusions and other components, along with the relationships of the carving with its natural features. A small scale analysis is recorded through the 'Carved Rock Surface' section, which attempts to describe carving techniques, the motifs (in terms of number, distribution, internal composition, and dimension), presence of superimpositions, orientation preferences, the use of natural features, etc.

The photographic record included the general landscape context from various directions and details of motifs. When required, RTI recording was performed (see Appendix 5.3, vol.2, for details and 5.4 for RTI models), however, photogrammetry was the main technique used to document the majority of the carved rocks (see Appendix 5.1, vol.2, for details and 5.2 for 3D models).

Fieldwork methodology was mostly tested in the first campaign in Scotland with only a few rocks being recorded through photogrammetry in order to contrast results with existing plans by van Hoek (1995) and assess their reliability. Nevertheless, the strategy was adjusted for the rest of the study areas, photogrammetry surveys being done for the majority of rocks, enabling a more effective comparison between pre-existing drawings and the renderings of this technique.

Fieldwork had the specific objective of providing a holistic analysis of the carvings, rocks in which these were deployed and the environment where they are located. Spatial variables were specifically tackled during site evaluations and later contrasted with the results of GIS analysis. These were previously conducted to assess expectations, and later re-developed with data collected in the field. Of course, whether empirical or computational, our landscape analysis will always be biased since the rock's backdrop has changed and, currently hardly resembles the one experienced by Atlantic Art's creators. Even when deliberately attempted to ignore modern obstacles, these interfere with the experience, with quarries, boundaries, roads, gates and others being constantly encountered.

6.4. RECORDING ROCK ART

Recording is an intrinsic part of Archaeology, a predominantly visual discipline, with an imperative to visually document its study-objects (Jones and Bonaventura 2011:3). Rock art obviously has a very visual character, which continues to intrigue researchers, and recording it is a challenging task. The evidence is often fragmentary and fragile, but the designs are also difficult to identify and process, resulting in a highly interpretative outcome, which can raise issues of subjectivity. This is partly because we are not familiar with past iconographies. Nevertheless, the visual reproduction of rock art has always been a fundamental part of the field's research biography.

In the second half of the 20th century, the interest in recording rock art led to the development of various techniques, some of which quite accurate, using photography and contemplating a number of variables such as light and shadow conditions (e.g. Lorenzo-Ruza 1953a: 9-10). In the 1960s and 1970s the bi-chromatic colouring of carved surfaces became very popular along with the reproduction of latex and silicone-based moulds (Baptista and Santos 2013:34-36).

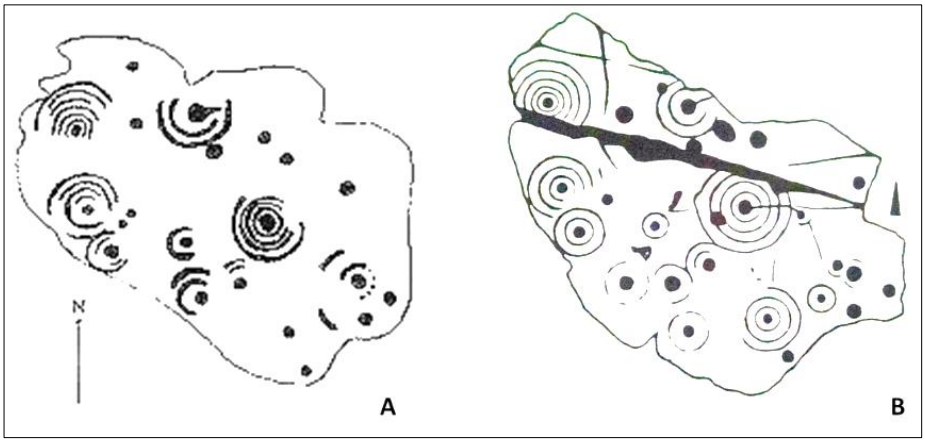


Figure 30 Representation of a carved rock at Culnoag (Machars), demonstrating different perceptions of what was depicted. A) after R. Morris (1979) and B) after M. van Hoek (1995).

These methods are now obsolete and considered harmful to rock surfaces and eventual organic remains encapsulated within the prehistoric grooves, potentially compromising future direct dating prospects. For the same reason, traditional recording techniques such as frottage and direct tracing over plastic sheets are in decline, although still used in many countries (Alves 2003; Alves and Reis 2017a; Baptista and Santos 2013; Domínguez-García and Aldecoa-Quintana 2007:1809; Fábregas-Valcarce and Rodríguez-Rellán 2012; Finlay 1973; Shee Twohig 1981; Valdez-Tullett 2013; Vilaça *et al.* 2011:299). These methods are currently being replaced by digital recording techniques, which do not imply direct contact with the media and/or the motifs.

For this project, most of the study areas had been previously recorded and therefore the initial dataset comprised drawings (Finlay 1973 for Iveragh; Morris 1979, van Hoek 1995 for the Machars, Boughey and Vickerman 2003 for Rombalds Moor; Fábregas-Valcarce and Rodríguez-Rellán 2012 for Barbanza), but also in some cases 3D models (ERA project in Rombalds Moor, a few rocks in Monte Faro). Iveragh Peninsula had been intensively recorded by Finlay through direct tracing (1973), a monumental dataset that was incorporated in the archaeological inventories that followed in subsequent years with only small (and rather inaccurate, in comparison) additions (Byrne *et al.* 2009; O'Sullivan and Sheehan 1996). The 3D models captured during fieldwork confirmed the accuracy of these plans, with slight changes being only exceptionally required. On the other hand, van Hoek's recordings of the Machars were based on a triangulation method corrected over photography. In general, despite being more stylized, the drawings are relatively accurate with some exceptions.

Because only a few rocks were recorded through photogrammetry in this study area, the motif analysis relied heavily on these drawings, once the degree of reliability was confirmed in the field. The Galician rocks were also mainly documented through direct tracing, and despite the risk of subjectivity, the drawings are quite accurate and were used thoroughly in this study, as only a few rocks were recorded *in situ*. The volume in which they were published, however, is not extensive and at times lacks graphic information (Fábregas-Valcarce and Rodríguez-Rellán 2012a).

Rombalds Moor is one of the most visible areas with rock art in Britain, having been studied by Bradley and becoming the prototype for his approach to rock art (1997). It was intensively investigated by IAG in the 1980s, who have compiled a catalogue of the area, with sketches of the carved rocks. These are very schematic and lack detail, therefore not very useful for the purpose of this study. However, the later development by ERA included 3D models of a great number of rocks. In many cases, these were not detailed enough, but constituted a good starting point for the study of Rombalds Moor and complemented the missing fieldwork data, when necessary.

Finally, the Portuguese study area remains largely unpublished with the exception of two sites (Figure 33 being one of them), of which only one has been integrally documented (Cunha and Silva 1980; Silva and Cunha 1986). The recent Monte Faro project added c. 120 new rocks to the region's inventory and the documentation of the surfaces is still being carried out with digital techniques (e.g. Figure 34). Due to the characteristics of the rock art in addition to the type of geology upon which the motifs are carved, these can be very difficult to recognise and photogrammetry has been pivotal in the identification of new occurrences.

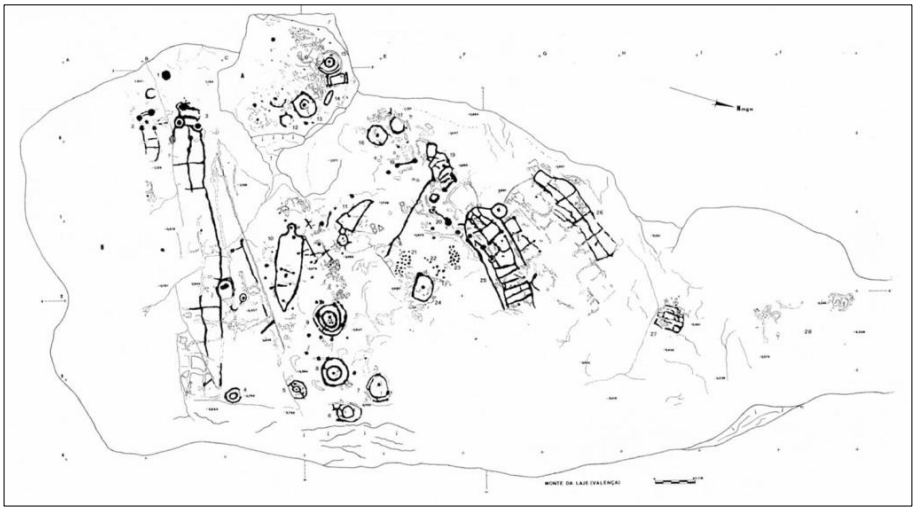


Figure 31 Monte da Laje, Valença, recorded by Ana Leite e Cunha and Eduardo Lopes da Silva (after Cunha and Silva 1986).

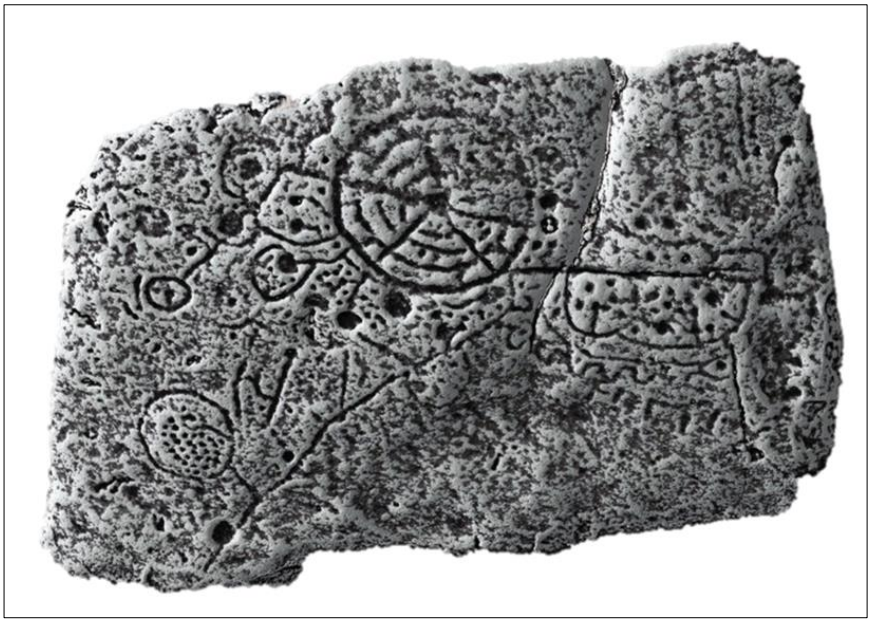


Figure 32 Monte dos Fortes 2 (Valença, Portugal). A rock known since the 1980s but only recorded recently with the Morphological Residue Modelling (MRM) technique developed by Hugo Pires (in Alves and Reis, 2017b).

It is currently accepted that traditional recording methods such as direct tracing, scale drawing or tracing through photographs have limitations, mostly due to a high degree of subjectivity enforced by the need of selection and interpretation during the data gathering process (Díaz-Guardamino and Wheatley 2013:189). The final objects resulting from these recording methods are by definition flat and mostly black-and-white 2D images, which lack

the ability to capture the essence of the monuments, their volume, micro-topography, three-dimensionality, depriving the researcher of vital information (Díaz-Guardamino and Wheatley 2013:189; Robin 2015:35). These limitations were, in a sense, overcome with a turn in rock art recording techniques triggered by the introduction of computer imaging methodologies. Not only did this revolution modify the way in which information is captured and documented, it presented the researchers with an array of 3D possibilities and precise interactive models, in which carvings, rock surfaces and contexts can be represented and explored (Robin 2015:35), in the field but also in the controlled environment of an office.

Recently, more 'scientific' applications of digital imaging analysis have benefited from new developments with Digital Image Analysis (DIA) and RTI gaining importance (Rogerio-Candelera 2015:69). RTI is a low-cost computational photographic technique used to augment details from the face of objects, making use of a surface's reflectance properties, enhancing their shape (Díaz-Guardamino *et al.* 2015:41). The product of this technique allows an interactive visualisation of the object, with controlled lighting conditions, and a thorough documentation of the recorded piece (Díaz-Guardamino and Wheatley 2013:190-191; Malzbender *et al.* 2000; Malzbender *et al.* 2001). Throughout fieldwork it became apparent that RTI is more appropriate for the documentation of details and small portions of surfaces and therefore photogrammetry was preferred as a recording method. However, RTI was useful for documenting features such as superimpositions or details of tool marks and techniques.

Figure 33 Recording with RTI at Rock 6 of Escaravelhão I (Monte Faro, Portugal).

Photogrammetry consists of the capture of a series of overlapping photographs of an object's surface, taken from different positions. The intersecting points are then stitched together in a designated software to form a 3D model of the surface in which depth is represented (Miles *et al.* 2013:146-147).

The advantages of digital recording, in particular their non-invasive and non-destructive character, outweighs any tradition recording method, and therefore the frequency of their application is rising amongst researchers. Digital imaging offers a decrease of subjectivity and more dynamic tools of model manipulation, resulting in more accurate representations of rock art including motifs that would otherwise be invisible to the naked eye. They also open new avenues of investigation and the possibility to address research questions that were previously inaccessible (e.g. superimpositions, execution techniques, diachrony of motifs, analysis of a rock's micro-topography), shedding light on the biography of artefacts (e.g. Díaz-Guardamino and Wheatley 2013).

A combination of 2D, 2.5D (RTI) and 3D recording procedures is seemingly the way forward, considering that each method has its strengths and weaknesses and in general can contribute differently to rock art visualisation (Robin 2015:36). The size and morphology of the surfaces, as well as the type of depictions to model, must determine the recording technologies to use.

DOCUMENTING ATLANTIC ROCK ART

Considering the study objects and the purposes of this project, photogrammetry was the preferred recording method used. Whilst initially the main objective was to use pre-existing drawings of authors, it soon became clear that these were often not accurate enough and would not provide the necessary details for the analysis to be performed. Furthermore, certain levels of interrogation could not be conducted with the traditional 2D drawings made by third parties. Unlike RTI, this technique enabled the recording of large surfaces, without being too time-consuming, and consequently providing a better visualization of the motifs within their rock context. Simultaneously, when conducted in high resolution at smaller scales, the method is also capable of providing detailed insights into carving techniques (e.g. Drumtroddan 1A, Machars; North Balfern, Machars; Kealduff Upper 2, Iveragh). Even the

most weathered motifs can often be enhanced using different renderings on the 3D models, making photogrammetry a useful tool for fieldwork at various stances (List of 3D models in Appendix 5.2, vol.2). This situation was particularly striking in the Portuguese study area, where many rocks were only conclusively catalogued after their 3D modelling (e.g. Rock 2 and 5 of Escaravelhão 1; Rock 1 of Escaravelhão 5, Monte Faro – Figure 36). Despite the suspicion that certain surfaces were carved, these were only confirmed with the photogrammetry surveys. Of course, the same is true for those rocks with only natural features.

Figure 34 Escaravelhão 1, Rock 5 (Monte Faro): A grid was carved on an extensive granite outcrop. The motif is very weathered can hardly be felt and it is not visible at all. It was confirmed through a photogrammetry survey and 3D model.

The photogrammetry models were, when required, complemented with the documentation of details with RTI. This technology has recently been successfully and more widely applied to the recording of rock art (Díaz-Guardamino and Wheatley 2013; Earl *et al.* 2010, 2010a; Kleinitz and Pagi 2012; Mudge *et al.* 2006; Díaz-Guardamino *et al.* 2015). A simple technique, with no special equipment requirements and benefitting from open access software, RTI facilitates the analysis of subtle changes on the object's surface morphology and detailed observations at small scales. The model is produced through the capture of a sequence of photographs from a stationary point towards a fixed object, under specific lighting conditions. The resulting RTI is then manipulated in an interactive software. The technology's versatility means that it can be used in indoor contexts as well as in open landscapes, both on vertical and horizontal surfaces and the possibility of post-capture corrections. The final result, however, is a 2.5D isometric representation of the object, since

the technique is unable to provide 3D geometries (Díaz-Guardamino and Wheatley 2013:200). Unlike photogrammetry it does not afford metrical data (Historic England 2013).

In the Machars, RTI was the preferred recording methodology, although when used in large areas of the rocks the results were not satisfactory. At this point, photogrammetry became the preferential method for the remaining study areas. However, RTI was used in specific situations to assess the relationship between motifs or the interaction between these and natural features of the rocks (e.g. Kealduff Upper 2, Iveragh) (Figure 37). In general, the project complies with the idea that digital recording techniques are advantageous for their accuracy, implementation and visual results, but also for their non-invasive and non-contact nature, meeting recent concerns of heritage preservation and safeguard.

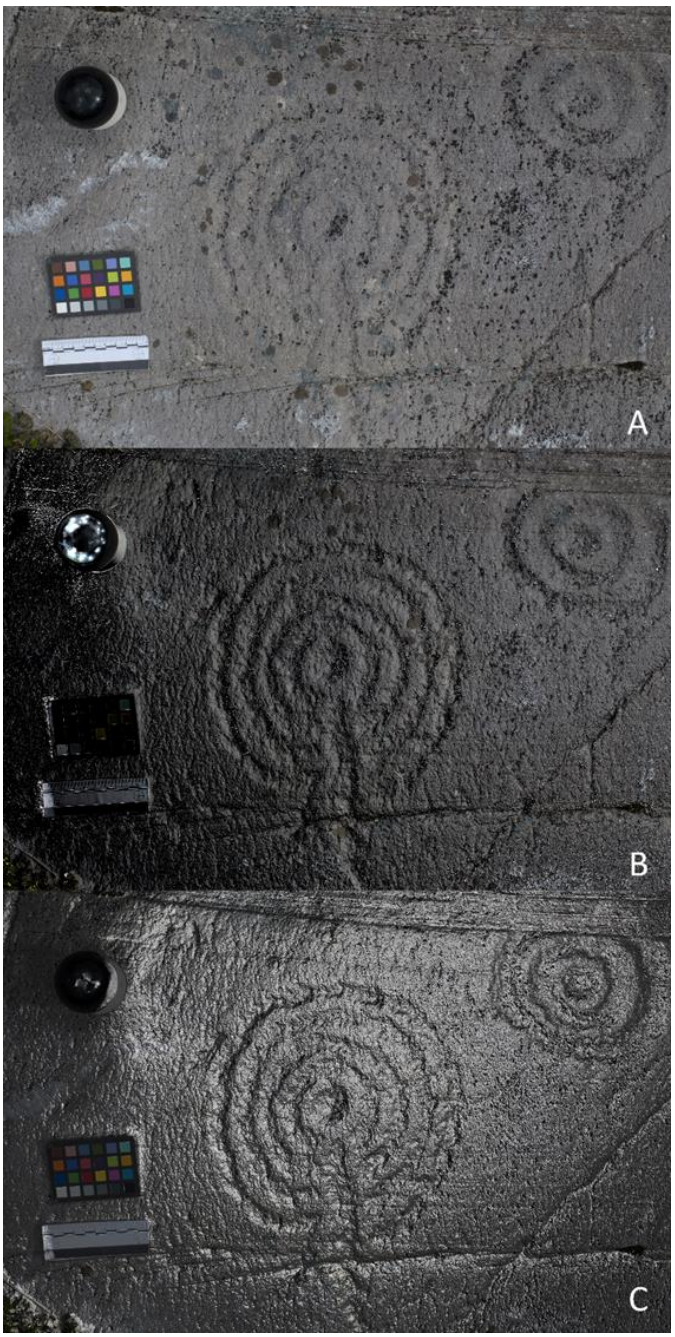


Figure 35 Rock 2 of Kealduff Upper (Iveragh Peninsula). RTI was used to understand the relationship between motifs and a large strip of different geology that crosses the medium, but also to compare motifs that were side by side and presented differential weathering conditions. 23A. Original capture; 23B. Diffuse Gain; 23C. Specular Enhancement.

CHAPTER SEVEN: RE-ASSESSING ATLANTIC ROCK ART

The assessment of differences and similarities within the context of Atlantic art aims to identify local and regional variations and identities, functions, meanings and chronologies. But how can one assess a creative tradition of which we know so little, apart from recognising a certain type of iconography? The starting point followed Bradley's premise in which Atlantic Art studies should focus on parameters beyond typologies (1997:42-43), emphasising design's structure, rules and assemblages of motifs in determent of individual types. It extends the analysis to the all-important landscape location, pivotal in the interpretation of the kinds of messages conveyed by the symbols, as well as carving techniques and motif behaviours. Much of this approach has an anthropological foundation, based on the relationship between people and rock art. This perspective contrasts with previous hermetic approaches, especially in Iberia, providing a fresh background to the practice of carving. The emphasis on landscape is an important turn in rock art studies and other approaches elsewhere. For instance, the examination of Comanche rock art in Rio Grande Gorge (Taos, New Mexico), dated to the 18th century, has shown that rock art was in fact used for a multiplicity of reasons, and practiced in many different locations. The type of places selected for carving, alongside the carving techniques played an important role in rock art's fulfilment (Fowles and Arterberry 2013:72).

A combination of methods was used to explore similarity and difference between the case-studies. According to Deleuze's principle of differentiation, an object may be copied from other, be physically similar, but have different meanings. A similar situation may have occurred with Atlantic Art, especially considering the wide geographic scope of the tradition and how the regions were connected during prehistory. Communities inhabiting these places could share some common practices, but probably had local social and cultural contexts, which may be apparent in regional preferences of the rock art, and other types of archaeological record. As such, comparing the local assemblages directly did not seem to be a viable option, since paralleling things that are different in nature, will certainly produce biased results.

To overcome this limitation the methodology was defined under three and four scales of analysis. The first relating to the graphical analysis of the designs and their immediate context, such as that of the rock medium, whilst the latter was applied in a wider landscape context in which, at times, it was necessary to zoom in into the panels, but also assess their immediate surroundings, the local context and the environment.

Essentially, three main strategies were combined, aiming at a comprehensive characterization of Atlantic Art, which formed the basis of comparison between the study areas. A small scale of analysis looked at Atlantic Art motifs. Although not engaging with simplistic views of typologies, the approach returned to the study of shapes and grammatical rules in order to develop an ontological perspective of the motifs, making and compositional structures involved in their fabrication. The context was provided with an assessment of the engagement between iconography and the rock medium, as well as the overall interaction between this whole and the wider landscape.

The establishment of differences and similarities was gauged in the Environmental scale of analysis through the comparison of a number of spatial variables assessed through a GIS/computational approach, contrasted with a more experiential phenomenological perspective, observed during fieldwork. The sensorial scale of analysis saw an overlap between methodologies, since its object was assessed both through GIS (e.g. visibility towards the carved rock), fieldwork observations and the Presence/Absence Matrix. Finally, the graphical scale relates to the analysis of the motifs. These have been studied by a number of authors seeking to establish rock art's differences and similarities, often under the form of classificatory schemes (e.g. Bradley 1997; Johnston 1989; O'Connor 2006; Purcell 1994). In this regard O'Connor's (2006) work was influential, since both projects shared a number of objectives. Results of this multi-scalar and multi-disciplinary approach were combined and contributed effectively to a renewed assessment of the practice.

The categorical scheme was pivotal in this process, providing a detailed insight into the making of Atlantic rock art. The motifs were deconstructed from their original compositions into simple and comparable shapes. This enabled the comparison of complex features which may have been built over long periods of time, by different hands with different cultural backgrounds. The exercise of individually analysing thousands of motifs was very important and enabled the identification of fundamental nuances between motifs and study areas. A Presence/Absence Matrix (PAM) was created to investigate further the differences and similarities of Atlantic Art, which were then input in a Social Network Analysis (SNA) system to assess the behaviour of carving practices and to explore the connections.

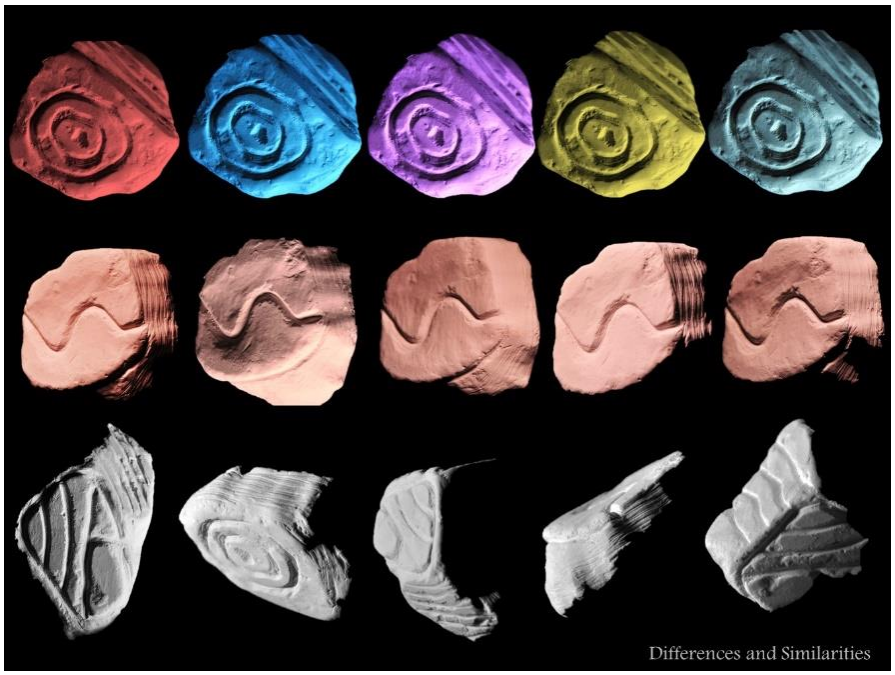


Figure 36 'Differences and Similarities'. Reproduction of Atlantic Rock Art grammar on chalk. (Produced by author at a workshop in Winchester School of Art included in the Chalk Festival, 9th September 2015). Composition by Joana Valdez-Tullett.

7.1. DESIGN AND GRAPHICS: AN ART OF ILLUSION

Authors argue that typologies dilute differences (Fowler 2017), one of the reasons why its use is so criticized. For the study of Atlantic rock Art, however, under the form of categories and attributes, it was an important mechanism to identify levels of variation and create a platform from which comparisons were possible. The scheme implemented here is not only highly detailed, but incorporates a multi-scalar character, making it dynamic and capable of relating the many defined categories at any scale of analysis.

Types evolve over time and new types may develop in relation to previous ones (Fowler 2017:97). The long lasting character of Atlantic Art illustrates this point particularly well and its seemingly long diachrony could have triggered the development of variation and local traditions/preferences, echoing Deleuze's process of *differentiation* (2004). Societies may have been in contact but ultimately they were also immersed in their own assemblages of practices, customs and beliefs, which may have shaped their relationship with the motifs and compositions. In addition, other physical characteristics would have been involved with

the carving practice, such as the rocks available to carve and make tools from, or the local topographical and geomorphological conditions. The dynamic character of these assemblages mean that they are continuously evolving and changing. Interaction with other assemblages could potentiate these changes, which could include the introduction of new elements accommodated in previously existing arrangements (Hodder 2012:113-137). Such may be the case of the depictions of weapons and animals in Iberia. Whilst the weapon's chronology is relatively straightforward due to the detailed character of the representations in comparison to their material counterparts, the dating of the animals is still controversial. Even if they belong to a different chronological period to that of the cup-and-rings, to our modern eyes they are in harmony with the overall assemblages.

It could be argued that a classificatory scheme used in this approach, based on 11 categories and 341 attributes may create false variability (Table 4). On the other hand, a minimal number of variables may introduce bias by not providing enough detail when assessing difference and similarity. The model used here relates to the nature of the data, which is essentially similar but with numerous nuances, the geographical scope of the project and the long period of use of the carvings. The latter may have had an important role in the evolution of the style which we are not necessarily aware of.

In practical terms the categorical scheme was built over an extensive table in which the motifs, their media and landscape location were quantified, first in counts and then through a binary system. The first assessed the real number observed for each variant, whilst the second the frequency. In the first case, the results were mostly driven in percentages, considering the uneven number of carved rocks between the study areas. However, since the exact location of each panel is not essential for this analysis, and in order to promote a wider diversity in terms of designs, an effort was made to include the largest number possible of carvings. As such, a number of *in situ* panels, which were not visited, were added to each study area, where reliable drawings, photographs or 3D models were available.

The exercise of categorizing items, in this case rock art, is subjective as it depends on the researcher's personal understanding of Atlantic Art, and their capacity to decide, for example, what is a 'simple' composition or a three-dimensional representation. In order to minimize levels of subjectivity and enable the comparison of the study areas with others, the applied criteria followed, whenever possible, those used in previous studies. As mentioned above, the main categorical model followed that devised by O'Connor (2006), complemented by the ERA project parameters. Some categories and attributes were directly imported from

these sources, others adapted and others specifically created to meet the specificities of the project. The details and description of categories and attributes can be found in vol. 2, Appendix 6, and the results of the analyses in Appendix 9.

Table 3 Total number of rocks and motifs used in the study.

STUDY AREA	NO. OF ROCKS P/A MATRIX	NO. OF ROCKS SPATIAL ANALYSIS	TOTAL NO. OF MOTIFS
Machars Peninsula	85	71	1266
Rombalds Moor	45	45	974
Iveragh Peninsula	46	33	1313
Barbanza Peninsula	41	40	839
Monte Faro	46	46	647

O'Connor's approach was more complex than other rock art studies (e.g. Bradley 1991, 1997; Cussen 2009; Johnston 1989; O'Connor 2006; Purcell 1994), inasmuch as it was based on three strategies of analysis, and in many ways, quite experimental. A first step implied the classification of the panels centred on their composition and motif types, followed by a presence/absence analysis of a set of attributes characterizing the design features of the motifs and their structural principles. Finally, she looked at the reliance of the classification method based on design elements and grammatical behaviours (a feature of taxonomic classification). A surface may or may not have cup-marks and these can have 'behavioural attributes', depending on how they respond to certain types of arrangements (O'Connor 2006: 217-218). This method allowed the confirmation of some characteristics previously highlighted by other authors as quintessentially Atlantic, such as the incorporation of natural features in the compositions (e.g. Bradley 2002), and the comparison of extensive datasets from the three case-studies featuring the investigation (O'Connor 2006).

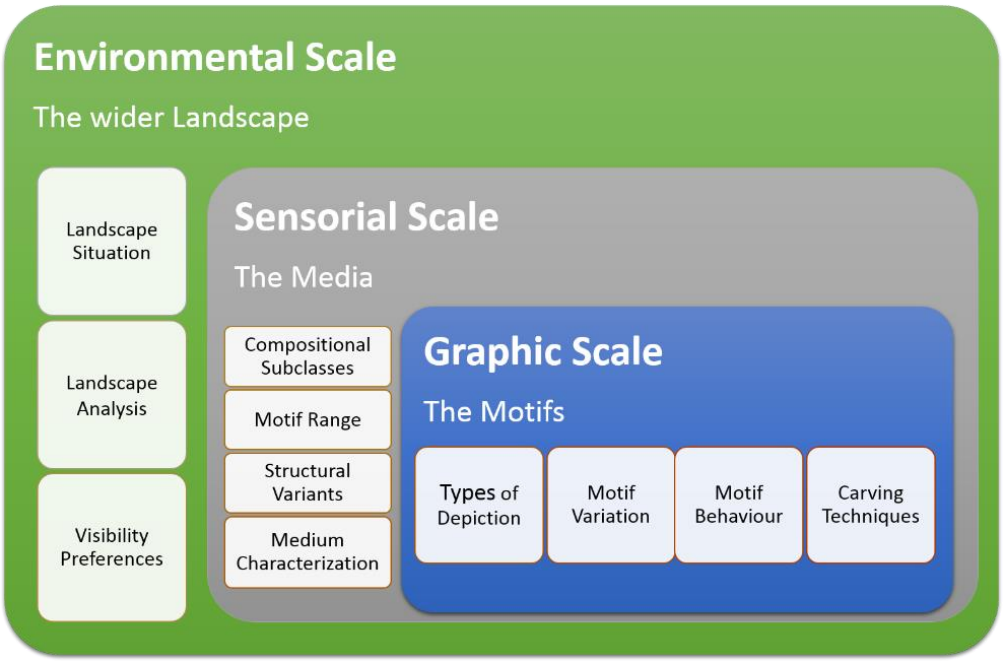


Figure 37 The three main scales of analysis and which categories and attributes are related to each of them.

In the present study, the categories were organized in the same threefold scale scheme devised in the methodology (see Chapter Six) and the analyses performed aimed to follow the lines of investigation defined for each general theme (see Chapter Six). As such, *Types of Depiction*, *Motif Variation* and *Carving Techniques* focus on the small aspects of Atlantic Art, the motifs. These categories examine the morphology of a number of types, their physical relation to the rock face, as well as the processes used to create them. The sensorial scale explored the motif's interaction with the rock medium in terms of organization and behaviour, but also the characteristics of the latter which may have led to its selection. Finally, the interaction between the carved rock and the wider landscape features the *Landscape Situation* and *Visibility Preferences*. The detailed assessment of each category enabled the identification of differences between the structural morphology of the motifs, as well as how they were organized on the rock surface and particularly how they were conceived. During fieldwork it became apparent that the visual results of the engravings vary regionally, depending much on the type of geology on which they were carved.

The Presence/Absence Matrix (PAM), as the name implies, is a method which assesses the existence or not of a certain attribute within a sample. In this case, it was applied in order to identify the most commonly used motifs and iconographic preferences in each study area. In practical terms, the PAM was drawn from the categorical system described above, this time

transformed into a binary system. The categories, sub-categories, variants and attributes were maintained, but classified with '1' when present and '0' when non-existent. This means that even if there are 5 cup-marks and one ring motif on the same surface, the table will only display a 1 for each attribute, signalling the presence of the designs.

Perhaps 341 attributes (see Table 4; for details on the categories and attributes see Appendix 6, vol.2) used in the matrix seem excessive, and the manageability of the dataset is compromised when explored through certain methods, however it enabled a deep insight into the tradition of Atlantic Art and led to important conclusions. The attributes were led organically by the evidence. Although at a large scale the study areas look rather identical, the introduction of detailed variables revealed particularities that would otherwise be overlooked. It was then obvious that the dynamic and relational classificatory scheme was meeting the purpose of investigating and identifying existing variability between the case studies. In some cases the variations were subtle, but since one of the main research questions of the project related to the unified character of Atlantic Rock Art, it is essential that one does not 'assume that these differences are insignificant' as such an assumption would only 'reduce the motif range to a more homogenous phenomenon' (O'Connor 2006:227). Furthermore, as demonstrated by ethnographic work on Australian Aboriginal rock art, minor details such as the difference between broken and unbroken circles, may hold symbolic importance (Martin 2003).

As ascertained previously, the analysis of motifs involves a degree of subjectivity and the defined categories may have had no meaning to the prehistoric carvers. Furthermore, the available data is obviously fragmented, either because the rocks are partially covered and with them the rest of the imagery, or because part of the motifs are weathered and difficult to identify. 3D models created through photogrammetry and RTI were pivotal in the identification of the carved motifs and their morphological details. The construction of the PAM and the examination of each carved surface in order to fill in the information constituted an important exercise which contributed to a deep understanding of the essence of Atlantic Art and its regional and inter-regional variations. This approach is a first step to test the premise laid out in the Hypothesis section (see Chapter 4), suggesting that a 'package' composed by a certain number of motifs, carved with specific techniques and located in particular places in the landscape travelled and was culturally transmitted between the people inhabiting the geographical areas involved in the study. The main motifs initially

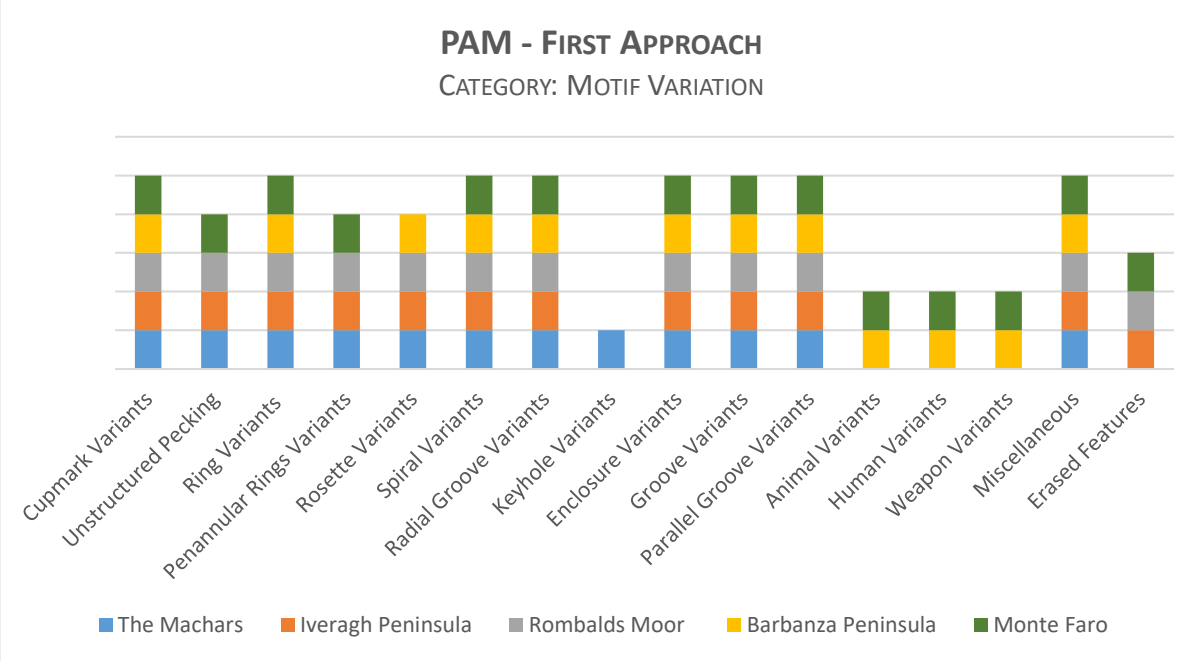
included in this package are cup-marks, cup-and-rings, penannular, radial grooves and wavy/linear grooves that connect designs.

Table 4 Summary of classificatory scheme used for the PAM analysis. Relation to the methodological scales of analysis to which the categories relate. More detail can be found in Appendix 8.

CLASSIFICATORY SCHEME			SCALE OF ANALYSIS
CATEGORIES	NO. OF SUBCATEGORIES	NO. OF ATTRIBUTES	
Types of Depiction		3	Small Scale
Compositional Subclasses		7	Medium Scale
Motif Range Subclasses		3	Medium Scale
Motif Classification	17	214	Small Scale
Motifs Structural Variants	4	17	Medium Scale
Motifs Behavioural Variants	6	13	Medium Scale
Carving Techniques		10	Small Scale
Medium Characterization	9	39	Medium Scale
Topographical Situation	3	14	Large Scale
Preferential Visibilities		8	Large Scale
Landscape Analysis		13	Large Scale

The approach to the matrix was phased according to three different levels of analysis. The first order of examination looked only at the main categories, excluding all variations, to provide the typical characterization of Atlantic Art. The categories were analysed in their basic forms (i.e. presence or absence of cup-mark variants, ring variants, boulders, outcrops, etc. See full list of criteria in Appendix 7, vol.2). Additional information usually used to describe Atlantic Art was included, such as the rock medium (horizontal or vertical, low-lying or above ground) and the landscape location, said to be preferentially located on platforms half-way up slopes that command extensive views. The category of grooves was only represented through straight or wavy lines. This principle of simplicity was applied similarly across all the categories. No relevant patterns were identified in this approach, corroborating the general idea that Atlantic Art is a widespread, unified phenomenon.

A second approach to the PAM introduced more variation in terms of the main categories, this time considering smaller details such as the ovals or extended circles within the 'Circular Motifs', or conjoined cups for the cup-marks or segmented enclosures. The number of attributes included in this approach was still easily manageable in terms of quantification and specialized statistical analysis, and broadening the number of attributes contributed to the identification of more detailed variation between the study areas. However, a third approach, including all the variants and attributes defined in the initial categorical system provided a better perspective about each region's rock art and the necessary details to establish comparisons and relate the assemblages.



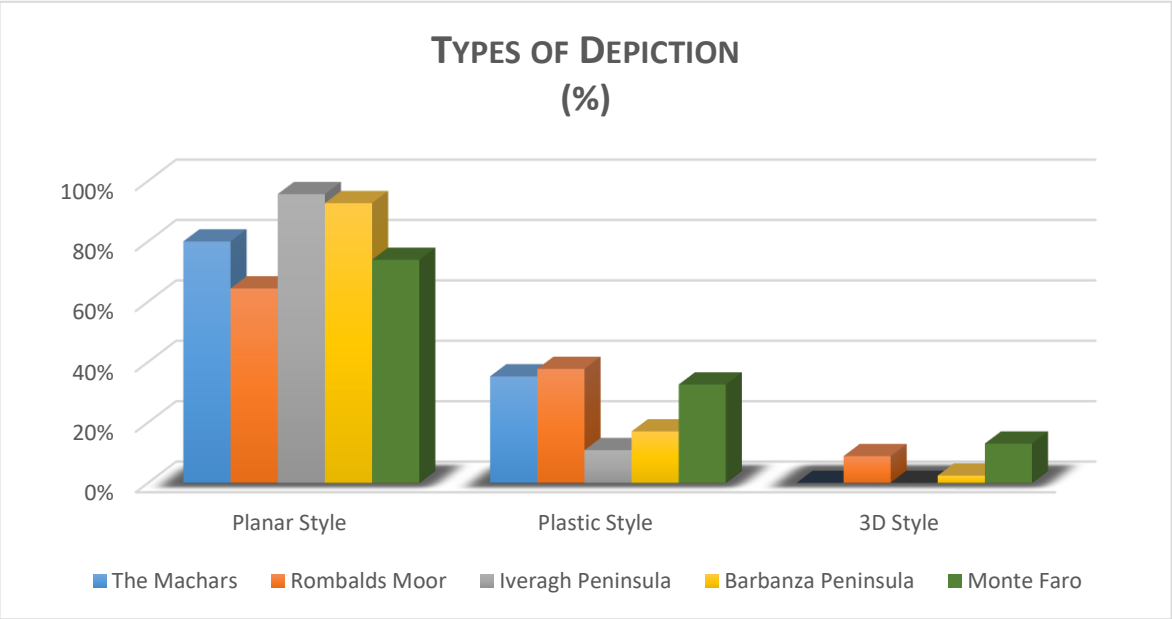
Graphic 6 First order of analysis, representing the number of times each attribute was documented per region, based on a binary system. Applied to basic attributes of the category Motifs Variation.

Graphic Scale

Types of Depiction

The category *Types of Depiction* was previously used by O'Connor, although it was slightly transformed for the purpose of this study. It assessed the relationship of the motifs with the rock medium and this differs considerably regionally. The general pattern seems to

be a preference for a *Planar Style*, in which the motifs are quite unresponsive, with little moulding of the images to the rock surface. This is the case in Iveragh, where the chosen surfaces are often levelled and would not allow for a more sculpted results. On the opposite side, some carvings embrace completely the physical features of the medium, acquiring a striking three-dimensional character. This is particularly noticeable in Monte Faro and to a certain extent in Rombalds Moor. In the Machars, only one motif was examined that could be included in the plastic or 3D attributes of this category (Drumtroddan 3A), but the execution technique is quite different from the remaining decorations of the outcrop and other examples nearby, raising questions as to whether it is originally an Atlantic motif. The deep grooves with quite sharp edges suggest that this is not an old engraving, or that it may have been re-carved. Nevertheless, the way this motif was created, using a particularly raised area of the outcrop, was verified in several other occasions. The *Plastic Style* is an intermediate stage between the *Planar* and the *3D Style* nature of the carvings, in which the motifs are more reactive to the micro-topography of the rock. Although not completely sculpted, they may even incorporate some elements into their compositions. It was documented in all study areas. In the last two types, there is an intricate relationship between the imagery and the rock face, which is not just an empty canvas, but facilitates the accomplishment of the motifs. It is possible that, instead of looking for landmarks, standing out in the landscape, the practitioners were more interested in small details such as bumps, hollows, fissures or crevices, with which combine their carved motifs.



Graphic 7 Types of depictions for each study area, following a Planar, Plastic of 3D style.

Figure 38 Detail of three-dimensional motif at Escaravelhão 5 (Monte Faro, Portugal).

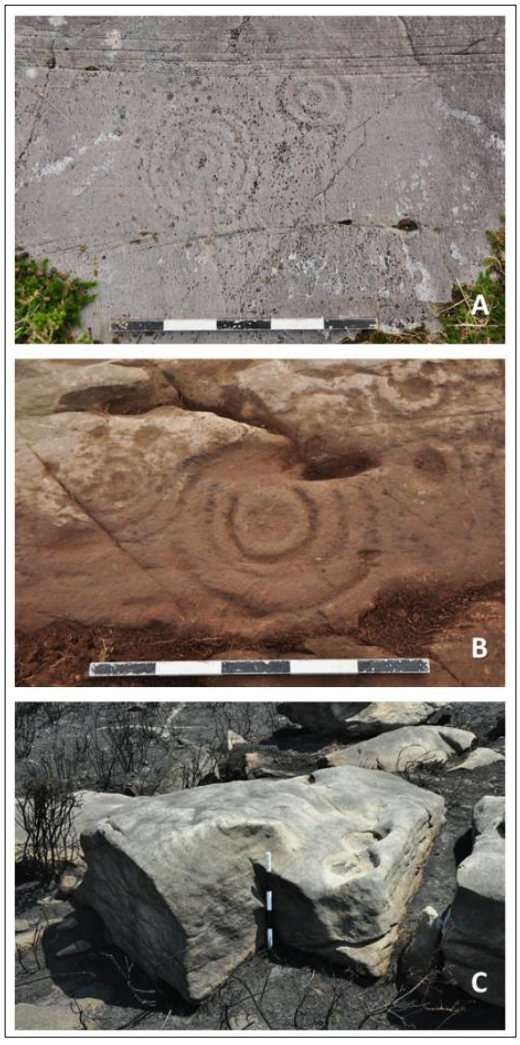


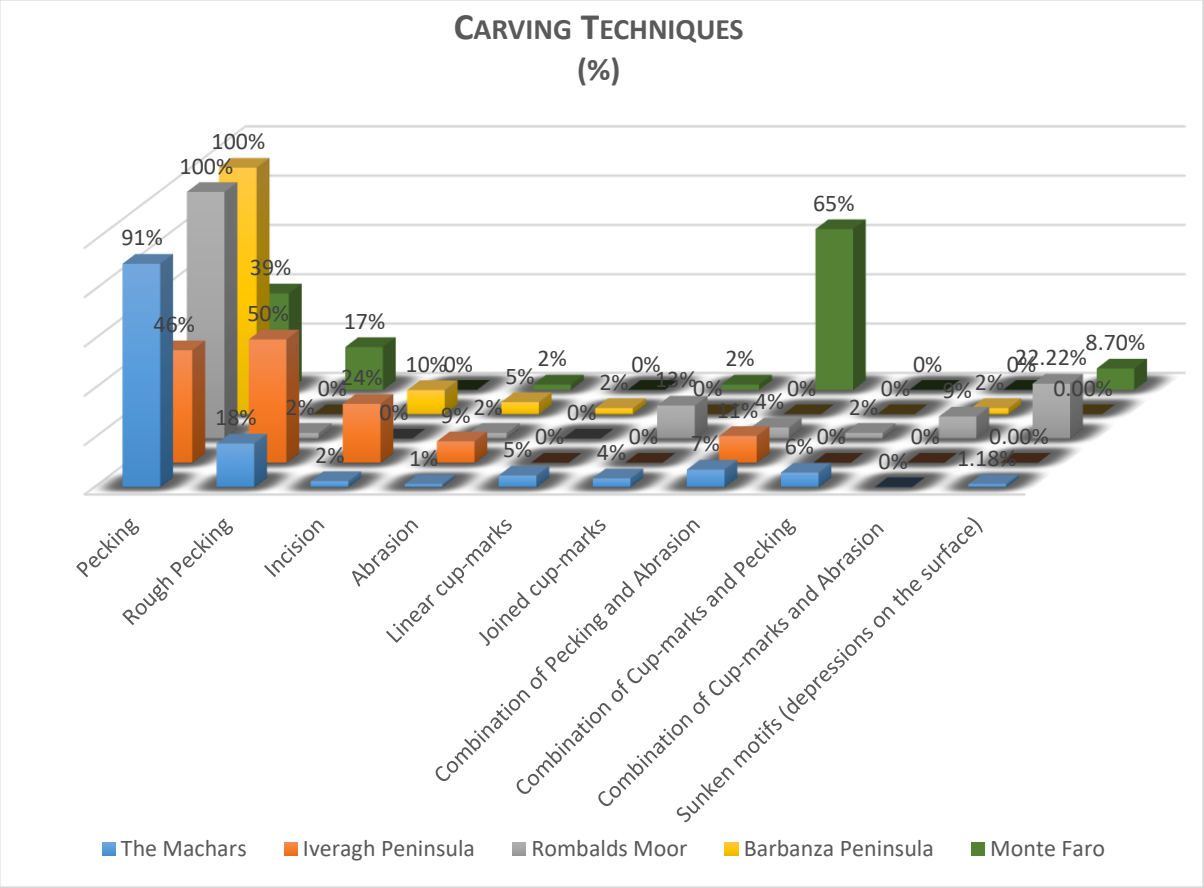
Figure 39 Examples illustrating the attributes of "Type of Depiction" category: A. Planar, Kealduff Upper 2; B. Plastic: North Balfern (Machars); C.3D Style, Monte dos Fortes 2.

Carving Techniques

The final result of the decorated panels and the types of depictions described above are intimately connected to the techniques used to carve (see Appendix 6, table 24 for details) and the tools required to accomplish the artwork. Here too differences were found, and although pecking is overwhelmingly the most common engraving technique, other variations were identified. It seems likely that most depictions were made through the hammering of rock surfaces, probably with stone tools. Pecking could have been performed directly on the rock face or indirectly, with the use of a chisel for more controlled results of the grooves. The analysis of this category was based on field observations and the assessment of the digital imagery produced with photogrammetry and RTI. Currently, known information about carving techniques derives mainly from the study of the groove's morphology which can be problematic considering the weathering agents. Occasional experiments (e.g. carved rock located at the entrance of Campo Lameiro Park, Galicia) have shown that the carvings weather quickly and can become quite unnoticeable in a short period of time. Furthermore, a few fragments recovered from a limited number of archaeological excavations, provide some insight into these actions. In Kilmartin Glen (Mid-Argyll), small chips of stone tools were recovered near the Torbhlaren decorated rocks, alongside possible hammerstones which were interpreted as carving instruments (Jones *et al.* 2011b:74-75). Similarly, the archaeological excavations of Ben Lawers (Perth and Kinross, Scotland) produced a number of deposits composed of broken and flaked quartz, focused around the more densely decorated rocks, also associated with the act of carving (Bradley and Watson 2009; Bradley *et al.* 2010; Bradley *et al.* 2012).

The *in situ* observation of the carved rocks and comparison with other known sites and types of carvings enabled the identification of various techniques used to produce Atlantic Art. The below chart (Graphic 8) describes 10 types of methods, some of them using one action, others a combination. The use of digital recording techniques was pivotal for this assessment, since the 3D models augmented the characteristics of the grooves and provided a reliable means for thorough observation of minute details. Nevertheless, not all carving techniques left the same kind of traces on the carved rocks, mainly because of local geologies. For example, tool marks can be often documented in the Machar's greywacke or Iveragh's sandstone, but Iberian granite does no preserve this kind of information. The rocks are grainy and tend to crumble over time, softening the edges and the inside of the grooves. As a result, in many cases it was only possibly to classify the techniques as 'pecking' which, to a certain extent justify its overwhelming prevalence on the results. Despite the lack of systematic studies on this topic, previous approaches have lightly touched on the subject, and therefore

there was a suspicion on how some grooves were made. It had been suggested, for instance, that the motifs of some panels in Portugal had been made through a succession of cup-marks carved next to each other and then smoothed to achieve a line (Baptista 1983-84). This technique was effectively identified and interestingly, not just in Portugal. Others were also identified, namely combinations such as those of cup-marks and abrasion, cup-marks and pecking, intestinal or sunken motifs.



Graphic 8 Different types of carving techniques identified and used in the study areas.

Although pecking is the preferential carving technique, its application differs regionally. In Iveragh the majority of panels share a large percentage between a regular and rough pecking. The former results in even grooves and was probably made with a chisel. The latter does not reflect a systematic method of execution, with uneven grooves and no refined finishing. The grooves are often lines of condensed pecks, of small sizes, which were not smoothed together. Compared with other areas in which the carvings were very well demarcated, this may suggest that the final result was not the main objective in Iveragh's

process of rock art making. Instead perhaps the act of making itself or just the symbol would be more important, regardless of the visual outcome. Although this practice was also identified in Monte Faro and the Machars, it is safe to say that the majority of rocks in Iveragh were carved in this fashion.

Figure 40 Panel A) displays steady and well-defined grooves (Drumtroddan 1, Machars), against fine, relatively shallow and irregular lines in panel B) (Derrynablaha, Iveragh).

Less variation in techniques was identified in Barbanza and the Machars, where motifs usually display regular grooves with an attention to symmetry and depth. In both cases there are several examples of carvings produced with combinations of techniques, namely linear grooves created through a set of joint cup-marks. Although rare, this combination was identified in three of the study areas: the Machars, Rombalds Moor and Monte Faro. Due to its peculiar appearance it was named an 'intestinal groove', clearly engraved through a succession of cup-marks that were merged through abrasion, that is, they were softened internally. The edges of the lines retain the irregularity given by a number of small depressions carved abutting each other. In the Machars, a linear groove composed in this fashion was identified on Drumtroddan's panel 1. This is a large rock with 12 deeply carved smaller panels. Despite the great number of motifs, repeated in the various surfaces, the intestinal is unique and could perhaps be seen as a 'signature', since it cannot be considered a quintessential figure of Atlantic Art. Interestingly, a very similar design was identified nearby, on Drumtroddan 3A, sharing remarkable formal similarities (Figure 43).

Figure 41 Intestinal Grooves: A) Drumtroddan 1, panel A; B) Drumtroddan 3A (both in the Machars); C) Penedo do Sol (Montedor, Portugal) (Last photograph by Diogo Oliveira).

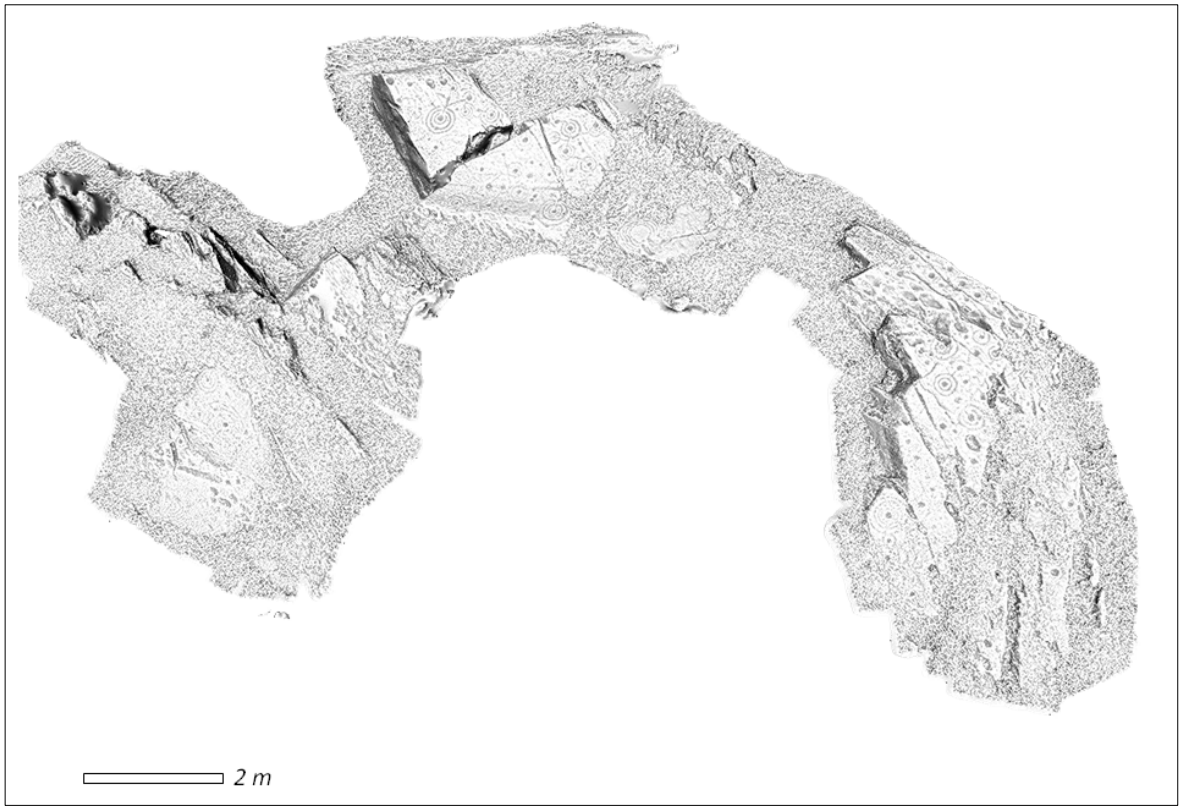


Figure 42 Drumtroddan 1 located in the Machars Peninsula. Two more groups of rock art exist in the surroundings.

In the Machars, another example of intestinals may exist in Broughton Mains 1B, but it needs to be confirmed in the field. In Rombalds Moor, where the iconography focuses largely on the arrangement of cup-marks and linear grooves, this combined technique was identified in Dobrudden (rock 11 of the catalogue, Baildon Moor) and also on Haystacks, Pancake Stone, Pepperpot (numbers 13, 30, 35 and 42 of the inventory) and Green Crag (no. 42) (all in Ilkley Moor) (see catalogue in Appendix 1.2, vol.2). As with Drumtroddan, where

the joined cup-marks were used in two large and extensively decorated outcrops, in Rombalds Moor the majority of surfaces in which this element was identified, are indeed very peculiar. Pancake Stone has been mentioned before for its very specific landscape location: a boulder balancing over a rather steep slope with extensive eastern views (Figure 45). Although today its motifs are practically invisible, potentially due to extreme exposure to weather conditions, it was once widely carved with cup-marks, cup-and-ring motifs, many linear grooves and even a rosette, although incipient. Haystacks (Figure 46), on the other hand, located in the heart of the plateau is also an important landmark. With a remarkable rectangular shape and large size, the boulder is visible from a number of points in the landscape, including other carved rocks. It is undoubtedly a landscape reference, even today. Despite its prominent position on the plateau, Haystacks does not command extensive views. The carvings were deployed mostly on its top face with a central ridge from which grooved and natural runnels develop entwined, sometimes difficult to distinguish between them. The motifs are essentially quite simple and do not make complex designs.

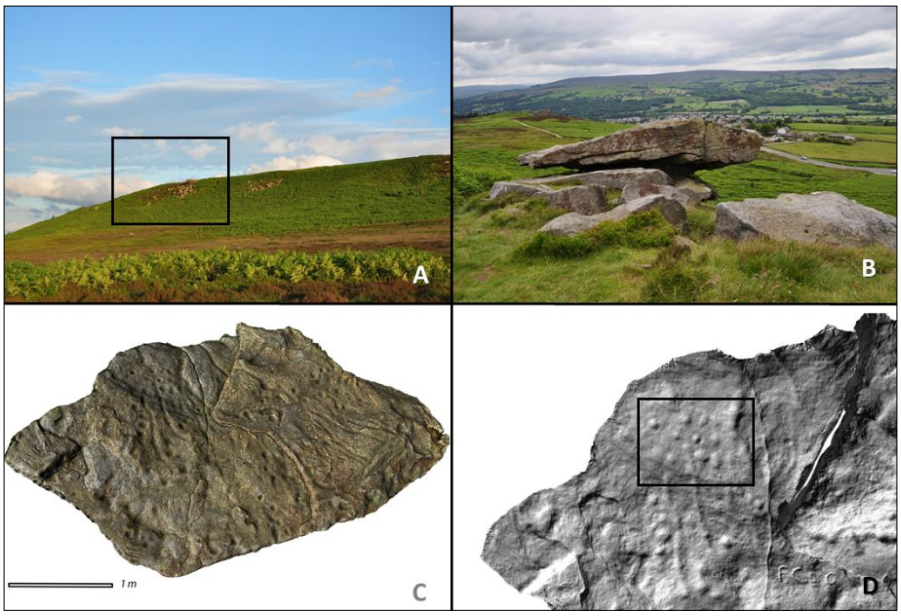


Figure 43 A) Pancake Stone's landscape location on the top of the bench and the edge of the slope; B) the boulder's location viewed from the south; B) 3D model of the carved surface; D) detail of the incipient rosette (in rectangle).

Figure 44 A) Haystacks in the plateau's landscape; B) and C) The 'Haystack'- like shape of the boulder and a detail of the carvings (D).

Both Pancake Stone and Haystacks have very close parallels in terms of shape of the medium and landscape location with other carved rocks: the former is similar to Woodhouse Crag 02, located on the edge of a break of slope in the NW of Rombalds Moor, and the latter resembles Old Bewick 01 in Northumberland, although bearing more motifs (Figure 47).

Figure 45 Woodhouse Crag 02 (left), with resemblances to Pancake Stone (Photograph by Richard Stroud); Old Bewick 1A (right), with resemblances to Haystacks (Photograph by Ian Hobson, ERA).

In Portugal joined cups as grooves were used in Monte dos Fortes 2 (rock 13) and another example is known outside of the study area, in Montedor (Figure *41*46 C), where a

group of intestinals radiate from the centre of a rock. A similar example is known in the shelter of Calderramos III in Barbanza (Galicia). Here, a small shallow recess displays carvings of, mostly, cup-marks, grooves and a few other circular motifs, both on the inside and outer floors of the shelter. Contrary elsewhere with granite engravings, the carvings on the inside of the recess are remarkably well preserved. A meticulous observation revealed a series of linear grooves abraded between the cup-marks, both large and small. Indeed, some of these hollows are incredibly small. Could they be sketches for images that were never fully carved? The shelter seems to have preserved several stages of the process of creation, with grooves from various moments of making saved on the rock.

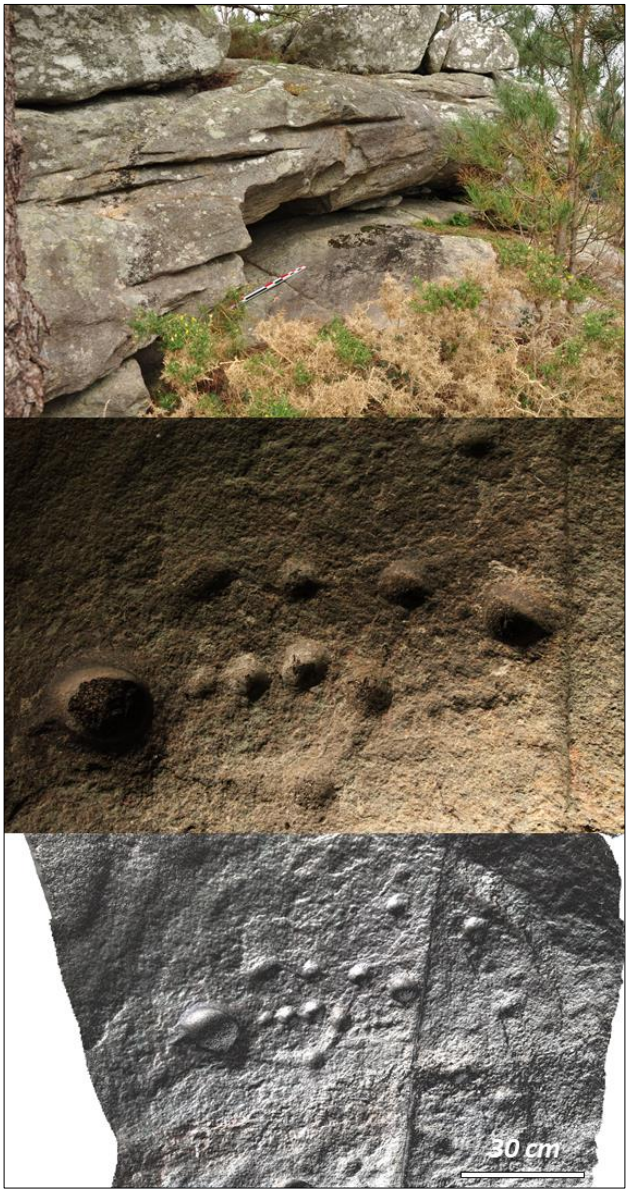


Figure 46 Abrigo de Calderramos 3. There is a group of carvings on the shelter's floor on the inside and another on the outside. Inside, the carvings are extremely well preserved.

Finally, it is interesting to note that the carving techniques used to produce the figurative images of animals in Galicia, is different from that of the circular motifs, with more angular sections and smoother grooves, indicating a more regular use of abrasion or sharper tools.

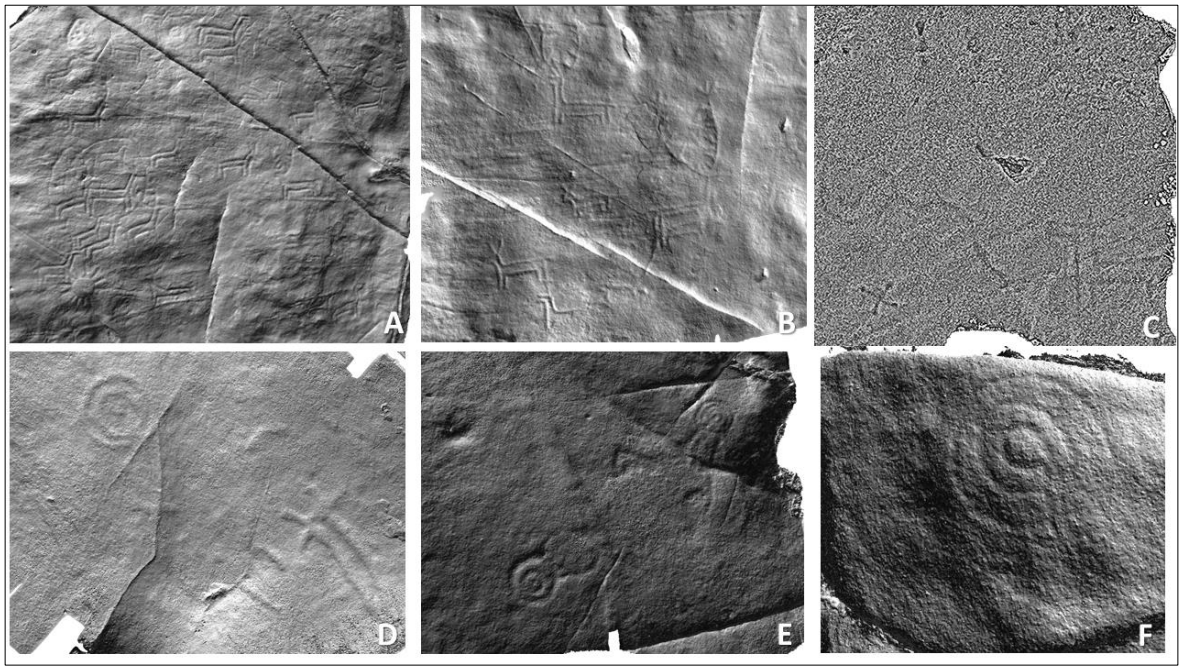
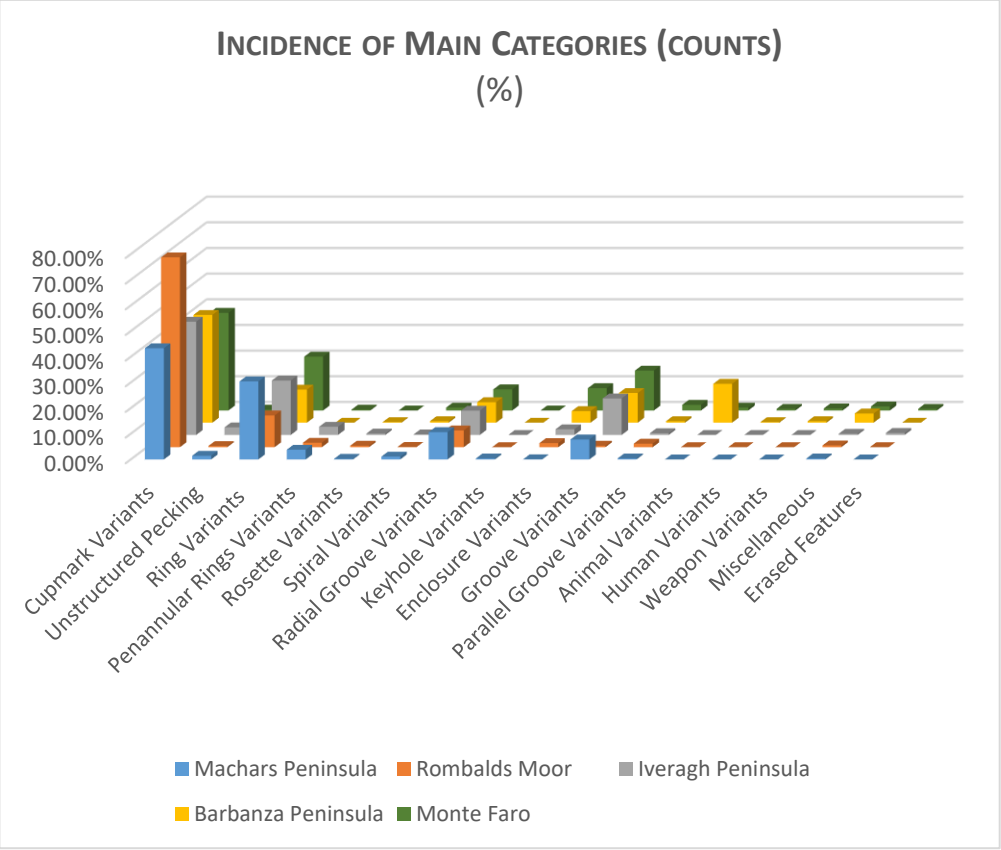


Figure 47 Differences of carving techniques between animal images and circular motifs in Barbanza. A) Gurita 1, B) Gurita 1, C) Lamela 1, D) Lamatrema, E) Fontandurín, F) Cova da Louza IVa.

Motifs Variation

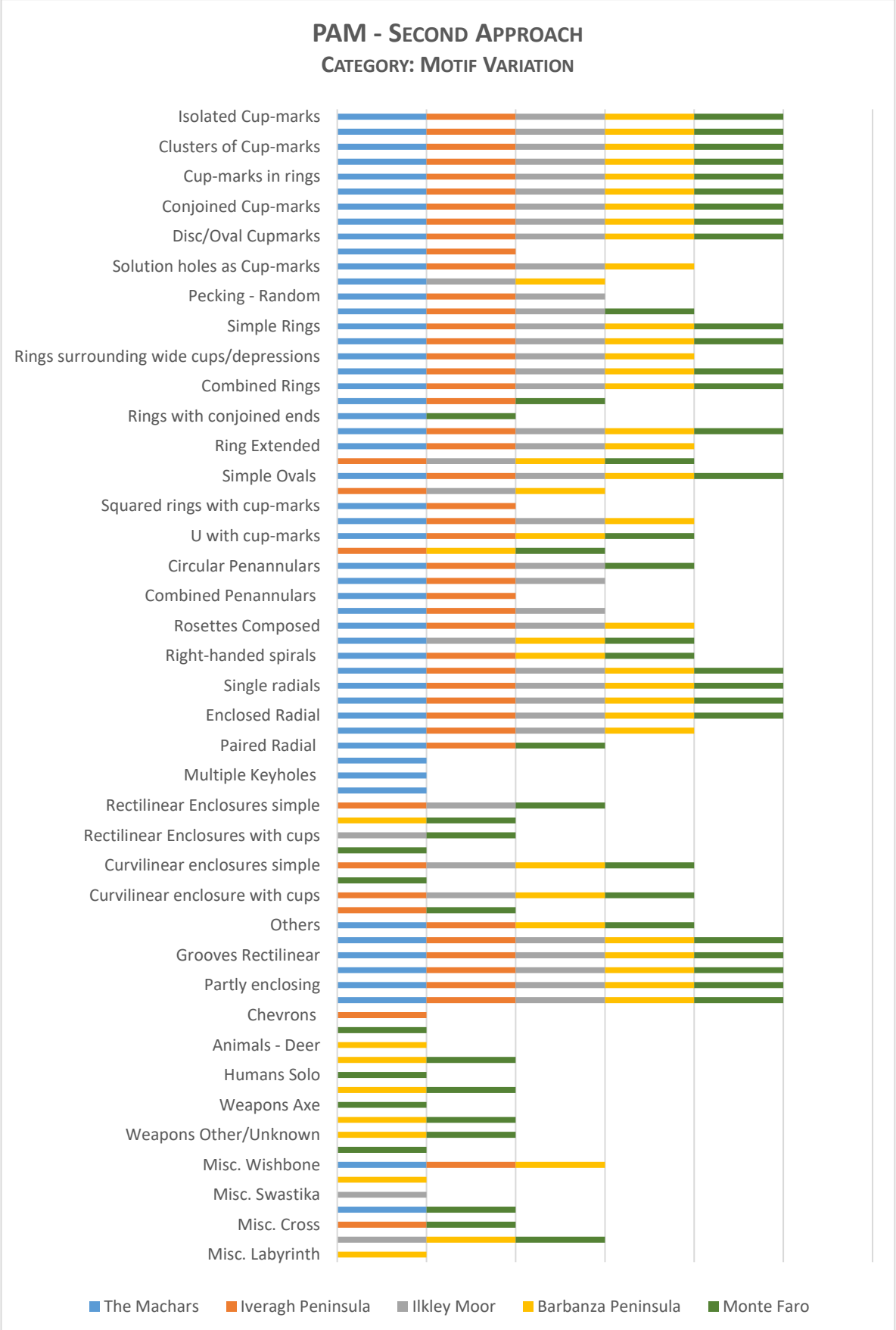
The analysis of this category was phased and developed under two strategies. On one hand, the Presence/Absence Matrix (PAM), which was based on a binary system in order to identify the existence or not of the attributes in each carved rock. This will be often illustrated with graphics along this section, where each bar represents the presence of the attribute for each study area. Where the bars are absent, then the characteristic is missing. The analysis was undertaken according to three main approaches, each of which adding more detail than the previous. The purpose of this was to assess Atlantic Art according to the main, global characteristics usually used to describe it (first approach, see Graphic 6), and slowly introduce more attributes in order to assess detail and regional variation (second and third approaches,

see Graphic 11 and Appendix 7, vol.2 for details). As the categories unfold, a number of attributes describing specificities introduce an insight into differences and similarities between the motifs on each study area in a more specific way, revealing the emergence of regional variance. Furthermore, these results were complemented by the analysis of frequency of motifs per rock and per region, which provides an idea of preference.



Graphic 9 Percentage of frequency of main categories per study area.

As expected, some of the most emblematic motifs of Atlantic Art, such as cup-marks, cup-and-ring motifs and radial grooves, were present in all study areas. The only other symbol that is represented globally, despite the small frequency, is the spiral. Grooves are overall well represented, and often used to structure the other motifs on the compositions. Lines were also widely used in direct connection with the circles, in the form of radials, common to all study areas. The only attribute that is underrepresented and included in the initial package is that of penannular motifs. A number of attributes are specific to some areas, such as the animals and weapons, only featuring in Barbanza and Monte Faro. Equally, keyholes are rather rare and only documented in the Machars.

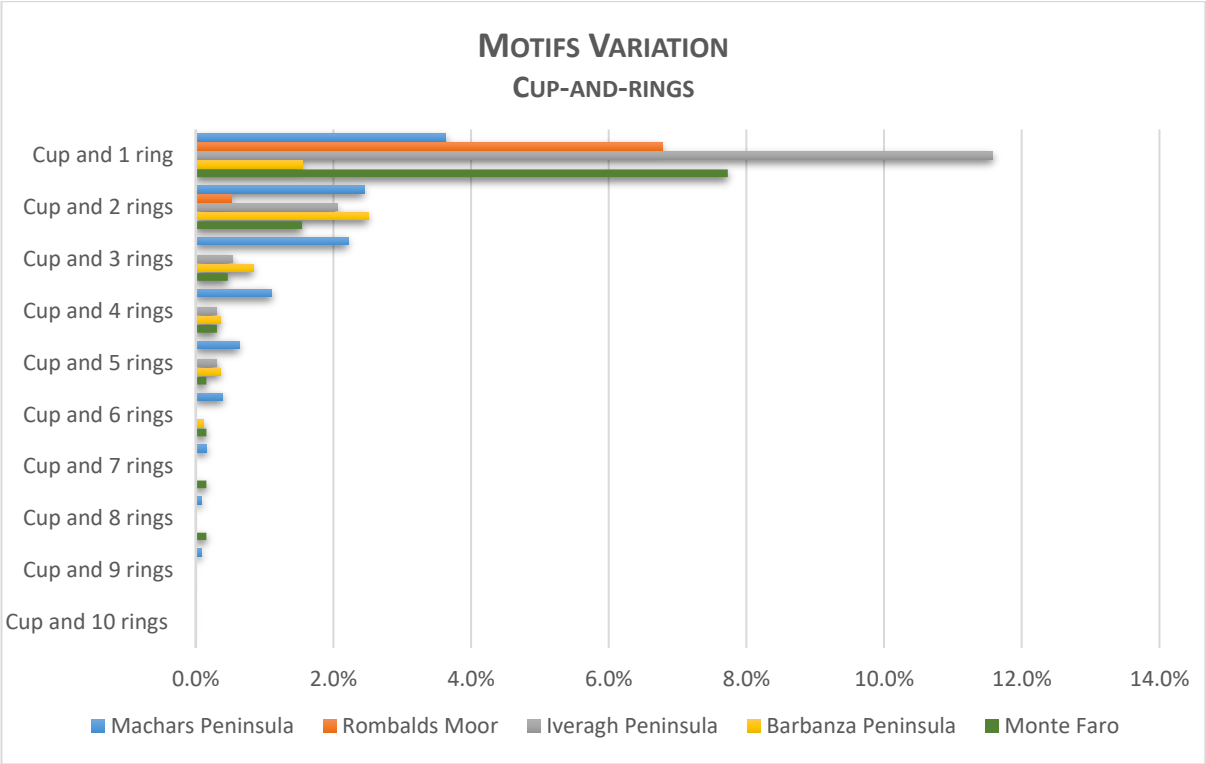


Graphic 10 Second order of analysis to motifs. This approach includes a higher variability of motifs.

When analysing Atlantic Art *Motif Variation*, it is obvious that cup-marks are favourite. Bradley has stressed that cup-marks are an intrinsic characteristic of Atlantic Art style (1997). These little hollows were cut on virtually all media, in isolation or as part of other designs, such as cup-and-rings. A closer look at the characteristics of cup-marks and the way they interact with both the rock faces and other motifs, however, reveals that they too have their own personality and can appear in a multitude of situations. Barbanza and Iveragh are the two study areas in which cup-marks have a higher frequency of use and appear in the largest variety of combinations. They can be displayed in isolation or alongside other main figures. Cup-marks are a constant presence and their shape can vary slightly towards a more oval or wider form (disc-cup). In the Machars, cup-marks are often depicted in direct interaction with other motifs but also with the rock surface. Occasionally, natural hollows or solution holes were used as, or transformed into, cup-marks.

Figure 48 A cup-mark at North Balfern (Machars). The hollow was shaped into a natural solution hole. Inside the cup, there are obvious marks of the action of abrasion, along with a small hole on the base.

Both cup-marks and circular motifs were described in the categorical scheme according to a number of variants reflecting the morphology of the types and their situation in relation to other images. Especially for cup-marks, the attributes question their position in terms of circular motifs, for example, whether they are located within, on the terminus or on the rings.



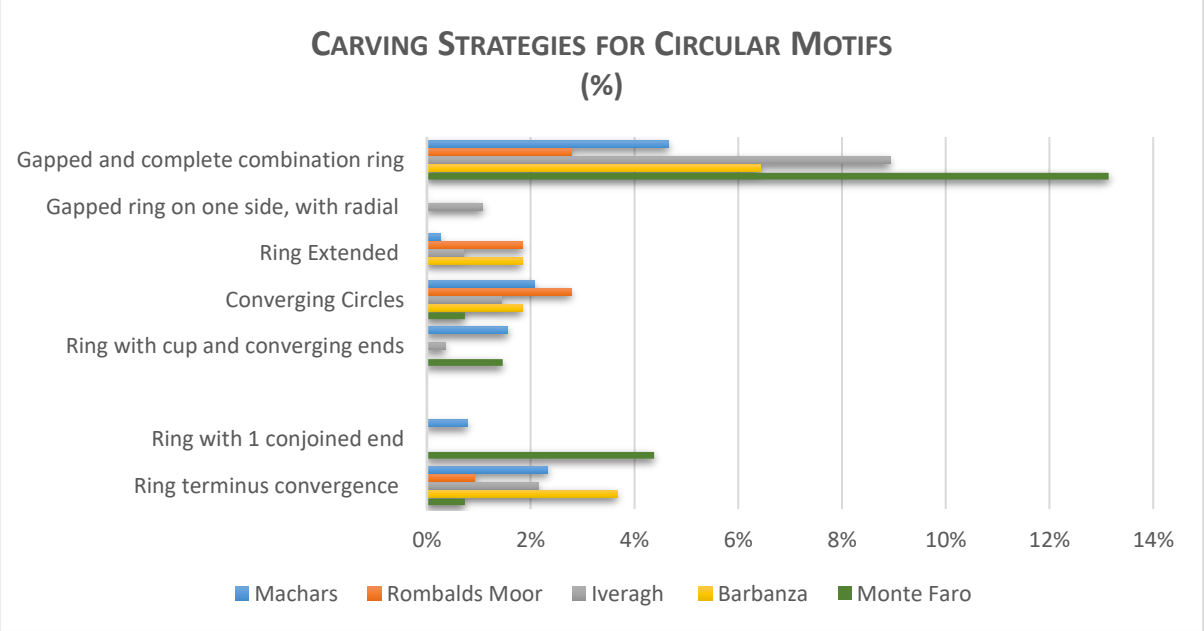
Graphic 11 Percentage of cup-and-ring motifs in relation to the total number of images in each study area.

The second most commonly used category, in all study areas, is that of cup-and-rings, probably the most quintessential element of Atlantic Art (Graphic 12). Circles were inspected in terms of the numbers of rings, and other levels of detail. The last approach to the motif analysis scrutinized the categorical scheme in detail, providing grounds for a comprehensive understanding of differences and similarities between the regions. Although the detailed observation of the motifs enabled the identification of regional preferences, the majority of the attributes are globally present, denoting a general understanding of the style and its specificities, as suggested in the Hypothesis chapter (Chapter 4). The variant of cup-and-rings illustrates this point. Despite being overwhelmingly present in all study areas, these display preferences for the number of concentric circles in each motif. As such, cup-and-rings with one circle are the preferred option in all areas except Barbanza, where the majority of the documented motifs have two circles. In the Machars the difference between 1, 2 and 3 concentric circles is not very significant but in Iveragh there is a substantial disparity between cup-and-ring motifs with one and more circles, the first case being clearly the favourite. As for Rombalds Moor, these images constitute a mere 7% of the repertoire, solely split between cup-and-rings with 1 and 2 circles. The Machars, Barbanza and Monte Faro have examples of

cups surrounded by multiple rings reaching 9 circles. In Monte Faro two very large motifs of concentric circles were recorded, in which 14 rings were counted, despite lacking a central cup-mark. The cup-and-ring motifs also occur with less completed forms, such as the *Partial Rings* or the *Gapped Rings* (details in Appendix 6, vol.2), the first being most common in the Machars where they may have high numbers of arcs surrounding a cup-mark, followed by Barbanza. The *Gapped Rings* are quite common in Rombalds Moor, where the majority of motifs feature central cup-marks, and along with other sub-variants are also popular in Iveragh. The gapped rings are virtually present in all study areas, but do not constitute significant numbers.

The most important conclusion this analysis of circular motifs revealed is that there are several ways to achieve a similar final result. Whilst one might think that Atlantic Art is solely about concentric circles surrounding a cup-mark, a detailed scrutiny shows a different scenario. Often, circular designs were not simply composed of concentric circles, but have combinations of complete and gapped rings, are gapped on one side and complete on the other, have multiple rings with convergent or conjoined ends, etc. With the second and third approaches, specialized motifs began to emerge, such as *Rings with Converging Ends* and *Rings with Conjoined Ends*, the first only present in the Machars, Rombalds Moor and Monte Faro and the latter being exclusive to the Machars and Monte Faro. Despite the particularity of the forms, many of these were identified in two or more study areas. For example, combinations of gapped and complete concentric circles with central cup-mark exist in all areas, although in much higher numbers in Monte Faro than in any of the other cases. *Ring terminus convergence* is another attribute present in all study areas, but others such as *Rings with Converging Ends* or *Gapped rings on one side*, as seen previously, were also popular in some areas, although not necessarily present in all of them. 'U' shapes can be found in all regions in one form or another, that is, with or without a central cup-mark. However, it should be noted that the categorical scheme does not necessarily account for subtle design particularities of these shapes, since they are of difficult description and can be quite specific. In Iveragh this motif seems to follow a very particular morphology, usually being depicted in a very well defined fashion (). In other regions this 'U' figure is not so regular and occasionally resemble narrow arcs instead. The Iveragh's U-shape motifs fit well on the attribute defined by O'Connor (2006). But variation is taken further and forms which are typical of the cup-and-rings were replicated in oval and square fashions. Sometimes only a quarter or half of the motif is depicted. This versatility of the circular designs may occasionally mislead the observers, because the different variations are too tenuous to be picked up by untrained eyes, due to their resemblance to spirals, or even the other way around. While not being classic cup-and-rings, these types are quite similar and may delude

into thinking that they are plain cup-and-rings. Arguably, such a situation may have occurred in the Machars where a number of spirals were re-classified as Iron Age (see 7.4. The Case of the Pictish Art). It is possible that the authors of such motifs did not recognize or relate culturally to the cup-and-rings interpreting them according to the symbols with which they were most familiar with. When looking at Pictish Art, for instance, the curvy and swirly character of the lines is noticeable. The carvers may have been inspired by Prehistoric images, to carve on open-air rocks or even replicate the cup-and-rings that, to their eyes, could have represented spirals. The main differences between these special motifs and the classic forms is mostly the way they were conceptualized, with rings not being quite circular and cup-and-rings suffering variations in the internal organization and direction of the circles. There is seemingly a sense of replication of a group of motifs to the other, but with the introduction of fundamental differences in terms of structure. These would have implied different ways of making and perceiving the motifs. Some of the details that compose these figures are very faint and delicate, suggesting that their co-existence in the different regions corroborates the idea of a style that was intentionally taught and deliberately passed on. Having been adapted from O'Connor's study (2006), many of these are present in Iveragh, and consequently, shared with other regions in her approach. Such is the case of the *Rings with One Gapped Side*, exclusive of this case-study. *Rings with Converging Ends* are quite particular, but they were documented in the Machars, as well as Iveragh.



Graphic 12 Different strategies of circular motifs' depiction and preferences for each study area.

These multiple strategies of cup-and-ring creation demonstrate a great capacity for abstraction and the ability to devise various carving solutions, revealing that Atlantic Art is in fact an Art of Illusion. At first sight, motifs are seemingly the same or very similar from rock to rock. However, a close observation reveals various strategies used in conception and execution. These variations may represent important ideological discrepancies, but in practical terms, they were pivotal in the assessment of differences and similarities between the study areas. There are obvious preferences in the construction of the motifs in each region, and neither of the study areas encompasses all of the attributes defined in the categorical scheme.

Many of the circular motifs described above have associated radials. These are segments of line usually departing from a central cup-mark, but also from inner our outer rings of circular compositions. In the second PAM approach the analysis assessed the relationship of the radials to the main imagery. They were documented according to their position in relation to cup-marks and circles, whether departing from a central cup-mark with no rings (*Radial from cup-mark – simple)*, having a final implement (*Dumbbell Radial)* or whether they are paired outside the last circle (*Paired Radial*), providing a similarity with keyholes. In this second approach, radials were also quantified if single (the most common) or multiple (usually departing from central cup-mark), or whether they were enclosed within a certain feature. These complements to circles exist in all regions but with different preferences. Dumbbell radials, are not recorded in Monte Faro, whilst paired radials are missing from Barbanza and Rombalds Moor. Whilst keyholes are exclusive to the Machars, the paired radials in Monte Faro hint at this motif, although not quite qualifying to be classified as such.

One of the most surprising results of this exercise was the realization that penannulars, initially outlined in the package, have failed to be documented in significant numbers in all study areas. Of course, to a certain extent there may be an overlap of these motifs with the *Gapped rings with central cup-mark*, on account of the recorder's interpretation, since the two share some similarities. However, even if this was the case, the percentage of this motif is not very significant. Penannulars are completely absent from Barbanza and constitute only 0.15% of the total number of motifs in Monte Faro, on its circular form as opposed to the oval. With a few exceptions of penannulars with multiple rings, they commonly have only one ring surrounding a cup-mark with central radial. An interesting variation of these are the oval penannulars, identified in the Machars and Rombalds Moor in their single form, and in Iveragh in their multiple ring variant. In the

Machars, penannulars are mostly oval, where they are repeatedly used in a small number of rocks. The variation with more than 4 rings is known to every region except Rombalds Moor, and this arrangement is found both for cup-and-rings and penannulars. A combined variable is also known to this motif, in which some of the loops are continuous and others gapped, surrounding the same cup-marks with radial.

Grooves appear in all regions with multiple preferences and are considered one of the quintessential motifs of Atlantic Art, widely used as connectors between designs. They and are very widespread in Iveragh and Rombalds Moor but relatively contained in the other study areas. In Iveragh they are varied and often appear interlaced on the rocky surface or interconnected amongst themselves and with other motifs. In Rombalds Moor they are usually combined with cup-marks. Grooves were classified as straight, smooth, wavy, angular, curvilinear, serpentiform, and these variations were comprehensively identified in all study areas. What is described as a chevron groove may have been identified in Kealduff Upper, which may have implications due to the strict relation of these elements with Passage Grave Art. The length of the grooves, however, is not included in the classification and can vary considerably. In Liss (Iveragh), for example, curvilinear grooves follow the rock surface almost from one side to the other, over its c. 10 m. In other occasions, these can be quite short and have just a few centimetres, branching from other motifs.

Furthermore, enclosure motifs were identified in every study area, however, in most cases these appear almost randomly made or with little intent. Although the second order of analysis introduced some variation in the use of enclosures, the third approach confirmed that this category encompasses important differences between the regions. First of all, it is almost absent from the Machars, where only one occurrence of a very atypical *Diamond Enclosure* was documented. The variant, is common in Iveragh, where surfaces are completely covered by enclosures of different types. In a few occasions, network of lines covered whole surfaces, creating *Conjoined Enclosures*, an attribute from the *Behavioural Variants*, which can have different geometries. In general, these can be seen as specialized arrangements of lines (e.g. Tullakeel).

Other particular motifs, such as rosettes, spirals and keyholes, were scrutinized through the classificatory scheme. Although these are not part of the quintessential Atlantic Art iconography, they are in general present in small percentages in the assemblage. These are the kinds of designs that can point to a local development of the style. Rosettes are present in all study areas, although in larger numbers in the British Isles, namely the Iveragh

Peninsula, where the motif is known to other rocks beyond the main dataset. However, the fact that the documented rosettes are more often designed under their simple form, an arrangement of cups around a central cup-mark, may not be very significant, as it is in itself a relatively simple representation. The rosette with radial and often surrounded by a circle, is a particular motif and although known in the wider context of Atlantic Art, it is not necessarily widespread. Several examples, however, are known in Kilmartin Glen (Scotland). For this project they have an unequal distribution, this time not existing in Monte Faro, but being present in all other regions. A specific circle with internal cup-marks in Escaravelhão 1 may induce the illusion of a rosette to the observer, but the 3D model did not show the existence of this motif, instead displaying multiple cup-marks enclosed within a circle. This is a common variation of circular enclosures in the region, present namely in rock 1 and 2 of Pinhal do Rei, but also in other panels not featuring this dataset. Rosettes are generally rare motifs, and often associated with other carving traditions such as that of Passage Grave Art (Jones 2001). At least one rosette was identified in each study area, except in Monte Faro. In some areas there are multiple examples, such as Iveragh, where just one rock (Derrynablaha 24) bears 5, some composed of a simple arrangement of cup-marks, and others including a circle. Of course, it is also in Derrynablaha that a famous rosette, about which a number of authors have written, can be found (Figure 51). This motif has been attributed to Passage Grave Art, in the past, but it has also been considered to be the representation of a shield (Shee Twohig and O'Kelly 1971).

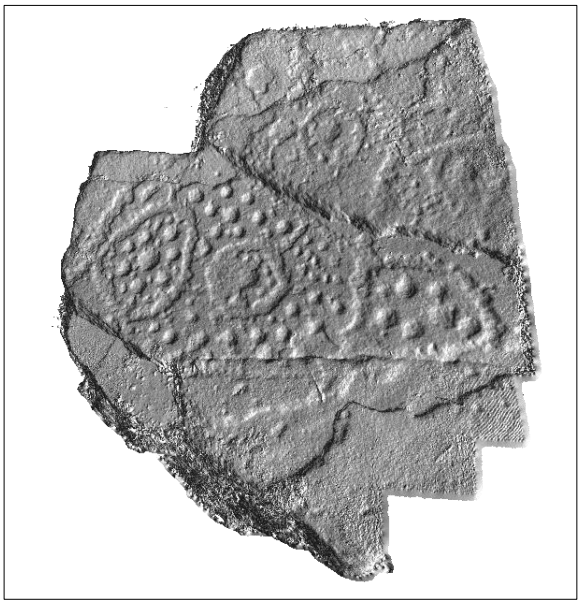


Figure 49 Derrynablaha 24 (Iveragh) with its numerous rosettes.

Figure 50 The rosette of rock Derrynablaha 22 (Iveragh). It is possible that this block was once attached to the main boulder, also deeply decorated.

The overlap of two rosettes in Backstone Beck 05 (Rombalds Moor) (Figure 53), in which a number of cup-marks are shared to produce two distinct motifs, is also interesting. There are other examples of shared grooves being used to compose more than one motif. Despite these overlaps, the motifs are not 'damaged', but co-exist on the same panel without disfiguring the neighbouring images.

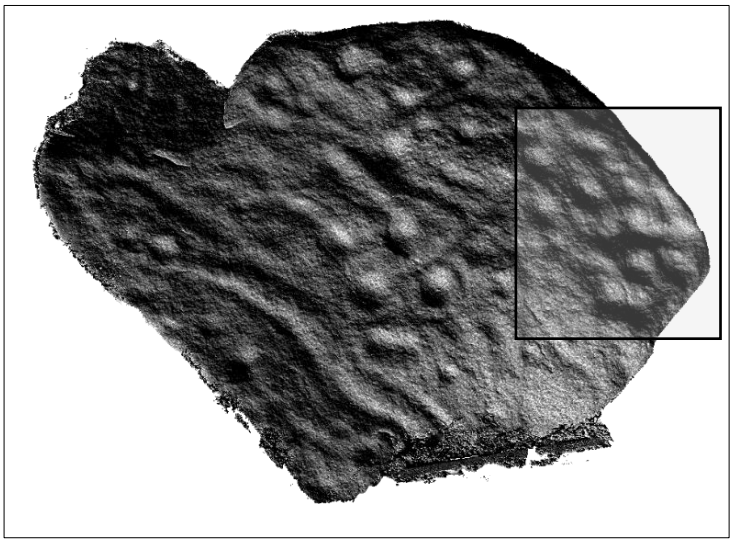


Figure 51 Rock 32 of Rombalds Moor, also known as Backstone Beck 01 (see Appendix 1.2), where two overlapping rosettes can be seen on the right corner.

Spirals are present in all study areas, although as it will be explained later, it is a motif that requires a careful assessment. The most common shapes are the simplified designs of this category. Spirals are known in all study areas, although in some cases such as the Machars they should be analysed with caution. In general they are incipient shapes curling to left or right but, in some situations, such as Pinhal do Rei 4 (Figure 54) and S. Tomé 2 (Figure 55) in Monte Faro, the final result is quite complex. Namely, the latter is within a group or rocks where several human images holding instruments were identified – S. Tomé 1 - although what is seemingly a classic up-and-ring motif is carved on the same surface. However, it should be noted that other rocks in these group bear relatively atypical types of motifs and therefore the association of the spiral to Atlantic Art is not straightforward, even when depicted next to motifs composed of several concentric shapes.

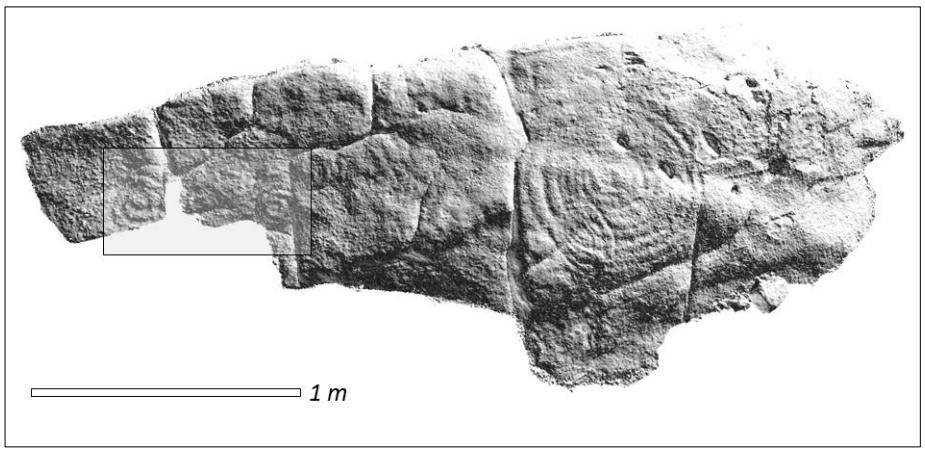


Figure 52 Two spirals were documented in Pinhal do Rei 4 (Monte Faro).

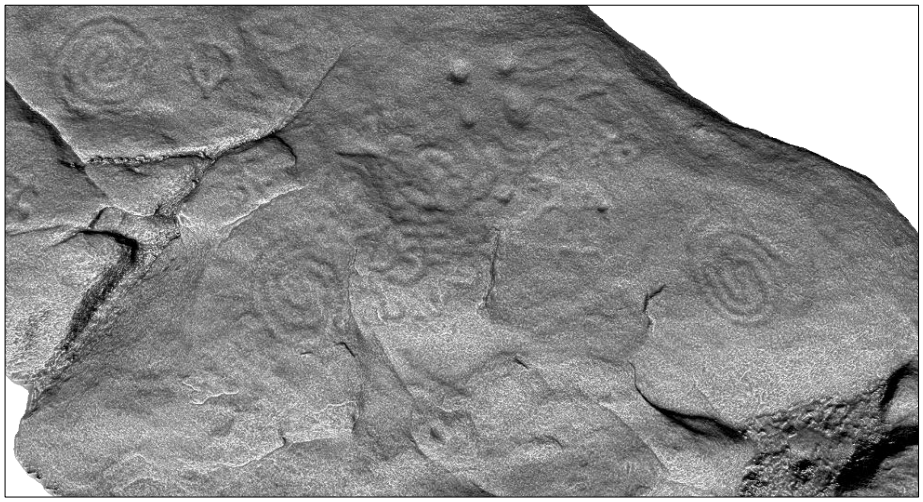


Figure 53 Detail of the spirals of S. Tomé, rock 2 (Monte Faro, Portugal).

Beyond similar motifs shared amongst the various study areas, there are others which are exclusive. Keyholes are often included in Atlantic art's repertoire, but in this study they were only documented in the Machars. Enclosures in general are not necessarily common, except in Iveragh, despite the many different shapes identified. However, only in Monte Faro are they internally segmented. Similarly, the *ladder* motif is currently exclusive to Barmishaw Stone in Ilkley Moor, with a parallel in Panorama Stone, located in the same area but not part of this dataset. Finally, humans and weapons are particular to Iberia and, although they are considered to be part of the Atlantic Art tradition, as they were carved alongside cup-and-ring motifs and derivatives, the relationship between these types is not clear. It seems probable that a majority of weapons are carved in the Bronze Age, as many of them can be identified due to their detailed depictions and similarities to material counterparts. These are mostly halberds, daggers, short swords and spears. Daggers are known both in Barbanza (e.g. Espiñaredo and possibly Lamatrema) and Monte Faro (e.g. Monte da Laje). A human holding a bow and arrow was also identified in rock 1 of S. Tomé (Figure 56), on the same panel where a horse riding scene was depicted (Monte Faro). Rock 2 of Santo Ovídio bears the representation of a halberd (Figure 57), one of the first to be identified to the south of the river Minho (Alves and Reis 2017a) alongside a motif composed of three concentric circles without central cup-mark, which has been interpreted as shield (Bettencourt 2017). Another combination of circles of this type is known in the assemblage of Monte dos Fortes 2, although standing isolated. Interestingly, a similar motif carved alongside other more recent figures, in a Scottish shelter, has also been considered to represent a shield (see section 7.4).

Rarer types of weapons are appearing in the wider record of this category. In rock 4 of Escaravelhão I (Monte Faro), potentially an axe or other type of hafted object was depicted. Three more examples are known in the area, and these hafted weapons find parallels in other groups of the region (Alves and Reis 2017a) and elsewhere (Bettencourt 2017). The latter have been associated with EBA contexts due to similarities with the stelae of Longroiva from Meda (Portugal) and Fraga Marcada (*Ibid.*). Animals are another exclusive category of NW Iberia and they are present both in Monte Faro and Barbanza (Figure 58). Only the rocks with circular motifs or those with animals sharing the surface with geometric imagery were considered in this study, but the comprehensive dataset of Iberia includes a great number of panels comprising figurative iconography. In Monte Faro the stylistic character of animals presents both schematic and naturalized forms. In Barbanza there are no completely schematic animals, such as those of Escaravelhão I in Monte Faro, and in a few examples it is difficult to determine the represented species. In general animals are depicted through a

single line, although Gurita 1 has a remarkable depiction of a stag with long antlers whose body was carved with a double line. Zoomorphs are often depicted in groups (e.g. rock 1, Escaravelhão I or Gurita 1 and Laxe da Sartaña in Barbanza) but also in isolation (e.g. Lamela 1 in Barbanza) or even in riding scenes (e.g. rock 4 of S. Tomé in Monte Faro and Rego do Corzo III in Barbanza).

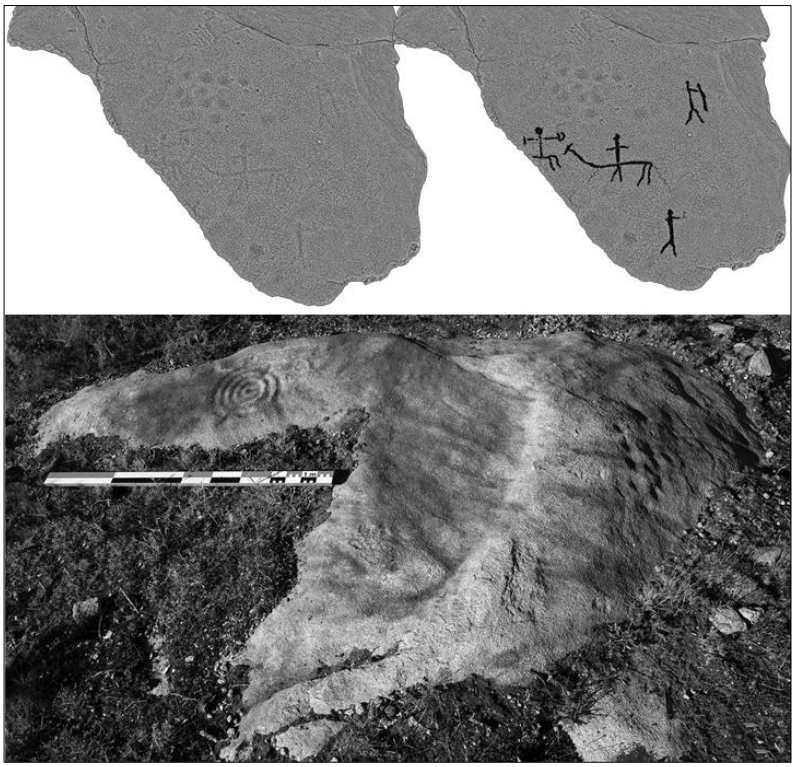


Figure 54 *S.* Tomé 1, where a number of humans (highlighted on the top right 3D model) were carved, alongside a cup and two rings with multiple radial (photo by Alves and Reis 2017a).

Figure 55 Halberd and potential shield (?) at rock 2 of Santo Ovídio. The shaft is c. 1 m long.

Finally, idols (Figure 59) were exclusively carved in Monte Faro, namely on Monte da Laje (Cunha and Silva 1981), but were also recently found in Escavarelhão 6, where photogrammetry was used to record a flat, smooth and apparently empty surface, which turned out to be extensively carved (Figure 60). This process enabled the identification of numerous carvings, including those of similar typology to that of Peña-Tu idol (Puertas de Vidiao, Asturias, Spain), itself carved next a dagger. An image of this kind is also known in Basoñas (Barbanza).

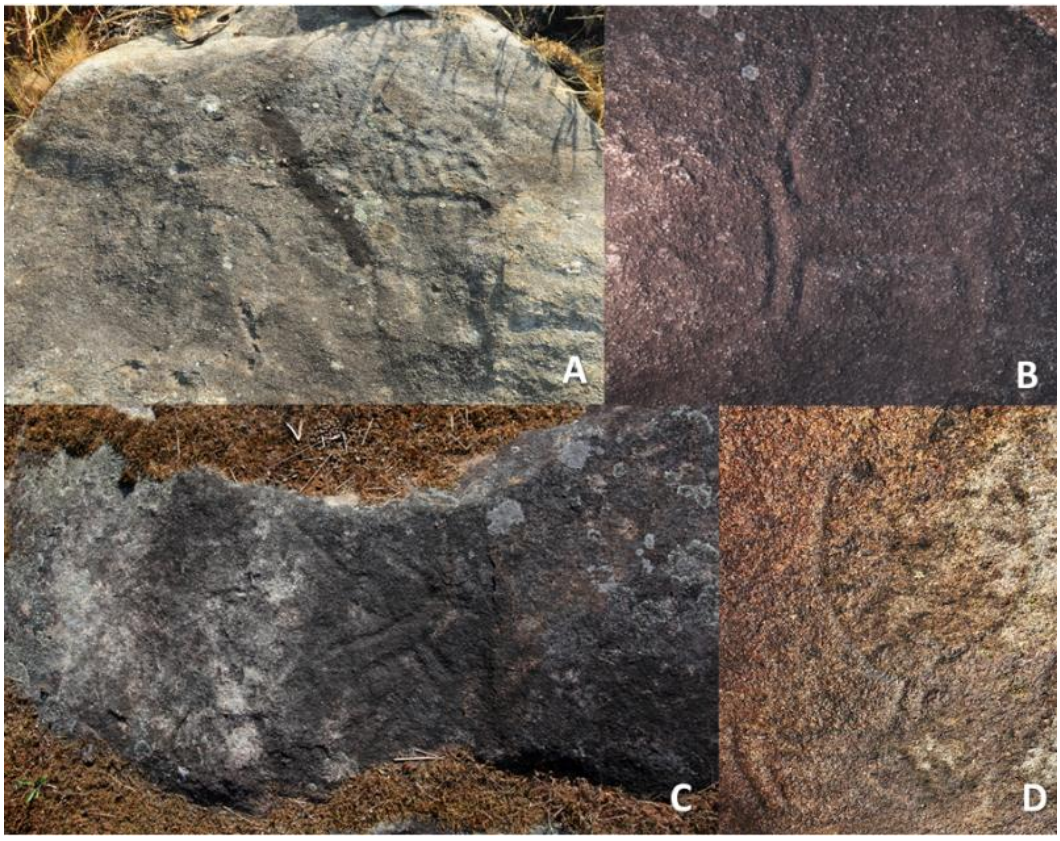


Figure 56 Styles of animal representation in Iberia. A) Rock 1 of Escaravelhão 1; B) Gurita 1 (Photograph by Lara B. Alves); C) Monte Faro (Photograph by Lara B. Alves); D) Laxe da Sartaña (Barbanza).

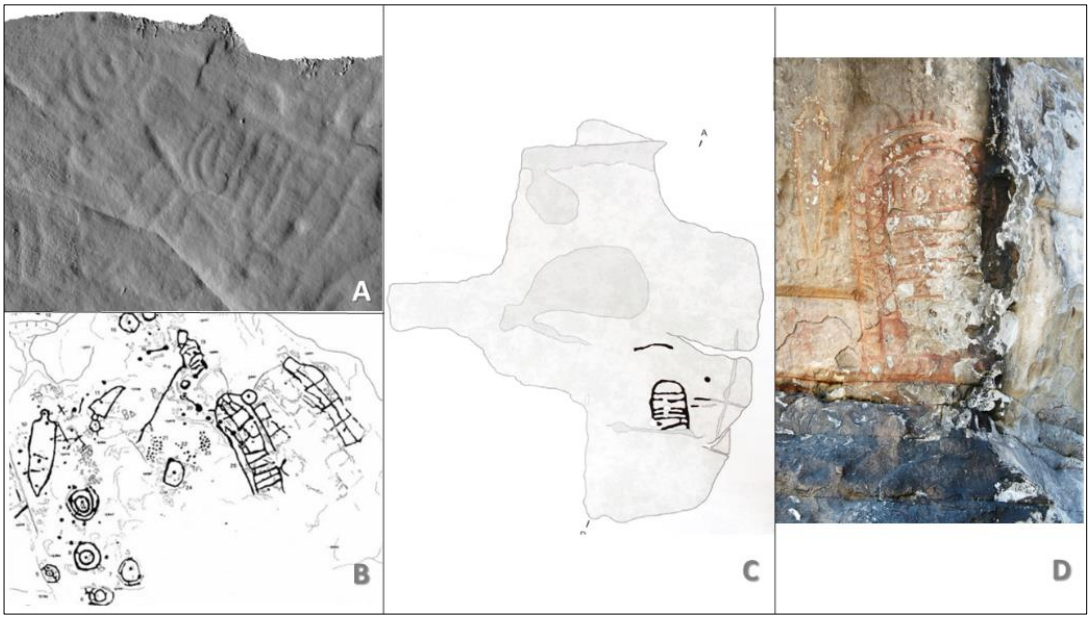


Figure 57 Idols in Monte Faro and Barbanza. A) Rock 5 of Escaravelhão 6 (3D model by Joana Valdez-Tullett); B) Monte da Laje (after Cunha and Silva 1980); C) Basoñas in Barbanza (after Fábregas-Valcarce and Rodríguez-Rellán 2012); D) Idol of Peña-Tu, located in the Spanish region of Asturias (photo by Ramón from Llanera, España (Ídolo de Peña Tu) [CC BY-SA 2.0 (http://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons).

Figure 58 Rock 5 of Escaravelhão 6 (Monte Faro, Portugal).

Another feature that is worth mentioning for its uniqueness occurs both in Iveragh and Monte Faro: the 'Erased Motifs'. Whilst in the Portuguese study area it looks relatively coincidental, in Iveragh it appears intentional. In Monte Faro the pecked area sits in a central part of a panel where other motifs were carved and due to weathering is not that clear (Figure 61). In Kealduff Upper a very flat, low-lying panel displays only one of these circles and two un-structured lines of very light pecking. But it is in Dromtine that is most interesting, being connected in two occasions with cup-and-ring motifs, to which they are linked by straight lines. The way Atlantic Art is seemingly conceived, suggests that the morphology of the imagery and the way in which it is usually placed on the rock surface, is pre-determined. This is particularly noticeable in areas such as the Machars, where a few panels seemingly result from a neat placement of the cup-and-ring motifs between natural crevices or narrow parts of the rock medium (e.g. Culscadden A and B, Machars, Figure 68), leaving little space for errors. However, the occurrences of Iveragh may not have been erased due to errors, being rather more in keeping with intentional options. The pecked circle of Kealduff Upper is a lonely image on a large low-lying surface, where only two other straight lines of much spaced pecking was documented. The example of Dromtine, however, plays an active role in the composition, being linked through short paired grooves to a cup-and-ring motif, in a similar way the latter is coupled with another circular image. A close observation raised the possibility that previous to the intense pecking within the circle, other features could have existed, having been purposefully erased. The erased circles share a similar diameter to the concentric rings on the rock surface. This pattern is repeated in Derrynablaha (rock 22). Notably, erasure does not seem to be at all unknown in the panorama of stone working in Ireland, and Muiris O'Sullivan had identified similar processes in the later stages of Irish Passage tomb contexts, through pick-dressing (O'Sullivan 1986). Cochrane argues that erasure could also be seen as a process of 'additive subtraction', in which erasure is used to highlight what has been removed, a practice in keeping with sequences of interaction of Passage Tomb imagery (Cochrane 2009). In Monte Faro, a similar situation seem to have happened in rock 1 of Fonte Formosa (Figure 61), where a rectangular depression was chipped off the rock surface, where potentially a motif existed. On the same panel, a cup-and-ring involves a natural convexity and further away an animal was also depicted. The rock was re-used later in time to amuse the creator of two medieval or modern board games.

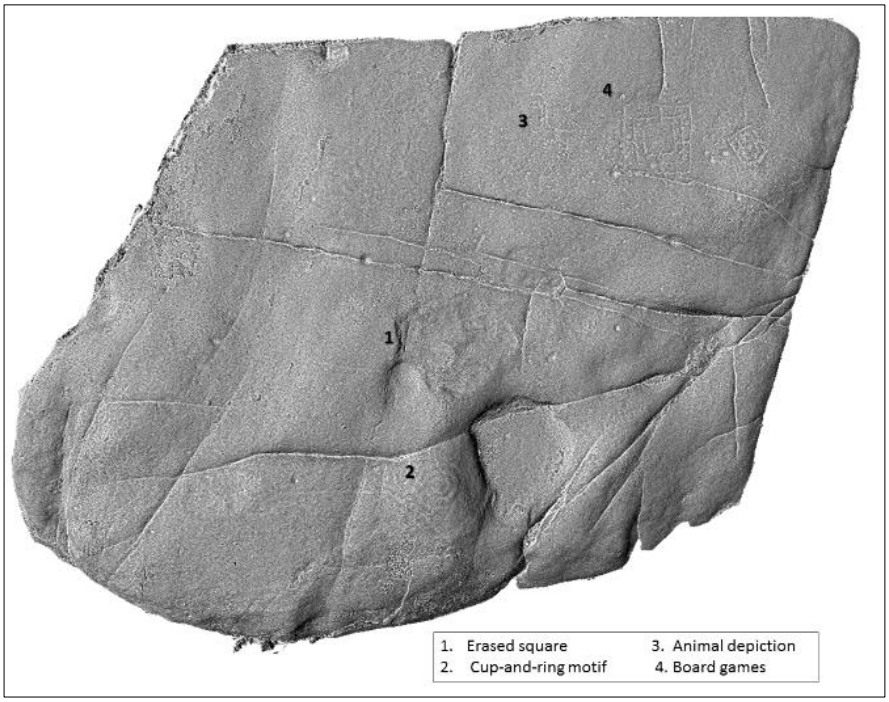
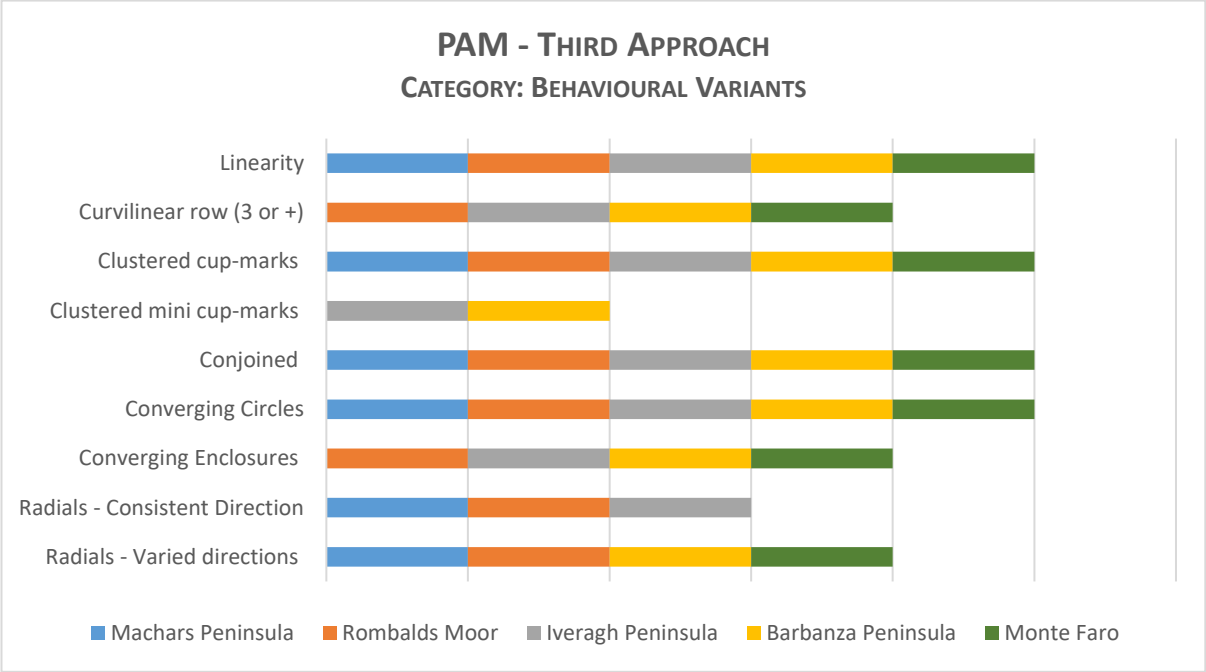


Figure 59 Fonte Formosa 1 (Monte Faro) with a possible erased feature in the centre of the panel.

Motif Behaviour

A category examining the behaviour of the motifs on the rock surface was devised. The attributes within this category assess the way in which the motifs were organized on the rocks, according to specific parameters such as linearity and clustering or convergence of motifs. Furthermore, the orientation of the radials within circular motifs was evaluated as to whether they have a consistent direction or if their orientation is seemingly arbitrary. Some authors have argued that the radials on the cup-and-rings maintain specific orientations and therefore it was important to assess this possibility (e.g. O'Connor 2006). In this regard, it is noticeable that unlike the other regions, in Rombalds Moor there were no occurrences of varied directions for the existing radials and that in both Iberian case-studies there are any cases of consistent direction of radials. In the Machars and Iveragh, both situations were present.



Graphic 13 Third order of analysis regarding the Behavioural Variants category, which includes parameters of organization of the motifs on the panel: whether they follow a linear pattern or are conjoined, direction of radials, etc.

The attributes of linearity and clustering were more often applied to the sub-category of cup-marks. When not isolated, these motifs often acquire specific organizations. Clustering is common, with Pepperpot in Ilkley Moor being the best example of this. Clusters of cup-marks were often placed on the edges or in between complex compositions of motifs (e.g. S. Tomé 1, Monte Faro), but can also be found within enclosures (e.g. Idol Stone 01 – Figure 63, and Backstone Beck 03 in Rombalds Moor). In this attribute, the placement of motifs in close proximity in one specific area of the rocks was also considered, of which the case of Willy Hall Wood's (Figure 62) rock is a good example. Here, the distribution of motifs is uneven, with a high number of motifs located on the higher area of the boulder, whilst the opposite remained empty.

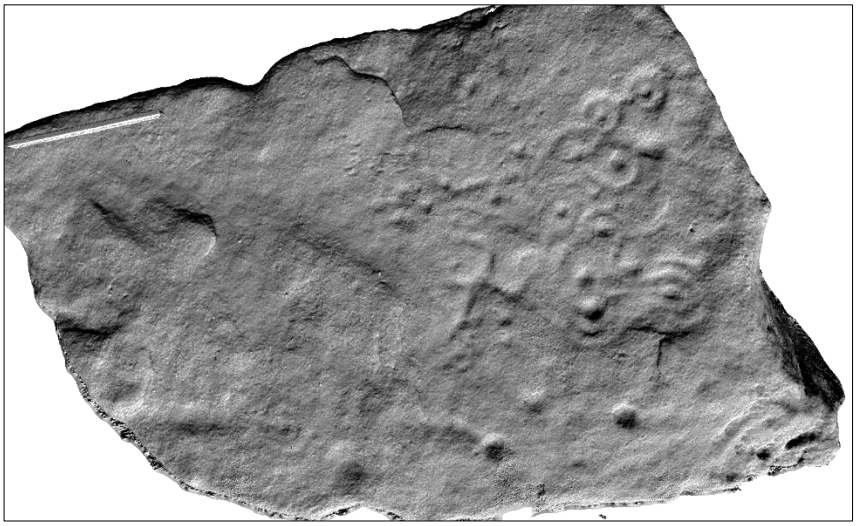


Figure 60 A cluster of motifs on one side of Willy Hall Wood's boulder (Ilkley Moor).

In many other occasions cup-marks were documented arranged in lines, namely in Rombalds Moor, Iveragh but also in Galicia (e.g. Calderramos III). In Rombalds Moor, the iconic Idol Stone is a good example of linear arrangements of cup-marks, which occur alongside each other but also within enclosures. Linearity is also known to larger motifs such as cup-and-rings. In Liss (Iveragh) there are six cup-and-ring motifs organized in a line on the lower part of the outcrop. Furthermore, the organization of cup-and-ring motifs in pairs is also common, and parallels have been established with similar situations from other types and material culture. Some have compared them to the "eye goddess" motif known to mobiliary art, particularly in Portugal, and the "face-motifs" of Irish megalithic art (Breuil 1933; Piggott 1954; Shee Twohig 1981:124)

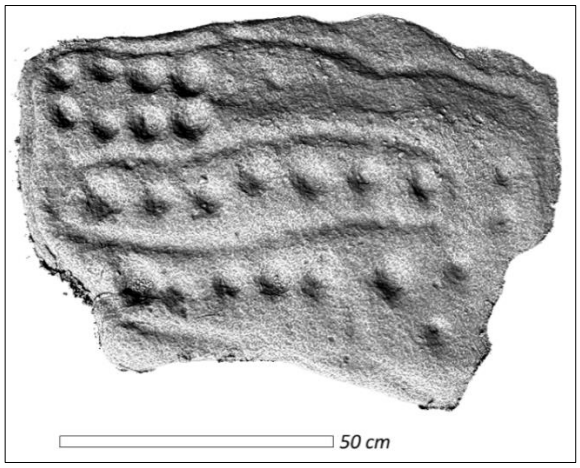


Figure 61 Known as Idol Stone, this is a small panel located in Ilkley Moor. Example of linear arrangements of cup-marks.

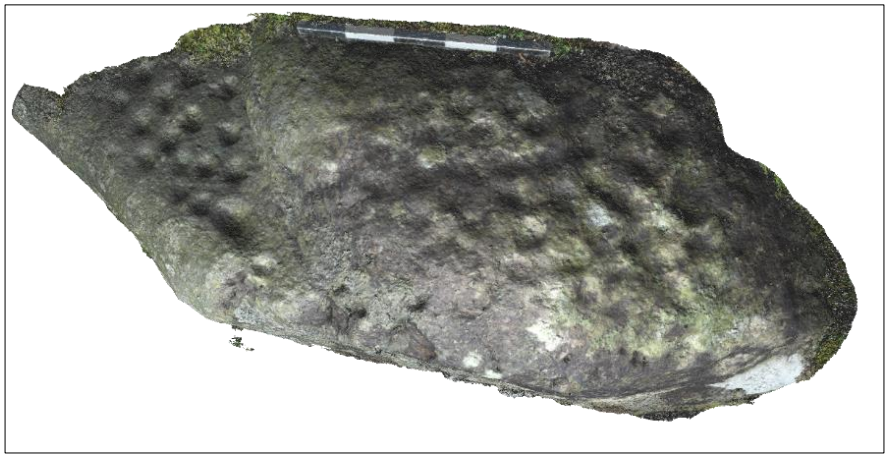


Figure 62 Pepperpot (Rombalds Moor) displays an impressive number of cup-marks arranged both in clusters and in lines. Intestinals are also present on this rock.

Figure 63 The conjoined circles at Glasserton Mains 1 (Machars).

The motifs deployed on the rock's workspaces adopted other kinds of organizational strategies, perchance more complex than just a linear or clustered disposition. Regardless of the size of the panel, more often than previously thought, the motifs were carved in very close relation to each other. Sometimes the grooves are cut on the rock next to others, although with hardly any interaction between them. This suggests that the compositions could have been planned before being applied, or at least part of them, when carved in the same moment. It also denotes a great control of carving skills, an intrinsic knowledge of the tools and techniques, in addition to a good awareness of the geology's behaviour under the pressure of hammering (J. Valdez-Tullett 2016). In other cases the execution of two motifs implied the

sharing of grooves, either for aesthetic or functional purposes, or due to space requirements, in the case of small panels such as Dobrudden 10 in Baildon Moor, Ilkley (Figure 66), where two motifs were fabricated from the same wavy line. This is particularly evident in the case of Iveragh's enclosures, where shapes of various types are carved from each other's grooves. As mentioned, Tullakeel is a good example of this, with 27 converged enclosures (Figure 67).

Figure 64 Dobrudden 10 (Baildon Moor in Rombalds Moor): the bottom motif of a cup-and-ring was built taking into account the morphology of the surface. Another motif was carved in relation to this one, and they share the same wavy line, which encloses other circular images.

Figure 65 In Iveragh there is a significant number of carved enclosures and often they are related to other types of motifs. In this figure, one can observe the intricate network of lines composing the convergence enclosures (documented as a Behavioural Variant) and a number of circular motifs (Photograph by Ken Williams and drawing by Finola Finlay).

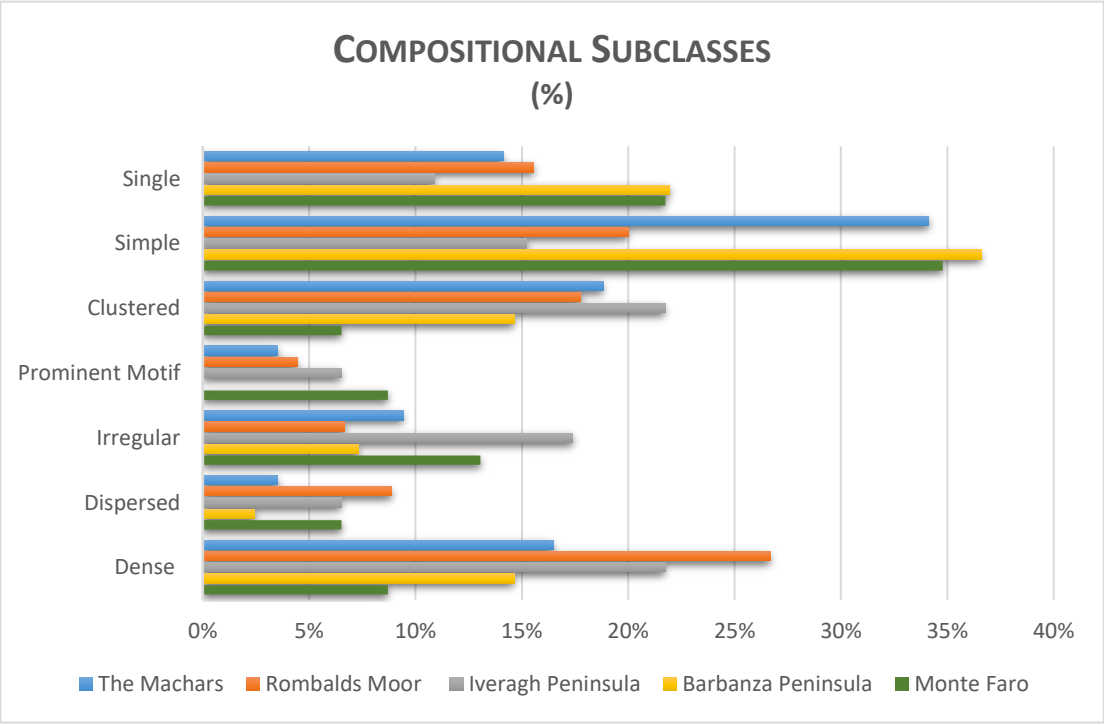
Although superimpositions are rare, and discussed later in the *Structural Variants* sub-category, there are instances in which the motifs are carved adjacent to each other. These can be whole motifs, such as the case of Culscadden 1B (Machars) or partial images abutting others. In the case of Culscadden 1A (Figure 68), for instance, there seems to be a sequence of three images being carved in relation to each other on a small, flat rock with a sub-triangular shape. The first motif, a small cup-and-two ring image is relatively central to the surface, although it is overshadowed by a larger design of a cup-and-six rings surrounding a large depression. Another motif with six concentric circles, developing around a very small cup-mark was carved adjoining the latter, and possibly overlapping some of its rings. This was fitted on the pointy end of the rock, giving the impression that the convergence with the larger motif is due to the lack of space, but only on this side of the rock face. Interestingly, the symbol could have been carved without constraints on the other end, but there was a deliberate decision to locate it on the narrower part of the rock, next to the larger motif. This tendency has also been observed in rocks outside the study areas, such as Cairnbaan in Mid-Argyll (Scotland).

Figure 66 Culscadden 1A (Machars) and a composition of three conjoined motifs (one possible overlapping).

SENSORIAL SCALE

Compositional Subclasses

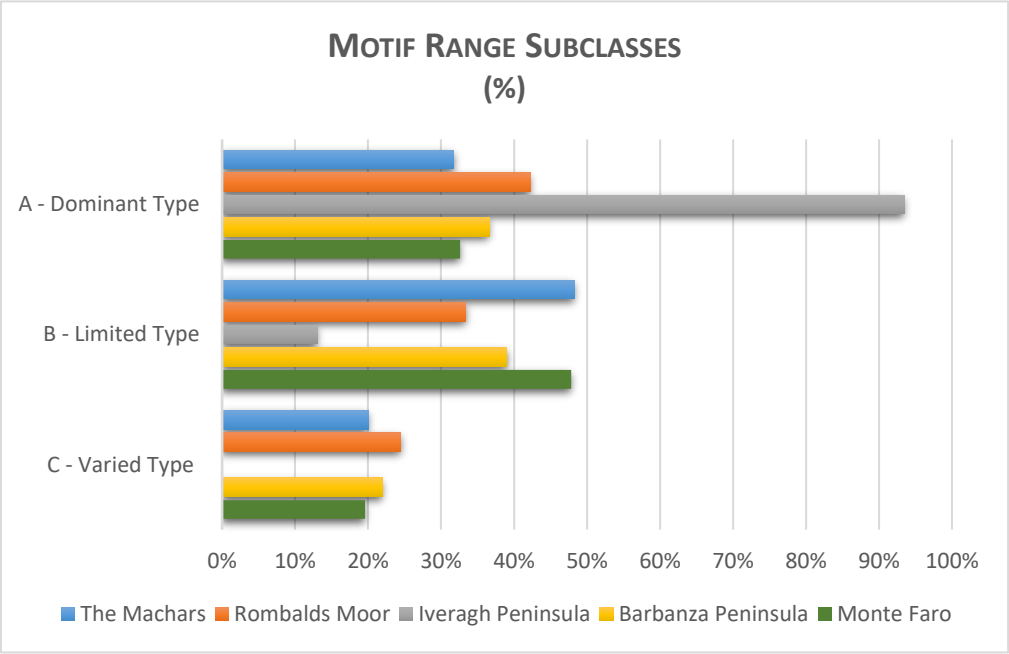
Besides the design details, the organization and configuration of the motifs on the rock surface are other important elements that contribute to the characterization of Atlantic Art. Categories such as *Compositional Subclasses* were devised to assess these features, looking at the distribution of motifs on the panels. This category is part of the sensorial scale of analysis, rising above the small details of the imagery, to look at a wider picture of motif organization, described in seven attributes. Although, in some cases, iconography seems to be rather sophisticated, general results show that there is mostly a preference for simple panels. The surfaces were typically decorated with only one motif or a simple arrangement of 1 to 2 motifs. This is particularly evident in the Machars, where Bradley had previously noted this tendency (Bradley *et al.* 1993), but it is also an overwhelming preference in Barbanza and Monte Faro. This does not exclude the occurrence of panels with more complex compositions, of which Drumtroddan and North Balfern are good examples in the Machars, Monte dos Fortes and Rego do Corzo I, in Monte Faro and Barbanza respectively, and of course the well-known panels of Derrynablaha and Kealduff Upper in Iveragh.



Graphic 14 Results for the analysis of the Compositional Subclasses category, in which the structure of the motifs on the rock surface was assessed.

Motif Range Subclasses

A similar tendency was reflected in the analysis of *Motif Range Subclasses,* another category taken from O'Connor (2006) and directly applied to the case studies featured here. It assessed the frequency of motifs on each panel, attributing them a *Dominant, Limited* or *Varied* type depending on the number of different motifs represented. The results obtained reflect those from the previous category, and in most cases the decorated surfaces display between one (*Dominant Type*) and two to three different motifs (*Limited Type*), although these may be repeated. Only in a few situations was the *Varied Type* documented, in which the panels bear 5 or more types of motifs simultaneously. This category highlighted the relative monothematic character of Atlantic Art.

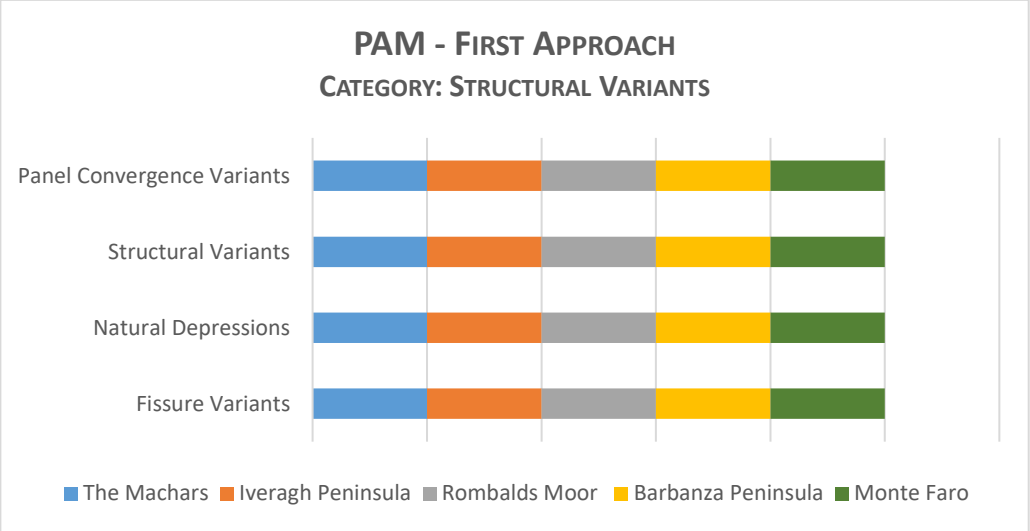


Graphic 15 Results of the analysis regarding the Motif Range Subclasses, included in the Sensorial Scale.

Structural Variants

The *Structural Variants* category is based on four groups of sub-categories, each of them composed by a number of attributes varying from 3 to 6. The analyses of these parameters aims to investigate the organization of the motifs on the rock surfaces, assessing the interaction of the images with natural features: fissures, cracks and solution holes, or the

edge of the rocks which may be used to conform motifs. The two were combined in order to identify patterns of regularity of such interactions. A first approach to this category revealed that in all study areas there is a certain degree of interaction with natural features, which may indicate that this is a general characteristic of Atlantic Art, even if more pronounced in some regions than others.

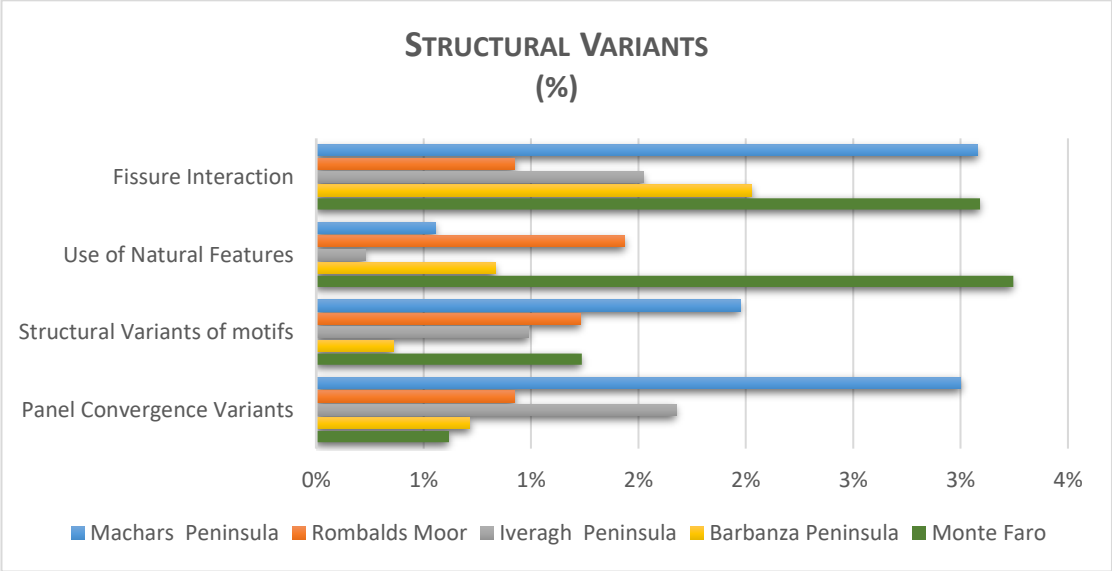


Graphic 16 First order of analysis regarding the Structural Variants category, which includes the relationship of the motifs with the rock medium in terms of fissures, cracks, pane edges, etc.

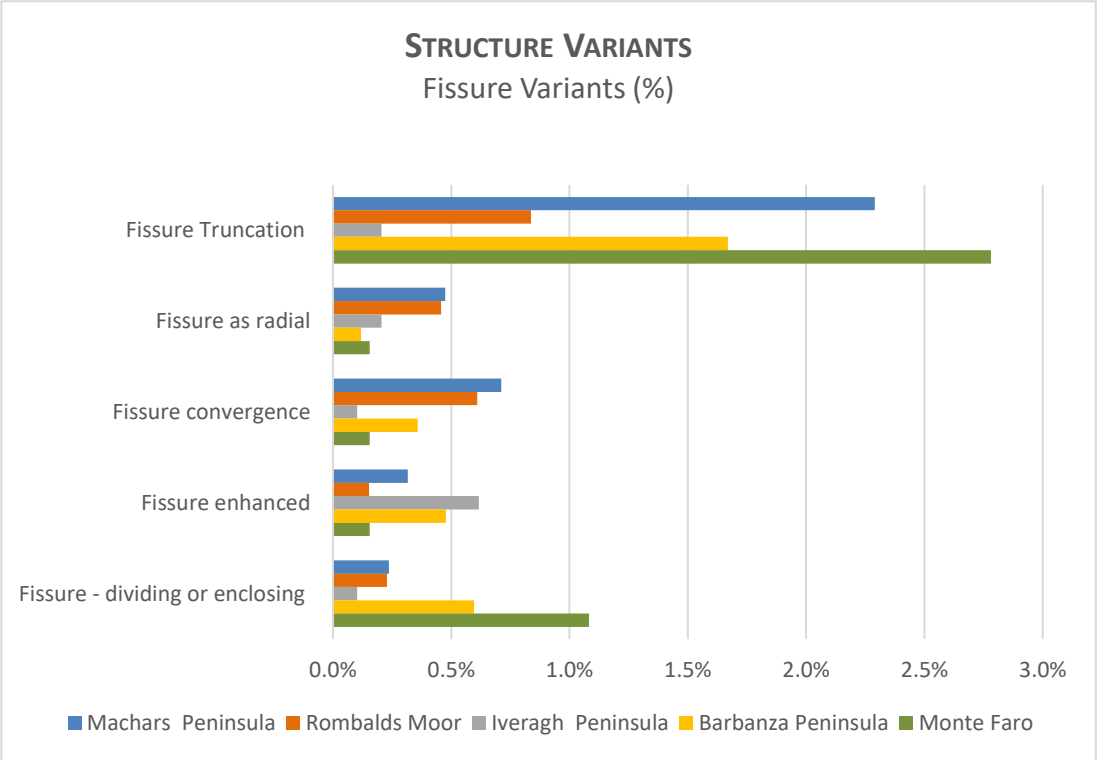
While unfolding these attributes, it became apparent that the images are often not simply deployed on the rocks, but enjoy an underlying complexity of interaction with the rocks' surfaces, micro-topography and geology. Motifs can incorporate natural elements of the rock face which are also used to determine the composition's arrangement.

The interaction with fissures is present in all study areas. In the majority of cases, this is linked to the truncation of motifs by these natural cracks of the rock, which often occurred after their engraving, however in some cases it seems that their incorporation in the assemblage is deliberate. More intentional is the use of fissures to organize the workspace, by creating smaller sections of panel on which the motifs were depicted. Examples of this can be found in the rock art group of Pinhal do Rei in Monte Faro, in rock 1 and particularly in rock 4, in which the main motif is flanked by two natural crevices. Furthermore, the crevices were commonly used as limits to the depictions of images, which often stop when encountering them, but were also used as natural radials (Figure 70), with the circular motifs

developing around them (e.g. Glasserton Mains 1, Machars; Dobrudden 2, Baildon/Rombalds Moor, Lamatrema, Barbanza).



Graphic 17 Types of Structural Variants identified in the study areas and their occurrence. See Vol. 2 for details.



Graphic 18 Relationship between carved motifs and natural fissures (an attribute of Structural Variants category) in percentage.

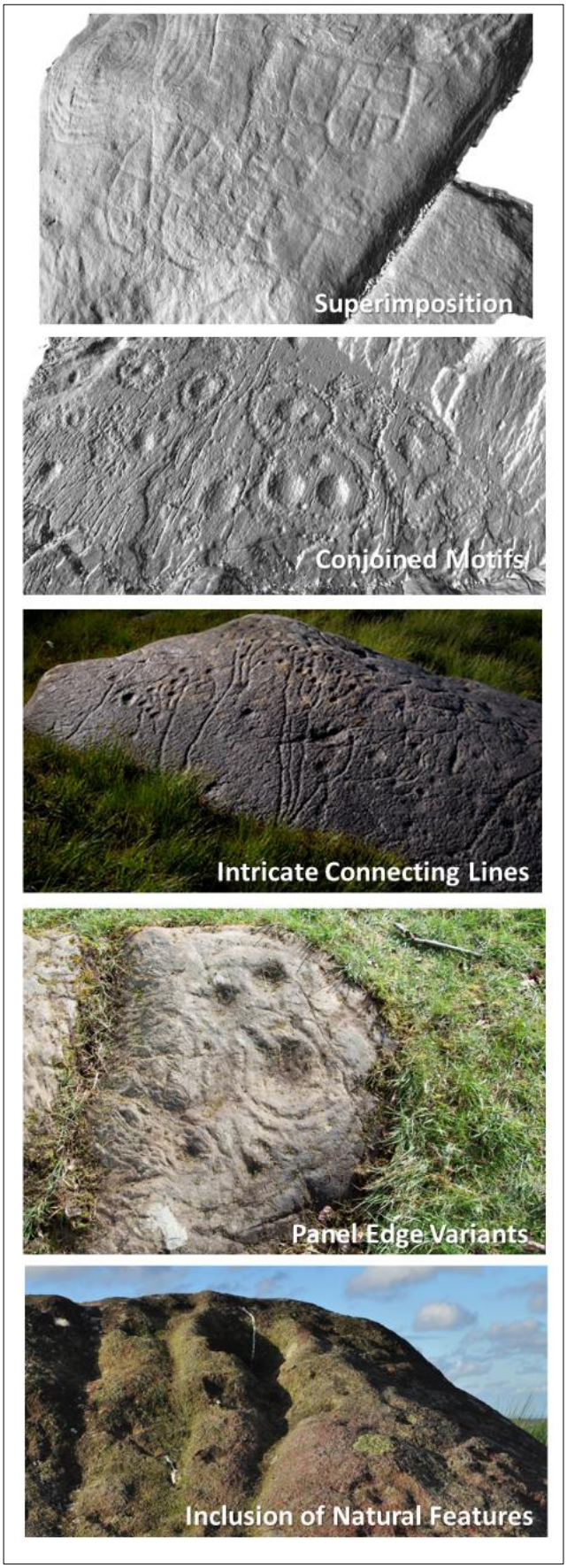


Figure 67 Examples illustrating the Structural Variants category (Photographs by Joana Valdez-Tullett except third image by Ken Williams).

Figure 68 Dobrudden 2 (Baildon Moor), where a fissure is being used as a radial.

The importance given to natural features is also obvious in cases in which these were enhanced. Some situations see natural elements being used to create motifs, such as the cup-marks from solution holes, whilst others were surrounded by grooves or lines of cup-marks (e.g. Knock 5, Machars). Badger Stone, in Rombalds Moor is a great example of the enhancement of natural features, having very wide channels running down its carved surface, with clear marks of tool work. Rather than having been made *ex novo*, these large features probably result from intense smoothing of the rock. Some motifs are carved in relation to natural features, whilst others are intersected. Nevertheless, the carvings at Monte de Faro take the relationship between the motifs and the rock surface to an extreme, with the imagery completely embracing their rock surface, producing a real sense of three-dimensionality (e.g. Figure 72). Monte Faro has the best examples of motif adaptation to the rock surface. In some occasions there does not seem to be a distinction between the two, since grooves and the panel's micro-topographies merge into one, resulting in real sculpture-like creations. This confirms the 3D character of the carvings in this study area, which had previously been noted but thought to be quite exceptional. Despite being rare, this characteristic is also observed, in small numbers, in other regions, namely Rombalds Moor.

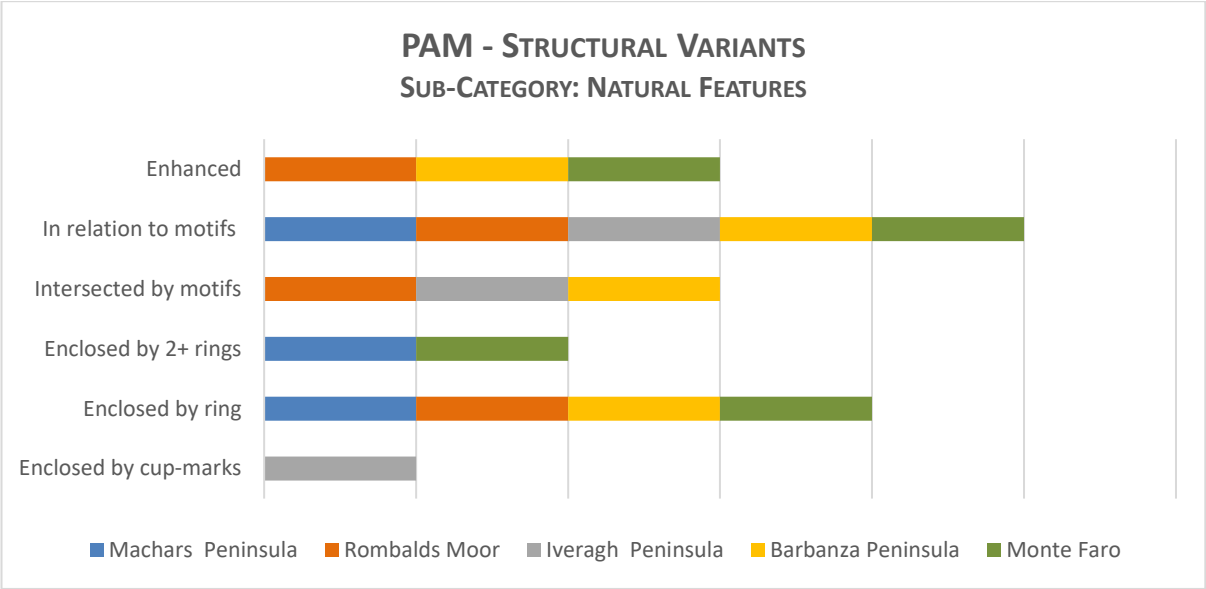


Figure 69 Relation of presence and absence attributes of the interaction of motifs and natural features.

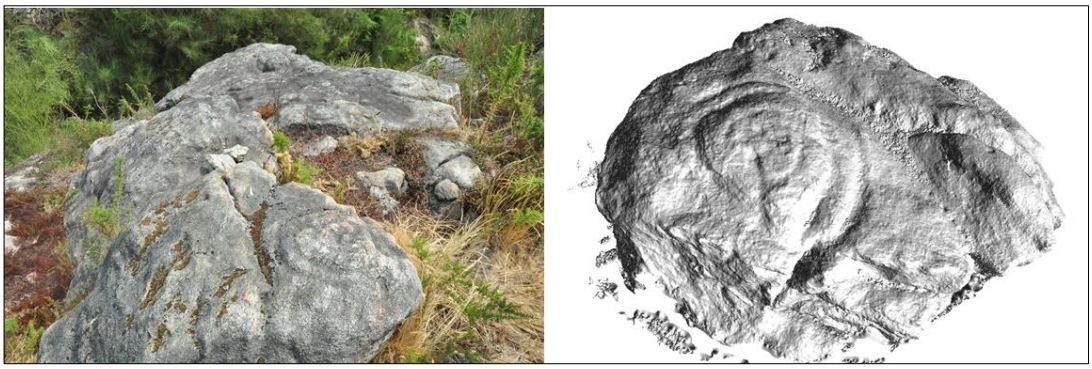
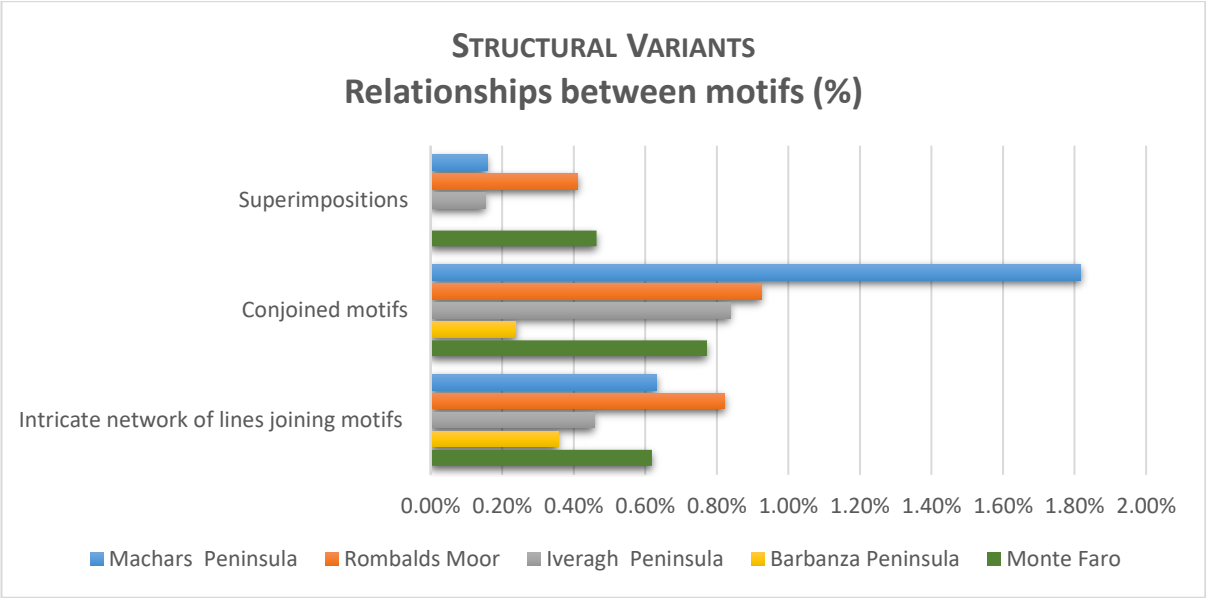


Figure 70 Escaravelhão 5, rock 3: an example of interaction between the depicted motif and the rock surface, in which the former embraces the latter, adapting to its micro-topography.

To a certain extent, the structural variants discussed here overlap with the *Behaviour Variants*. However, these too are elements of space organization and may have intricate relations with the rock medium, and therefore were also included in this category. Besides the conjoined elements, already mentioned, this sub-category explores the existence of superimpositions and the use of intricate networks of lines to connect motifs.



Graphic 19 Types of Structural Variants related to relationship of the motifs on the carved surfaces.

In general, all these attributes are relatively rare or constitute exceptions as their frequency is not high. However, they are present in all the regions, except for the superimpositions, which were not documented in Barbanza. In fact, until now, superimpositions were believed to be extremely rare in Atlantic Art. This study, however, has shown that the overlap of images is more common than previously thought and opens the possibility to develop this strand further in order to identify moments of carvings and perhaps establish relative stages of antiquity to the motifs. Superimpositions were identified in Badger Stone, Barmishaw, Backstone Beck 5 and Dobrudden 10 (Rombalds Moor), rock 1 of Monte dos Fortes 1, rock 7 of Monte dos Fortes 2, rock 5 of Escaravelhão 6 (Monte Faro); Derrynablaha 22 and Derreeny 1 (Iveragh); Drumtroddan 1 and Broughton Mains 2B (Machars). Once again Barbanza presents the lowest frequency for conjoined motifs, suggesting that there is a preference, in the region, to maintain the images clear and distanced from each other. In all the other study areas there are examples of conjoined motifs, this attribute being championed by the Machars.

The use of grooves to inter-connect motifs is a well-known characteristic of Atlantic Art and this feature was assessed as a structuring element of the compositions and relationship with the rock medium. In fact, the use of grooves is not only used to join numbers of motifs, but also to link these to fissures, natural basins, solution holes, the panel edges. Nevertheless, this resource is commonly associated with the more exuberant rocks which, as

we have seen throughout this thesis, are relatively rare, preference being given to simple compositions between 1 to 3 motifs.

Finally, along with the fissures and crevices, the natural limits of the outcrops or boulders may have important roles in the overall arrangements. The use of these to limit the composition's setting was noted in a number of occasions, but it was very evident particularly in the Machars. In a number of occasions the motifs were well adjusted to the edges of the rocks, which seemed to have been worked and smoothed down in order to obtain such an effect. This is the case of Drumtroddan 2A (Figure 73) and 3A, for example, in which circular motifs are adapted to the curvilinear edges of the medium in which they are depicted. In other cases, the limits of the rocks are completely overlooked, with motifs deliberately extending beyond the edges, imprinting an intentional sense of truncation, as observed in Derreeny 8, Iveragh (Figure 74).

Figure 71 Drumtroddan 2 (Machars). A circular motif is perfectly adapted to the edges of the rock surface, using its characteristics to conform the motif.

The use of the panel's edge would also imprint a sense of truncation which, in some cases seems to be related to the breakage of the rock, but in others, observed details suggest that it may be deliberate. This means that the artists would carve the motifs until the limit of the rock in such a way, simulating that the images were fractured. In other circumstances, the artisans seemingly ignored the edges of the rocky surfaces, continuing carving over it. This is the case of Derreeny 8 (Iveragh), where a cup-and-three ring motif and a linear groove extend beyond and bending the edge of the panel.

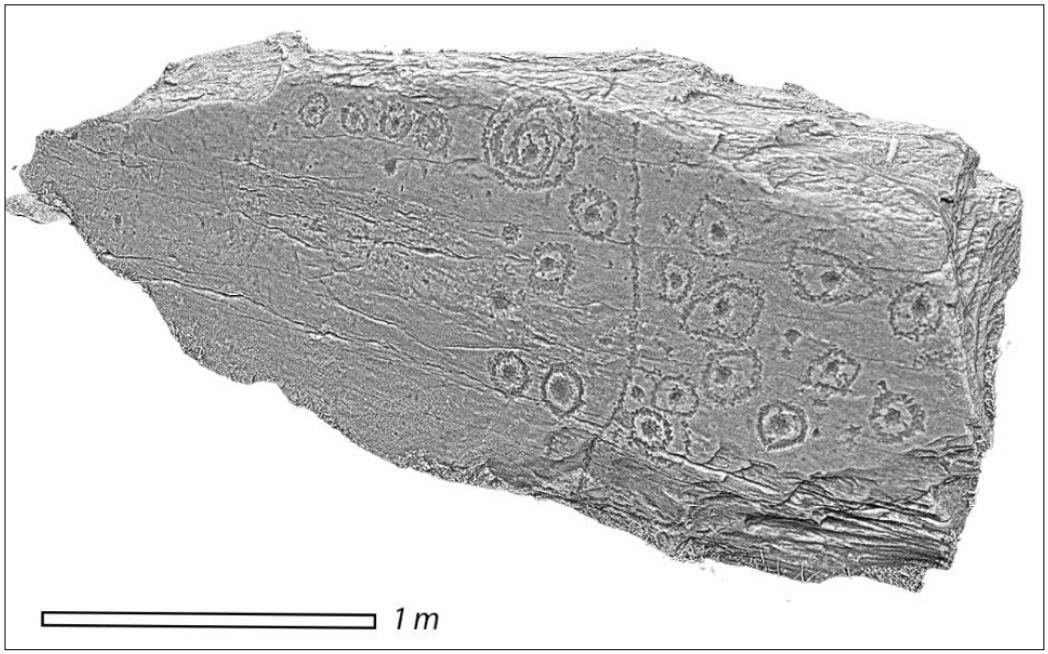


Figure 72 Derreeny 8 (Iveragh): an example of disregard to the edges of the panel. The top circular motif is bending the upper edge of the rock face.

Medium Characterization

The PAM analysis revealed differences in understanding of what type of media should be selected to carve Atlantic Art motifs, but also regarding the placement of the carvings in the landscape. In general, the documented sites are all located in open-air environments, with the exception of the shelter of Calderramos 3 in Barbanza peninsula. These contexts for Atlantic Art are rare, although there are a few more examples, not only in Galicia, but also in England, such as the Ketley Crag rock shelter 1, in Northumberland. Whilst the premise that Atlantic Art has a preference for low-lying, horizontal outcrops was confirmed, it is also true that in some regions other types of rocks are also widely used to carve, not only on the top surfaces, but also near-vertical panels (e.g. Derreeny 8, Iveragh – Figure 74). In Iveragh, the preference is given to erratic boulders of all sizes and shapes. Either because they are rare or because in this region flat rocks are not a requirement. Motifs were depicted in very inclined and sometimes almost near vertical rock faces as well. It is possible that the local geology played an important role in the selection of the surfaces to carve, since the Iveragh Peninsula is a glacial landscape and boulders are common features.

Figure 73 Types of media in which Atlantic Rock Art is found depicted: low-lying, horizontal flat surfaces; boulders and shelters. From left to right, top to bottom: Fontandurín (Barbanza), Low Plains 06 (Baildon Moor), Calderramos III (Barbanza), Glasserton Mains 1 (Machars), Idol Stone 26 (Ilkley Moor), Ketley Crag rock shelter (Northumberland, photograph by ERA) (All photographs by Joana Valdez-Tullett except last one by ERA).

ENVIRONMENTAL SCALE

The low-lying character of the majority of panels poses questions regarding the rock's prominence in the landscape and how visible they would effectively be, especially considering the seasonal overgrowth of vegetation. Potentially, the observers would require previous knowledge of the rock's location to view them, otherwise they would only be spotted randomly by those roaming through the landscape.

The landscape location and affordances were also included and analysed in the PAM. However, results of these observations were incorporated and discussed in the following sections, contrasted with similar parameters assessed with GIS.

7.2 WHERE IN THE LANDSCAPE ARE THEY?

The following section will explore the greater scale of analysis, that of the landscape and the environment. This was examined with a combination of methods, including spatial analysis with GIS, contrasted with field observations. The aim is to assess the affordances of the terrains but also avoid a purely computational approach to the landscape, introducing nuances of human experience.

The section will begin with a brief overview about the development of landscape studies applied to rock art and the use of spatial technologies. The sub-sections will provide an explanation of each type of analysis included in the study, incorporating details of their general function and specific implementation to the dataset. Results will also be discussed in more detail in the following sections.

The geographical information used for Scotland and England was freely available from Edina[33], from where 5 meter resolution Digital Elevation Models (DEM) were downloaded along with hydrology and topographic maps (1:25 000). Most of the spatial analyses calculated were based on this data. To study Ireland a similar DEM was bought from the Ordnance Survey Ireland, along with the 'Discover Raster', a topographic map at a 1:50 000 scale. Cartography for Spain was obtained freely through the Centro Nacional de Información Geográfica (CNIG), including raster and DEM (LiDAR based), whilst for Portugal the same products were bought from the national Direcção Geral do Território (DGT)[34].

The preferred software used for Spatial Analysis was ESRI ArcGIS 10.4.1, license provided by the University of Southampton.

Whilst for the two first scales of analysis – motifs and medium – the dataset was composed not only by panels visited *in situ* but also others published in different sources, in this case of landscape studies, it was important to ensure the accurate location of the rocks. As such, the dataset is composed by a majority of rocks whose grid references were checked in the field, or provided by reliable sources such as HER officers in some instances, OS Maps, other researchers.

LANDSCAPE STUDIES, GIS AND SPATIAL ANALYSIS

A Biography of Landscape Archaeology and Atlantic Rock Art

The interest in landscape did not only emerge with Post-Processualism. Authors such as Tate announced the importance later given to landscape in rock art studies when, as early as 1865, he documented the motifs on the rocks of Northumberland and Eastern Borders,

33 https://edina.ac.uk/
34 A word of appreciation to David Wheatley who funded this purchase.

alongside the local geology and topography. The introduction of context in rock art studies was slow, but references to landscape features can be traced here and there in a number of publications (e.g. MacWhite 1946; Shee Twohig 1968; Clarke 1982, Johnston 1989). It took a few decades and a comprehensive approach to make the landscape paradigm almost intrinsic of new approaches to rock art (Bradley 1991, 1997; Bradley *et al.* 1993). Bradley was inspired by other authors before him (e.g. Morris 1977) and developed the philosophical background of a perspective that transformed the study of rock art in general, but very specifically that of Atlantic Art. The initial focus on landscape-based approaches was initially more developed in Ireland (Shee Twohig 1968, Clarke 1982, Johnston 1989, Purcell 1994), where some authors assessed a number of variables beyond visibility, such as intervisibility, altitude, the distance to water sources, to the sea, local type of soil and visibility affordances which were initially considered essential in the locational decisions underlying the placement of rock art (e.g. Johnston 1989; Purcell 1994). In Britain the approach was also gaining importance, with incipient landscape studies carried out by Morris (e.g. 1968, 1977, 1979, 1981, 1989) whose perspective on the relationship between carved rocks and viewpoints had a great impact on van Hoek (e.g. van Hoek 1987, 1988, 1995), but also Bradley (e.g.1991, 1997). Ultimately Morris' influence is pivotal in the development of landscape archaeology and rock art through Bradley who, imbued with views of Social Anthropology established a connection between the carvings and their potential social significance (1991). Rock art's importance would depend on the social groups with which it interacted, depending on their adaptation to the environment, since hunter-gatherers and agriculturalists would interact differently with the landscape and therefore have different experiences of it (Bradley 1991, 1991; Ingold 1986). Bradley resonated this difference with societies' creative practices arguing that agriculturalists would be building larger monuments, whereas hunter-gatherer's intervention on the landscape would be minimal, leading to what he designated of 'places as natural monuments' (Bradley 1991). He argued that rock art was mostly a phenomenon of mobile societies, losing its importance with sedentism and the advent of agriculture (*Ibid.*). Conclusions were mostly drawn from results obtained through a methodology which created effective relationships between the rock art and landscape features and affordances such as the study of visibility, optimal pathways, accessibility, relationship to watercourses, but also other archaeological sites. As mentioned elsewhere, Bradley's approach is essentially structuralist, and he divides the landscape into binary oppositions seeking regular patterns, concluding that complex motifs are intimately related with upland areas, where a higher number of people would come in contact with the carvings even if irregularly, and the simple motifs are specific to lowlands. Bradley's theory and methodology was in general well accepted, despite being challenged by some authors who criticized the idea that similar

assumptions could equally fit other geographic areas (e.g. Purcell 1994, 2002). Nevertheless, the model was transposed to other regions such as Galicia, where it was thoroughly applied (Bradley *et al.* 1994b, 1995; Bradley *et al.* 1994). Here too a concept of landscape archaeology was emerging, despite the different nuances of the notion (Criado-Boado 1989, 1993; Criado-Boado *et al.* 1991). Whilst Bradley's concept of landscape tends to incorporate people's experiences, Criado-Boado's perceptive focused on a more positivist role where rock art is used as a resource to structure space, generating a symbolic landscape that would be universally understood by the past communities using it. Both perspectives of landscape had important repercussions in western Europe (Alves 2003; O'Connor 2006; Purcell 1994, 2002; Waddington 1998 following Bradley; Fairén-Jimenéz 2004c; Fredell 2010; Parcero-Oubiña *et al.* 2013; Santos-Estévez 2008 following Criado-Boado).

Rock Art, GIS and Spatial Analysis

Landscape Archaeology is an collection of methodological and practical approaches exploring the relationship between societies and their environment (Montero-Ruíz *et al.* 1998:165). The introduction of GIS into the study of rock art has allowed the development of innovative research questions to investigate aspects that would otherwise be ignored or difficult to access (Díaz-Guardamino and Wheatley 2013:188). It provides a system to cross-reference multiple variables on site distribution (O'Connor 2006), and a means to engage with the creation, manipulation and simulation of space (Eve 2014:15). It has been criticized by Post-Processual and Post-Modern approaches that raise issues of environmental determinism and over-reliance on functionalist and environmental explanations (e.g. Thomas 1991, 1993; Tilley 1994), which are a consequence of its origin within functional-processual archaeology (Wheatley 2014). These, however, can be overcome with a stronger investment in social datasets to back them up with a wider variety of arguments, including social and ideological variables to explore the landscape (O'Connor 2006:28).

GIS is currently well established in archaeology and gaining influence in rock art research, being used for both investigations and data management (e.g. Cruz-Berrocal 2005; Díaz-Guardamino 2009; Enlander 2013; Fairén-Jiménez 2004a; O'Connor 2006; Robinson 2006; Valdez 2010; Wienhold 2014). Gaffney *et al.* is one of the first examples that combines rock art and GIS, to analyse visibility and test Bradley's assumptions regarding Kilmartin, Argyll (Gaffney *et al.* 1995). It was later criticized for the use of a static scale of analysis and dismissing important elements that would interfere with visibility, such as vegetation (Wienhold 2014; Winterbottom and Long 2006). The study of viewsheds and visibility is an

overarching theme of rock art research that crosses geographies and periods (e.g. Alves 2003; Cruz-Berrocal 2005; Enlander 2013; Fairén-Jiménez 2004a; O'Connor 2006; Robinson 2006; Santos-Estévez 2008; Valdez 2010).

It has been hypothesised that rock art is a means of marking routes and pathways and this possibility has also been explored through GIS (Hartley and Vawser 1998; Robinson 2006, 2010), mainly through a Least Cost Path analysis, which in essence refers to the calculation of the most efficient path possible between a source and a destination point (Wheatley and Gillings 2002; Connolly and Lake 2006). This algorithm is useful for the study of known routes of travel or patterns of movement, but is problematic to use it in the context of prehistoric rock art, being hard or virtually impossible to know whether there was a connection between two carved rocks or if people would be moving from one specific rock to another.

One of the most comprehensive studies of rock art applying GIS is that of O'Connor in Ireland, challenging Tilley's criticism of the computer tools whilst combining cartography, archaeological evidence and field observations to articulate a number of variables that could explain the carved designs (e.g. various types of distribution of prehistoric sites, exploring palaeoenvironmental areas, elevation, location of water-features, geology, soil type and visibility) (2006:27).

Despite the potentials it is important to hold in mind that GIS is no more than another tool available to the archaeologist in their exploration of the past and therefore the outcomes of analysis only represent the physical affordances of the terrain. These can be used to infer about the possibilities posed to people's actions in the past, although human behaviour in response to these may have been completely different. GIS is useful for modelling the landscape and conducting analyses that may lead the researcher down avenues of investigation that would be otherwise barred to them, although interpretation of results should be combined with data from other provenances and be critically analysed. In his discussion of the application of GIS to empirical research, Gillings argues that 'not only has experiential theory come under sustained and insightful criticism, but the widespread penetration and routine application of spatial technologies such as GIS within the discipline have been profound. Instead seeking out a notional middle ground, archaeologists using GIS should actively work to develop new conceptual frameworks that are not only sensitive to broader currents and debates in critical thought, but also the potentials and possibilities offered by emerging spatial technologies' (Gillings 2012:610). In recent years spatial technological approaches have pursued a deeper theoretical basis to their work on landscapes, and as a result there has been an outburst of sophisticated methodologies, drawing on a range of processual and post-processual stances (Wheatley 2014). Whilst

visibility studies were, in many ways, a proxy for landscape perception, there has been an attempt to overcome this limitation. Frieman and Gillings suggested the creation of a 'sensory envelope' within a GIS environment to provide a structure to 'our creative exploration of the sensory textures and affordances of a given locale', despite acknowledging the difficulty of the task (2007:13). Not all GIS studies are environmentally deterministic, and there are good examples in which the technology was successfully applied and thought through (e.g. Eve 2014; O'Connor 2006; Robinson 2006; Wheatley and Gillings 2000). Furthermore, in some cases, environmental factors proved to be important in site distributions (O'Connor 2006:29).

Finally, GIS as well as maps and orthophotography, result from spatial abstractions, representing a perspective of the land seen from above (Wheatley 2014). The implication is that by using these resources we are not effectively experiencing the landscape as if we were in that space, and the body is essential in our understanding of the world (Eve 2014:16-17). Although spatial explorations with computational applications pose limitations, personal field observations also introduce subjectivity into our analysis due to body cultural-specific biases (Brück 1998; O'Connor 2006). This study was not designed to meet the complex requirements of embodied space, however, in order to minimize partiality, the methodology comprised a combination of data acquired through bibliography review, cartographic sources, fieldwork, multivariate and GIS calculations. Results of fieldwork and spatial analyses were contrasted in order to understand the limitation of these two spheres of data and to complement each other. This project was an exercise of 'embodied GIS' (after Eve 2014:85) in which there is an engagement of 'human scales of landscape (…) with places and sociocultural and experiential phenomena' (Rennell 2012:513).

UNBOUNDED ATLANTIC ROCK ART IN PLACE AND SPACE

The following section will describe the spatial analyses undertaken in this project, present and discuss results. The topographies of the study areas were modelled in order to enable explorations of features that had been previously considered meaningful in rock art location and distribution (i.e. clusters, visibility, orientation). These results, which should only be interpreted as affordances of the terrain (Gibson 1986), were contrasted with field observations in order to build a comprehensive picture of the landscape and identify spatial patterns and other potential social and economic commonalities.

Rock Art Clusters

Spatial distribution is a recurrent theme in archaeological research. A quick glance at a map with the location of the carvings suggests that these are organized in clusters. A calculation of the Complete Spatial Randomness (CSR) of a point distribution is the first step of a series of spatial analysis to assess this assumption. The CSR is a process in which a point pattern, appears to be completely random. Also known as *Poisson Process* it implies that each point has an equal probability of appearing in any location, and that each point's location is independent of all others. It is often used as the null model in exploratory analysis (Rirris 2014).

Nearest Neighbour (NN) Analysis is a method to evaluate pattern distributions. The Clark-Evans test, for instance, was devised in 1954 and extensively used in archaeology (Clarke 1977; Hodder and Orton 1976). Lately, approaches exploring variance-to-mean ration, kernel density estimates (Baxter *et al.* 1997) and k-means clustering (Kintigh and Ammerman 1982) have also gained popularity.

From a spatial point of view, archaeologists tend to consider that it is unlikely that humans act randomly in the landscape, since randomness would imply the absence of behaviour but also unsuitable data (Riris 2014:191; Rodríguez-Rellán and Fábregas-Valcarce 2015:328). NN analysis is a relatively simple spatial statistic algorithm that can be used as an initial approach to the dataset to explore distributional patterns. By detecting potential site clusters, it confirms or disproves any suspicions raised by a simple visual observation of point patterns. The human eye tends to couple things together and draw patterns that may not hold any significance and therefore, it is useful to test the datasets. Point distribution is commonly characterized as random, clustered (an area with concentrations of points) or regular (points are spaced in a uniform manner) (Riris 2014).

In this study, NN analysis was calculated through the Average Nearest Neighbour function of ArcGIS 10.4.1, where each feature's centroid[35] is measured in relation to the distance to their closest neighbour's centroid. The average nearest neighbour ratio is calculated through the division of the observed distance by the expected average distance. The latter is based on a hypothetical random distribution, with the same number of features covering the same total area (see ArcGIS Pro website for details). The obtained results are averaged and if the average distance is less than the one defined for the hypothetical random

[35] The geometric centre of each point.

distribution (null hypothesis), the latter is considered to be clustered. Conversely, if the average distance is greater than the hypothetical random distribution, then this is accepted as dispersed, which means that should the values of the index be < 1, then there is an element of clustering, but if they are >1, then the result indicates regularity (Riris 2014: 195).The NN distance ratio is based on the expected density of sites and therefore depends on the study area. The average NN distance index (probability) and z-score (standard deviation) are based on the assumption that the points measured can be placed anywhere within the study area. Because these values can be sensitive to perimeter changes, they should only be compared within fixed areas (ArcGIS Pro website).

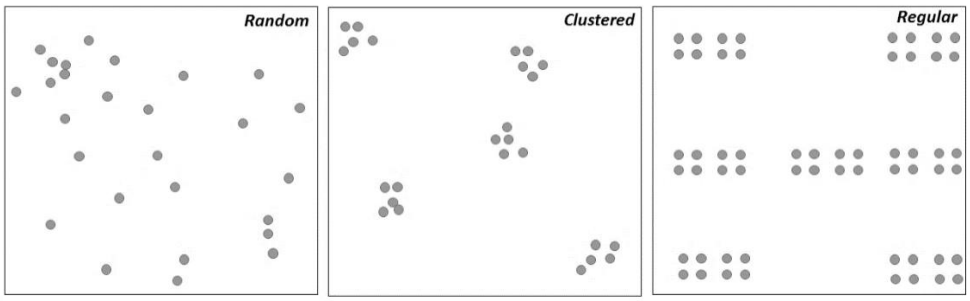


Figure 74 Types of distribution patterns.

The difficulty of introducing multiscalar perspectives is indeed one of the main handicaps of this method. As a result, it is useful to test for clusters when considering first order neighbours, but NN does not allow for the analysis of clusters at different spatial scales, nor the identification of variations occurring in a multitude of associated temporal scales (Bevan and Conolly 2006; Conolly and Lake 2006:164).

The areas used for NN calculations in each case-study were those previously mentioned, defined through a buffered convex hull (see Appendix 1, vol. 2 for details) from the groups of sites. The analysis considered the location of the main datasets within these pre-defined areas, confirming initial visual inspections which suggested that rock art sites were clustered. The z-scores below (Table 5, shaded row), show that all values are <1 and therefore the probability of a random distribution is less than 1%.

Nevertheless, the dataset may also introduce bias, should there not be a representative sample. Furthermore, if an area surrounding a random distribution of points

is too wide, then these are more likely to be identified as clustered (Conolly and Lake 2006:166). As such, areas like that of Iveragh were adjusted, considering its size (a total of c. 814 km²) and the small number of sites from the main dataset. Additional calculations were performed, based on smaller areas that were divided into a northern and southern group (see Appendix 1, vol. 2 for the areas of Rombalds Moor and Iveragh). In these cases, the z-score was very different from the initial result, attributing positive values to the north (z=16.41) and south (z=19.08) areas, and therefore classifying them as random distributions. In order to investigate this difference further, the NN analysis was repeated, using the whole dataset, including those sites for which co-ordinates had not been confirmed *in situ*. These were obtained through the published catalogues (Byrne *et al.* 2009; O'Sullivan and Sheehan 1996). In all the analysis performed with this dataset, including the whole area of the peninsula, and the smaller northern and southern areas, the results were <1 and therefore considered clustered.

A similar division was defined in Rombalds Moor, given the distance that separates Ilkley and Baildon groups of carvings. However, the individual areas both scored <1, meaning that the distribution patterns are clustered (whole area z= -9.63; Ilkley z= -9.89; Baildon z= -5.18).

Table 5 Results of the Nearest Neighbour analysis, calculated with ArcGIS 10.4.1 for all study areas. The standard deviation is highlighted.

NEAREST NEIGHBOUR ANALYSIS (EUCLIDEAN DISTANCES)					
	THE MACHARS PENINSULA	IVERAGH PENINSULA	ROMBALDS MOOR	BARBANZA PENINSULA	MONTE FARO
NN Ratio	0.18717	0.551492	0.117684	0.29539	0.145785
NN Z- Score	-13.1027	-4.928995	-11.323	-8.735832	-11,203,321
P-Value	0	0.000001	0	0	0
NN Expected	954.13	1928.27119	698.6593	322.8937	48.4545
NN Observed	178.5843	1063.42545	82.22101	1093.1093	332.3684

Table 6 *Table showing the different results obtained through the calculation of Nearest Neighbour algorithm, when considering two different datasets and three study areas. A main one, which is then divided into north and south.*

NEAREST NEIGHBOUR ANALYSIS OF IVERAGH PENINSULA (Z-SCORE)			
	WHOLE AREA (C. 814 KM²)	**NORTH AREA (C. 217 KM²)**	**SOUTH AREA (C. 467 KM²)**
NN Z-Score (Main Dataset)	-4,928995	16.410025	19.08968
NN Z-Score (Whole Dataset	-13.156718	-0.610036	8.058048

Clearly, the NN analysis is not entirely a reliable algorithm, and for this reason further examination was conducted through Ripley's K Function o assess the clustering patterns of sites. This is another method to assess clustering, popular in archaeological research (e.g. Bevan and Conolly 2006; Crema and Bianchi 2013; Eve and Crema 2014; Markofsky 2014; Rirris 2014). This enables a multi-scalar evaluation of the data, designed to identify significant clustering or dispersion of points at a specific range of distances. Unlike NN analysis, the shape of the area does not interfere with the results (Conolly and Lake 2006:166). Briefly, the equation identifies point intensities (λ), 'where λK(r) defines the expected number of neighbours in a circle of radius *r* at an arbitrary point in the distribution (…). The K-distribution is a cumulative frequency distribution of average point intensity at a set of intervals of r. Significance intervals are generated by Monte-Carlo simulation[36] of random distributions (…) compared with the observed values of K to provide a statistically robust measure of cluster size and cluster distance in the dataset'. (*Ibid*.166).

[36] A group of methods that use repeated random sampling to confirm results, running simulations of processes multiple times, in order o obtain a distribution of numerical data on a specific subject of interest.

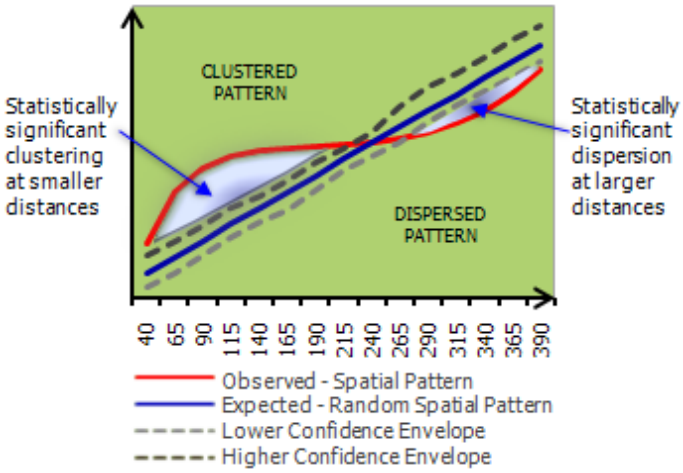


Figure 75 Measuring spatial aggregation/segregation over a range of distances (Source: http://pro.arcgis.com/en/pro-app/tool-reference/spatial-statistics/multi-distance-spatial-cluster-analysis.htm)

The transformation of K-Function used in this analysis, and provided by ArcGIS, is the following:

$$L(d) = \sqrt{\frac{A \sum_{i=1}^{n} \sum_{j=1, j \neq i}^{n} k_{i,j}}{\pi n(n-1)}}$$

In which *d* is the distance; *n* represents the total number of features; *A* the total area considered in the calculation; and $k_{i,j}$ is a weight (ArcGIS Pro website).

Discussion

The general impression according to fieldwork and basic visualization of points on a map is that Atlantic Rock Art is organized in clusters. This conclusion was confirmed through both NN analysis and Ripley's K-Function. From this point, it is now possible to organize the carved rocks in space, in order to conduct the remaining spatial analysis without establishing complete random relations between the panels.

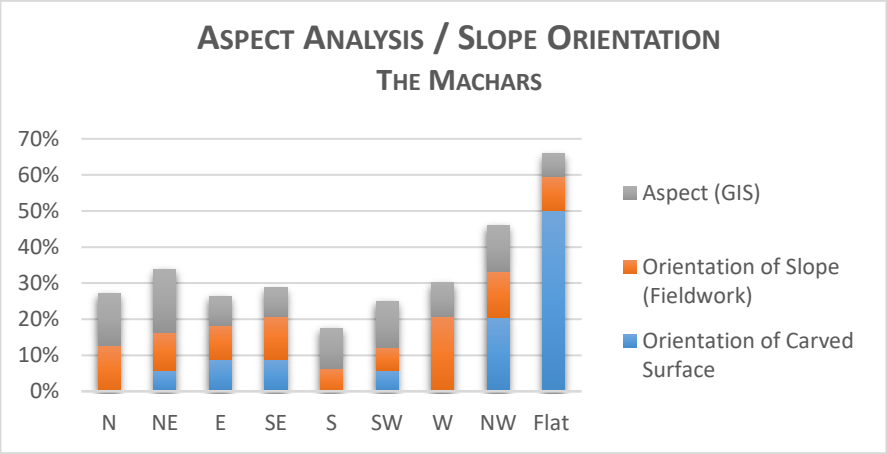
Aspect Analysis

Computational Aspect analysis was carried out in ArcGIS. It refers to the estimation of the slope's orientation deriving from elevation data (available in the DEM), based on a simple algorithm valued from the local neighbourhood's geometry (Conolly and Lake

2006:194). Calculated in degrees, the cells of the model are divided between 0º (due North) and 360º (again, due North), making a clockwise circle. The results can then be reclassified into the desired number of cardinal points, in this case N, NE, E, SE, S, SW, W, NW, adding to these a flat option referring to areas of no preferential orientation (Wheatley and Gillings 2002: 120,121).

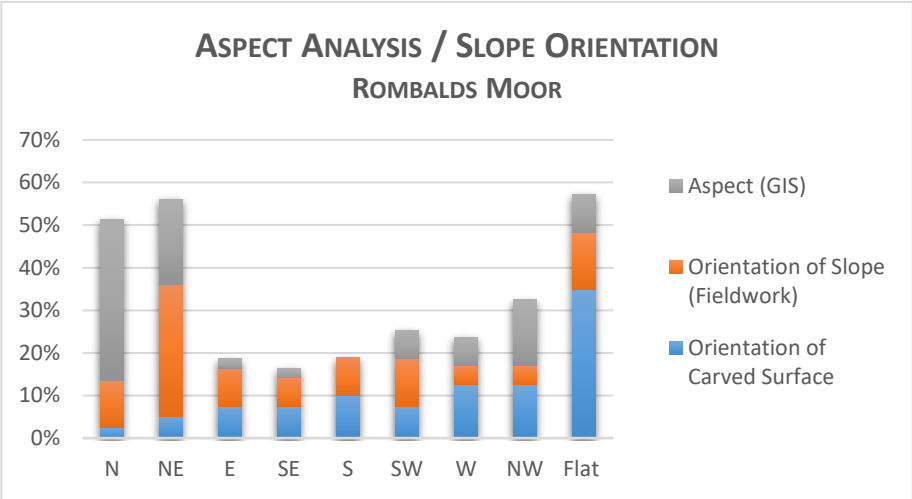
The assessment of the aspect determines the location of each rock in terms of the orientation of the slopes. This may be a defining argument for the location of carvings, be it for its hypothetical relationship with other cultural or natural elements, or preferential visibilities. The computational analysis was contrasted with results observed during fieldwork.

Field observations in the Machars suggested that, although there is a relatively regular distribution of orientations, there is a slight preference towards the western quadrant (W + NW + SW = 48.86% in the field and 34.86% in GIS), although the two sources of analysis indicate slight discrepancies with GIS indicating a preference towards N/NE. Furthermore, results also show differences in rocks classified as 'flat', absent from the fieldwork record and making 6.35% of rocks analysed with GIS. The eastern quadrant of the peninsula emerges as the second favourite orientation of the group, being a preference to 35.09% of the rocks according to fieldwork, and 33,33% to GIS. North and south directions are least favourites scoring less than 15%. These results may reflect the fact that the majority of rocks known to the peninsula are located on coastal areas, bounded by Luce Bay to the west and Wigtown Bay to the east.



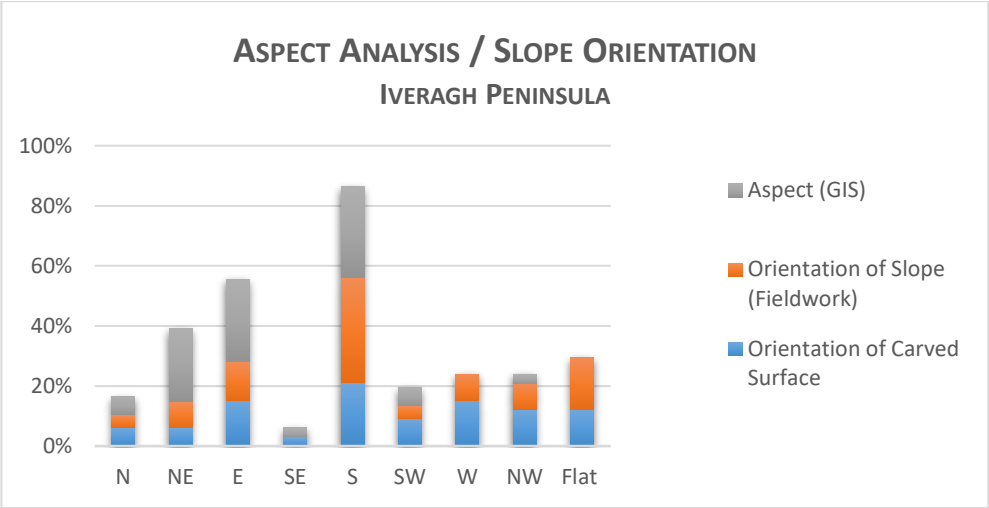
Graphic 20 Slope orientation results for The Machars contrasting Field Observations, GIS analysis (aspect) and the orientation of the carved panels.

The group of carved rocks studied in Rombalds Moor produced different results. In terms of orientation, both fieldwork and GIS analysis corroborate the idea that N and NE are the preferred orientation of rocks. However, GIS identified an important number of 'flat' rocks, which obviously echoes the topographic character of the plain in which the carvings are located.



Graphic 21 Slope orientation results for Rombalds Moor contrasting Field Observations, GIS analysis (aspect) and the orientation of the carved panels.

In Iveragh, despite a greater variation in the results, both field observations and GIS, seem to consider that south is the preferential orientation of the rocks. This preference is followed by 'flat' in fieldwork, as opposed to N and NE highlighted by GIS. Interestingly, during fieldwork almost 18% of the carvings were considered to face W, while this direction has almost no representation in the GIS analysis. In the southern area of the peninsula, in which Derrynablaha and Derreeny are included, rocks are definitely preferentially oriented towards the S (8 of them), with only 3 facing N, according to both types of examination. Regarding the northern part of the peninsula, where the groups of Kealduff Upper and Coomasaharn are located, field observations seemingly suggest that a majority of rocks are placed in 'flat' areas, without a preferential orientation. The GIS analysis points towards a NE preference. Also the carved rocks are located on the edges of the extensive Behy river valley, as opposed to the high mountains that surround it.



Graphic 22 Slope orientation results for Iveragh Peninsula contrasting Field Observations, GIS analysis (aspect) and the orientation of the carved panels.

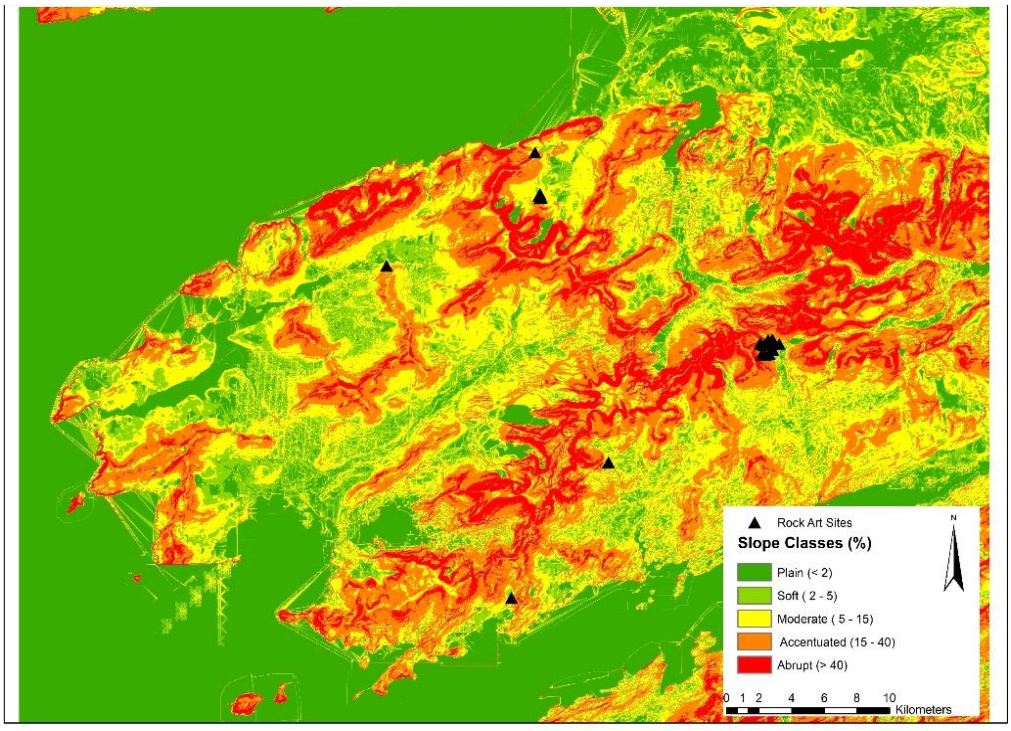
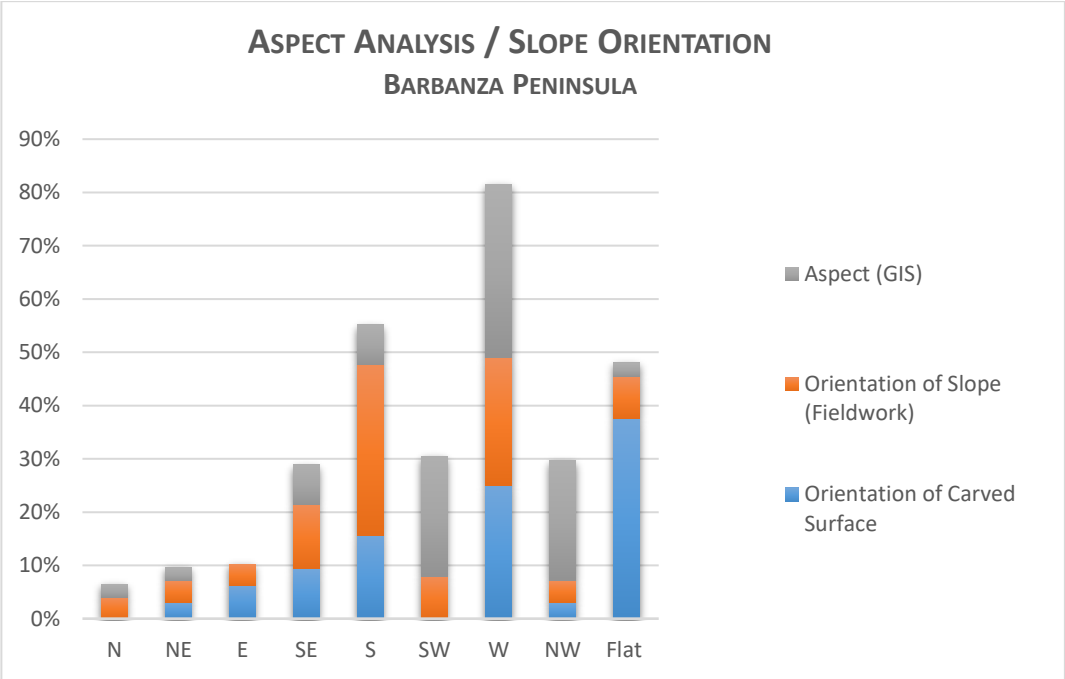


Figure 76 Relation of rock art sites in Iveragh Peninsula and the slope classes defined according to Butzer parameters (%).

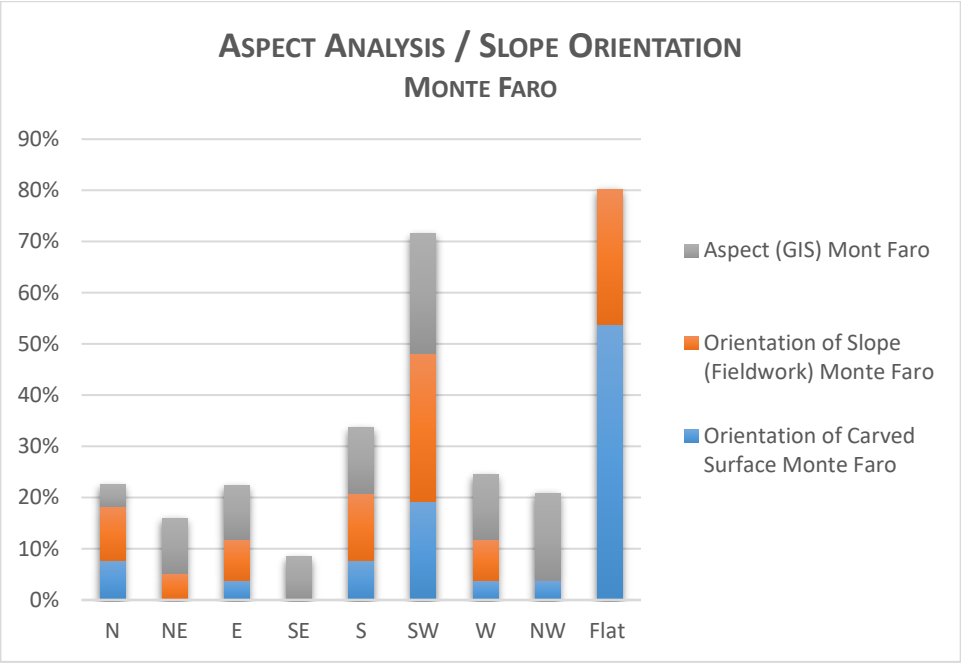
Figure 77 Derrynablaha 8 facing East towards Ballaghbeama Gap (Iveragh).

Fieldwork observations and GIS results were strikingly opposed in Barbanza, demonstrating the value of contrasting computational and experiential analysis. Whilst in the field orientations to the south followed by west were favoured, GIS results privileged W and NW. This leads to the northern Ría de Muros and Nóia, over which many of the rocks effectively overlook, including the region of Muros, the opposing stretch of land. Interestingly, and despite the local geomorphology and different topographic conditions in which the rock art is found, computer results showed that 22.5% of the rocks are placed in areas of no preferred orientation, whilst this category was only applied to 8% of the cases during fieldwork.



Graphic 23 Slope orientation results for Barbanza Peninsula contrasting Field Observations, GIS analysis (aspect) and the orientation of the carved panels.

Finally, the Portuguese Monte Faro study area also produced contrasting figures, when analysed from a fieldwork and GIS perspective. Although in both cases the preferential positioning of the rocks is towards SW, fieldwork analysis considered 'flat' to be the second main feature of the category (26,3%), not featuring at all in the GIS analysis, who defines the NW as a second preference (17,02%). Once again these results seem to be in line with the natural geomorphological characteristics of the region, since Monte Faro extends towards the River Minho and its mouth to S and SW.



Graphic 24 Slope orientation results for Monte Faro contrasting Field Observations, GIS analysis (aspect) and the orientation of carved panels.

Testing for Significance

Assuming that the carved rocks were chosen due to their orientation, or that there was no agency involved in their selection, is making a flawed assessment of their landscape location. When in the field, one has an immediate perception of where the rocks are oriented to, even if this does not always correspond to the natural inclination of the terrain. Our human nature tends to be appealed by specific features such as the beauty of long vistas over valleys, or the enclosed character of some areas in a mountain. Of course, our current perceptions do not necessarily match those of past societies and we can only infer the reasons why specific boulders and outcrops were selected.

To investigate this issue further, significance tests were performed to the GIS results, in order to contrast the location of the rocks and the natural affordances of the terrains. For each study area, this test was developed both for the main and comprehensive datasets. The first ones feature the sites studied *in situ* or with confirmed details via reliable sources, the second include unconfirmed HER, Canmore and ERA data for Scotland and England, catalogues for Ireland and Spain, and the comprehensive list of sites provided by the Monte Faro project in Portugal. On occasion study areas were refined into smaller portions, as is the case of Iveragh, where the northern and southern case studies were used again.

The method applied in this investigation was the chi-square test (see Appendix 9, Vol. 2 for details). In essence, the chi-square test contrasts the known distribution of rocks across the defined aspect classes (cardinal points), with a theoretical expectation of the distribution among those categories. As such, the null hypothesis[37] formulated intended to investigate whether the carved rocks were evenly distributed across the various categories. This conclusion is reached when comparing the obtained value of chi-square with the theoretical value, at a significance level of 0,05[38]. The χ^2 for 8 degrees of freedom (the 9 cardinal orientations - 1) at $\alpha = 0.05$ is 15.5073.

Table 7 $\chi 2$ square results for each of the study areas performed with the main and comprehensive datasets.

	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
Machars (Main dataset)	71	71	**26.56429**
Machars (Comprehensive dataset)	92	92	**34.57613**
Rombalds Moor (Main dataset)	45	45	**46.42093**
Rombalds Moor (Comprehensive dataset	77	77	**44.92471**
Iveragh Northern Area (Main dataset)	11	11	**38.9772**
Iveragh Northern Area (Comprehensive dataset)	55	55	**62.0087**
Iveragh Southern Area (Main dataset	22	22	**34.46709**
Iveragh Southern Area (Comprehensive dataset)	60	60	**31.23718**
Barbanza (Main dataset)	40	40	**38.93805**
Barbanza (Comprehensive dataset)	164	164	**200.252**
Monte Faro (Main dataset)	47	47	**10.44815**
Monte Faro (Comprehensive dataset)	125	125	**25.00338**

[37] In a statistical test, the null hypothesis says that there is no significant difference between a population and the observed sample.
[38] This level of significance means that there is a 95% probability that the stated relationship is correct. 1 in every 20 cases the stated relationship may be erroneous.

Since the chi-squared values calculated are (see Appendix 9, vol.2 for calculations and results), in most cases, greater than those observed in the tabulated values, we can reject the null-hypothesis. This means that the chosen rocks to carve were not evenly located in the landscape, suggesting that there was a certain degree of intention in terms of their setting. In Rombalds Moor, for instance, the preferential orientation of c. 50% of the rocks, according to field observations, and c. 45% according to GIS is towards N and NE, the direction in which the valley opens and enjoys the greatest vistas over the valley.

Of course, we must bear in mind that the datasets may be quite fragmented and the lack of a comprehensive dataset bias results.

Discussion

In the Machars there is a balanced pattern of orientation preferences, although field observations favour the west and GIS indicates NE/N. In Rombalds Moor, both analysis agree towards the north-eastern quadrant, and in Iveragh results show a contrast between N/NE and S. As for Iberia, Barbanza's carved rocks are preferentially orientated towards S, although GIS analysis also indicates a leaning to N and NE. In Monte Faro, field experience revealed a tendency for flat areas such as small plateaus on the hillsides, which mirrors an overwhelmingly preference of flat, low-lying carved outcrops. However, GIS analysis completely disregards this character of flatness inherent to so many rocks, in general ascribing a preference towards the SW quadrant, which reflects the overall results of field observations.

The main outcome of the aspect analysis, is the realization that there is a certain discrepancy between the perception of the landscape while experienced *in loco* and the digital models. A number of reasons may explain this difference, from our inability to detect slight terrain variations that may lead to their classification as 'flat', whilst computer models pick up faint differences and attribute specific orientations. GIS and fieldwork data are more in keeping with each other in the Machars, probably because its flat topography does not raise many issues. The main inconsistencies concern our personal experiences of the terrain when categorizing it, as field observations may be influenced by cultural backgrounds and previous experiences. Although unwillingly, the slopes of one study area were often assessed in relation to another, and it is difficult to ignore the flatness of the Machars or Rombalds Moor, when compared to Barbanza or Iveragh.

The aspect analysis reveals that the orientation of the slopes in which the carved rocks are located, is obviously conditioned by local topographies. The fact that most rocks in Barbanza are facing west and south directions is intrinsically related to the natural geomorphology of the peninsula which develops from a NE – SW and is divided in two main areas by a mountain range rising in its centre. This assumption does not exclude the possibility that this natural orientation is exactly the reason why past societies sought to carve rocks with those specific affordances. It may also mean that there were few alternatives. However, it should be noted that the slope of the carved surface does not need to be positioned towards the same direction as that of its medium or the terrain slope in which the assemblage is located, although these three levels often coincide. Similarly, in the Machars, Monte Faro and Rombalds Moor, where the area is generally flat, it is expectable that no preferential orientation occurs. In Monte Faro, the advance of the mountain towards the river Minho and the sea enables the anticipation of this preference; in Rombalds Moor, the rocks in the study area are located on a high plain with an open visibility towards the wide valleys of the Wharfedale and Airedale.

Knowing the orientation of the slopes provides an idea of the natural lighting conditions to which the carved rocks would be exposed. The type of sunlight shining over the slopes (which can be calculated through a Hillshade analysis) may have an active role in the visualization of rock art, depending on whether it is shining from a frontal or lateral position (Fairén-Jiménez 2004a). This may suggest that certain rocks were supposed to be viewed during specific times of the day.

Furthermore, some authors have argued that this type of analysis enables inferences regarding the vegetation and fauna surrounding the engravings, also resulting directly from sun exposure (*Ibid.*). The fact that a slope faces north, means that it will hardly be exposed to direct sunlight throughout the day, whilst a slope facing south will benefit from sunlight during most parts of the day. The growth of vegetation is an important element to consider in the perception of carved rocks in the landscape. In fact, our current experience of the landscape, with or without vegetation, influences our awareness of the outcrops at short and longer distances, making them visible or invisible in the background. This would be particularly important for flat surfaces.

In conclusion, the analysis of the carved rock's orientations demonstrates that, unlike some suggestions, there are no specific or systematic preferences as to where the rock art should be facing. The orientation of carved faces does not always match that of the rocky

medium or the slope upon which they are located. As a result, the fact that a specific slope is facing west, is not necessarily synonym of the rock art's preference. As for the latter, this study seemingly confirms that in all study areas, with the exception of Iveragh, there is indeed a predisposition for flat surfaces.

Slope Analysis

Aspect and Slope analysis are first order derivatives of the surface, analysing the changes in the terrain, based on a DEM (Conolly and Lake 2006: 191). In this study, slope was calculated in percentages. The results were reclassified into five intervals following Butzer's slope principles (1982), previously applied to the study of rock art elsewhere (Fairén-Jiménez 2004a).

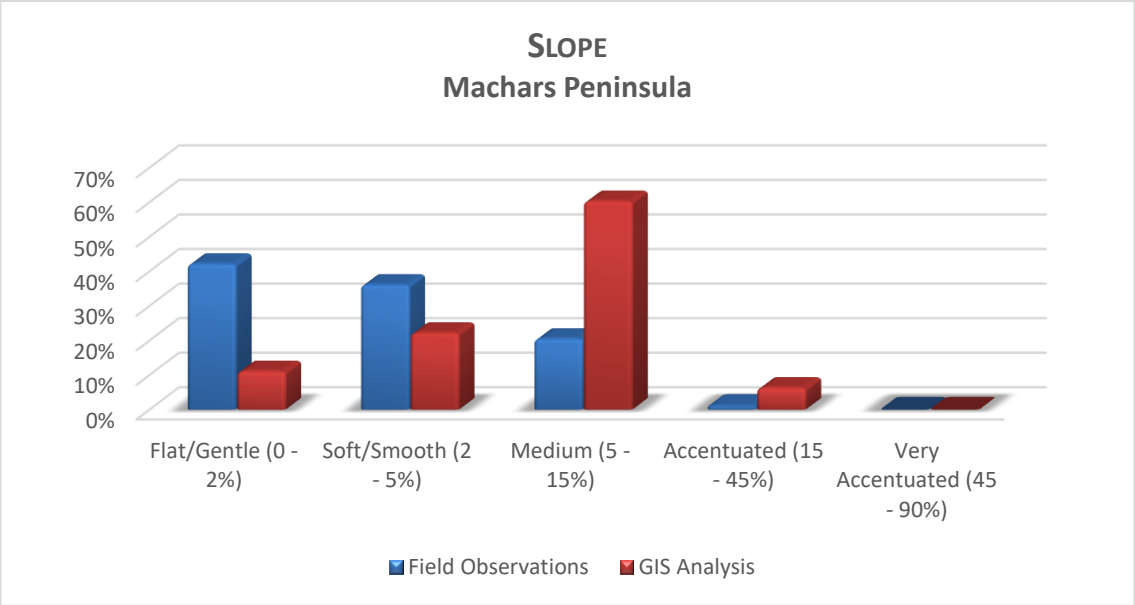
This evaluation was equally contrasted with field observations which inherently translate the recorder's experience also in terms of physical effort. Even if a hillside is not the steepest, it will feel as it is quite inclined, if the trekking is particularly difficult. Due to this subjectivity, it is interesting to contrast the data collected during fieldwork with GIS analysis. Combining the two should enable a balanced landscape perception.

Table 8 Categorization of slope inclination in percentages, according to Butzer (1982).

1	***Flat/Gentle***	< 2%
2	***Soft/Smooth***	2% - 5%
3	***Medium***	5% - 15%
4	***Accentuated***	15% - 40%
5	***Very Accentuated***	> 40%

The results obtained for the Machars are contradictory. There is a disagreement between fieldwork observations and GIS analysis. In the first case, rock panels are considered to be placed mostly in soft/gentle slopes, and GIS points at 60.32% of the rocks situated in medium slopes. This result may relate to the 'academic' nature of Butzer's divisions, as opposed to the significance of an embodied experience. The remaining rocks are distributed between flat/smooth surfaces (11.11% and 22.22% respectively), with a few in accentuated gradients (6.35%). None of the rocks in more inclined backgrounds bear particularly

exuberant motifs, although they can be considered somewhat particular. Blairbuy 5 and 8 are located on the base of the Fell of Barhullion, a conspicuous hill crowned by an Iron Age settlement (Canmore ID 62757). Blairbuy 5 has a single motif of a very strange cup-and-ring, lacking symmetry and carved with rather deep grooves. Knock 1 has a spectacular implantation, on the edge of a promontory, crowning a cliff overlooking the coast, although the carvings are actually on the inward face of the outcrop. It bears a simple combination of a spiral and the only recorded grid in the area. The other case is Drummoral, a small flat rock, often overgrown by vegetation, where a combination of cup-marks, four cup-and-one ring motif and a cup-and-two rings were carved. This surface is quite unnoticeable in the landscape, although located near the top of a small elevation from where the sea is viewed. The main feature that unites these three rocks is indeed their visibility relationship to the sea. No rocks were recorded in the steeper categories.



Graphic 25 Percentage of Atlantic Rock Art sites in the Machars Peninsula according to each defines slope class, as evaluated during fieldwork and GIS.

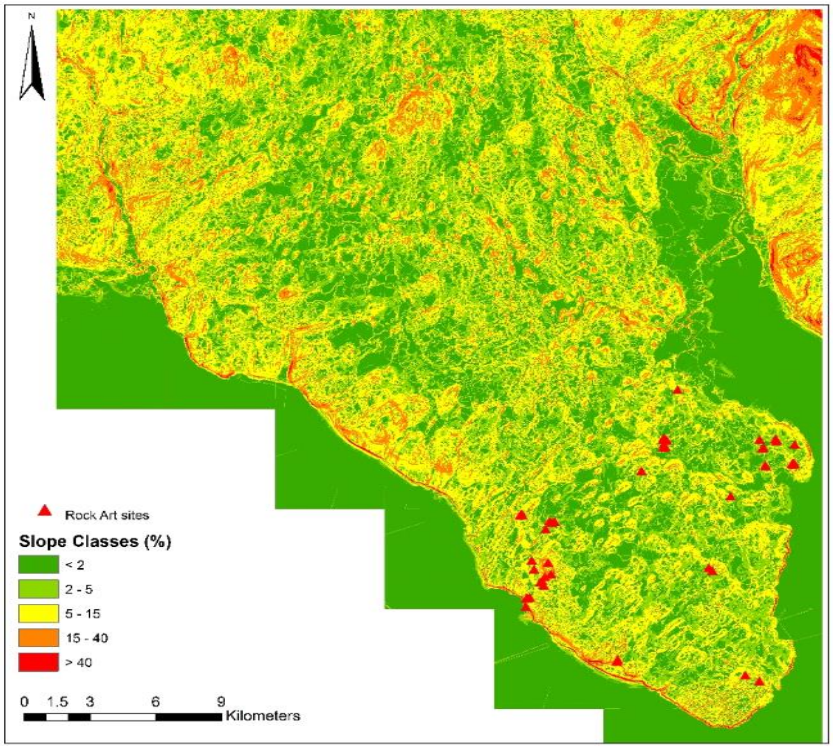


Figure 78 Location of rock art sites in the Machars Peninsula, according to percentage of slope pendent.

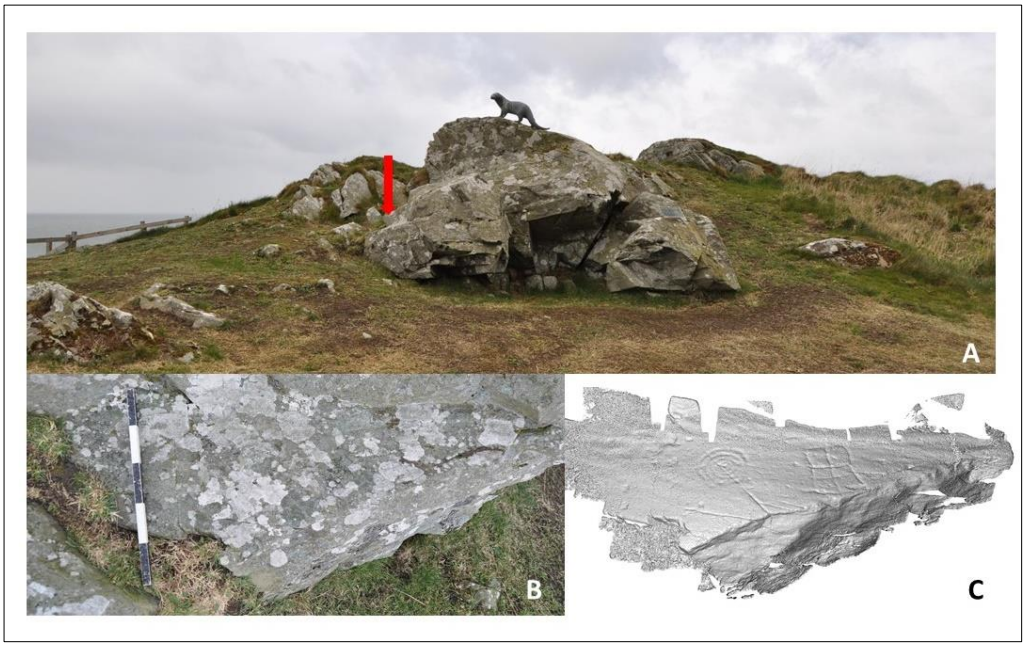


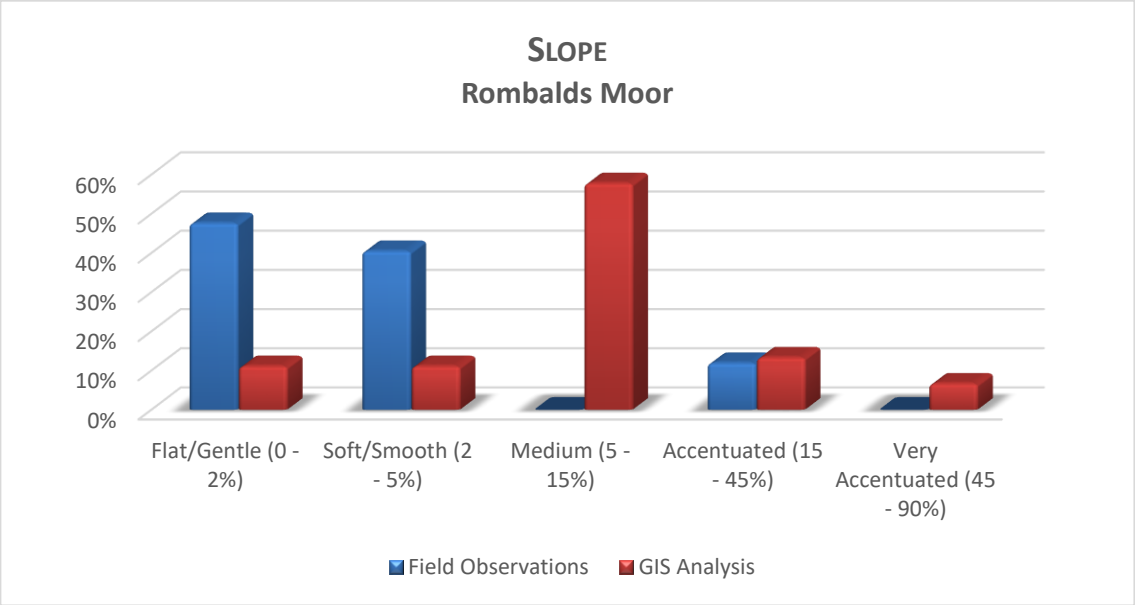
Figure 79 Knock 1: (A) Outcrop where the small carved surface, indicated by the red arrow (B) is located and on which a spiral and grid motifs were carved (C).

Regardless of the differences, both approaches agreed on the flat character of the Machars' landscape, and the only challenges posed to the wanderer are those of the modern world: roads, walls, houses, gates. The carved rocks are generally accessible and located in low grounds, sometimes surrounding high hills, such as the Blairbuy group. Most of the panels enable the assembly of large numbers of people, although the observation of the motifs would be conditioned by the size of the media and ultimately the motifs. The fact that large groups of observers could gather around the rocks does not necessarily imply that they would be looking at the carvings simultaneously.

Rombalds Moor' results are similar to the Machars' since the rocks are located in flat terrains. Again, the *in situ* perception of the landscape is quite different from the computational analysis. Because Rombalds Moor has two distinct groups of rock art they were analysed independently. In Baildon Moor, both types of analyses give preference to slopes with medium inclinations (61% for fieldwork and 69.23% for GIS). A second favourite are the smooth/soft slopes. This pattern is repeated in Ilkley Moor, with similar results emerging from the two types of assessments, although in this area five carved panels are located on areas of accentuated inclinations, such as Pancake Stone and Hangingstones. Pancake Stone is a large flat stone perched in a precipitous location overhanging an imposing cliff and Hanginstones is associated with a 19th century sandstone quarry, from which it was miraculously saved. It is difficult to know what the landscape looked like before the quarry and whether the rock would have had a very different background originally. The presence of a shelter on the bottom of the cliff where Hangingstones is located suggests that at least the north facing wall may be untouched.

Overall, GIS evaluations point at an overwhelming preference for medium slopes, absent from the fieldwork records where the majority of rocks were documented in gentle and smooth slopes. Most carved rocks enable the congregation of people and are relatively accessible, once the plateau is reached, after the climb of the hill onto the first terrace.

Figure 80 Pancake Stone, a large flat rock precipitously located over a cliff, overlooking the Wharfe Valley.

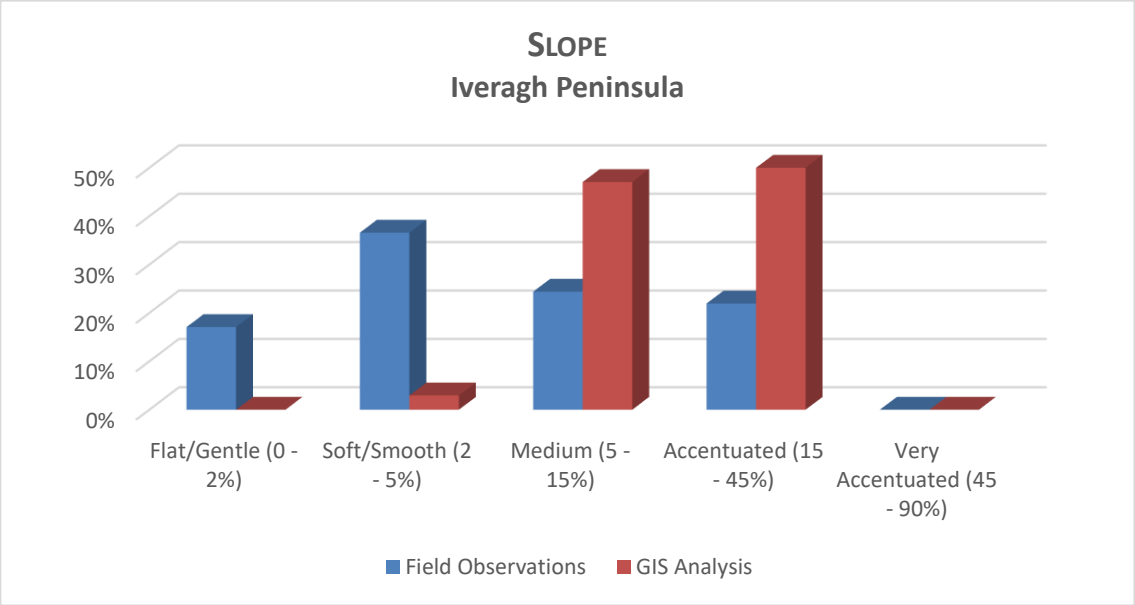


Graphic 26 Percentage of Atlantic Rock Art sites in Rombalds Moor according to each defines slope class, as evaluated during fieldwork and GIS.

Unlike the Machars and Rombalds Moor, the landscape in Iveragh is markedly mountainous and less hospitable. This situation varies across the peninsula, north and south presenting great contrasts. Whilst the northern valley systems of the Ferta and Behy are slightly more open, with broad valley floors and various lakes, the valley of the Sneem, to the south, is surrounded by impressive mountains and the intricate valley of the Kealduff. These

differences are reflected in the location of the rock art and the results obtained through slope analysis.

Considering the topographical contrasts and the distance that separates the two main groups of rocks in Iveragh, slope analysis was performed at two scales: a larger one encompassing the whole of the peninsula which includes the total number of rocks, as well as smaller areas enabling a detailed local assessment: Kealduff Upper to the north and Derrynablaha/Derreeny to the south. Against expectations, at a large scale, field observations considered the carved rocks to be located in soft/smooth slopes (35.59%) with a significant percentage of the panels on medium slopes (24.39%) and a smaller number in flat areas (17.07%). Unsurprisingly, the landscape experience led to the categorization of some of the rocks (21.95%) as located in areas of accentuated relief, however, in many cases these were considered to be placed in areas with medium inclinations.



Graphic 27 Percentage of Atlantic Rock Art sites in Iveragh Peninsula according to each defines slope class, as evaluated during fieldwork and GIS.

The different conclusions are more striking at the local scale of analysis. In the northern group of Coomasaharn and Kealduff Upper the rocks were considered to be located in flat/gentle areas which, according to the GIS, are overwhelmingly (90%) placed in medium and accentuated (10%) settings. The misconception of the fieldwork may have been influenced by an interpretation of the local landscape, since these rocks are located on the

edges of the Behy valley floor, in a rather flat area. While potentially located in optimal paths across the landscape, the engraved surfaces could have been observed by a great number of people simultaneously, namely Kealduff Upper 2 (Figure 83), an outcrop of large dimensions with extensive decorations. Furthermore, the flat character of the terrain favours the development of a number of activities.

Figure 81 Kealduff Upper 2, extending W - E towards the valley.

The head of the Glenbeigh horseshoe range of mountains is currently covered in a large layer of peat, radiocarbon dated to 2430 +- 110 BP (Mannion 1983:93 cit. O'Sullivan and Sheehan 1996). A number of rocks are known to have been uncovered in recent decades, and more could still be found in the future. Furthermore, a pre-bog field system composed of walls (SMR 071-043), which is believed to date to the Neolithic is also covered by peat (Figure 84), only accumulated due to the relatively gentle slope of the terrain (O'Sullivan and Sheehan 1996).

Figure 82 Pre-bog field systems in the Behy valley floor, near the Kealduff group for rock art.

The southern area of Derreeny and Derrynablaha present a completely different landscape configuration, this time dominated by hills surrounding the narrower valley of the Behy. Naturally, the carved rocks are seemingly located in areas of steeper slopes, on the hillsides, namely those of medium (38.10%) and accentuated (33.33%) orientations, according to fieldwork, followed by other more gentle areas. The GIS analysis, however, associates the carved rocks mainly with accentuated (76.16%) slopes, only followed by medium slopes (23.81%). There are a few cases in which the rocks are located on the valley floor. This is the case with Derreeny 7 (Figure 85), a simple example of Atlantic Art bearing a couple of cup-and-rings, located on the base of a hill on top of which lies a modest standing stone. The area is also flanked by numerous watercourses making the territory very irrigated. In general, the setting of the majority of these rocks would not allow the congregation of large numbers of people, unless when located on small plateaus, such as the case with Derreeny 1, itself a large boulder.

Figure 83 Derreeny 7, located on the bottom of a valley, in a mountains landscape of steep slopes. It is located on the bottom of a hill on top of which lies a standing stone (Photograph by Ken Williams).

Outside these two main groups of rock art, the loners of Dromtine and Liss, located to the south and southwest of the peninsula, were also analysed. Dromtine is a carved boulder situated on the edge of a slope descending into Lough Dromtine. Liss or Staigue Bridge is a peculiar and very large outcrop situated on the left bank of Staigue River (Figure 87 and 88). In both cases the landscape of the immediate surroundings of the rocks is gentle, in Dromtine descending into the Lough and in Staigue confined by the river, a mountain to the east and the sea. This assessment was largely confirmed by the GIS analysis.

Similarly to Kealduff Upper, here too there are evidences of prehistoric occupation of Dromtine, namely an imposing Bronze Age ringfort (SMR KE090-012001) at a short distance, crowned by a 4m standing stone (SMR KE090-012002) (Figure 86). Although there are no dates for these sites and the relationship with the rock art is unknown, these remains are evidence of a lived landscape. In Staigue, apart from references to other carved rocks, one of which lies buried underneath the nearby road, there are no other known sites. However, this is an area wealthy in resources with favourable settings, suggesting it suitable for human settlement.

Figure 84 Standing stone and ringfort at Dromtine.

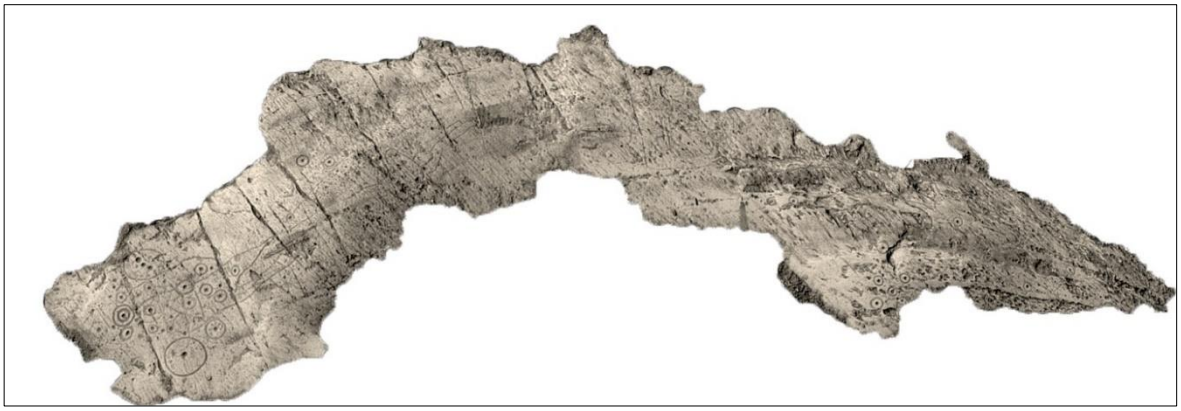
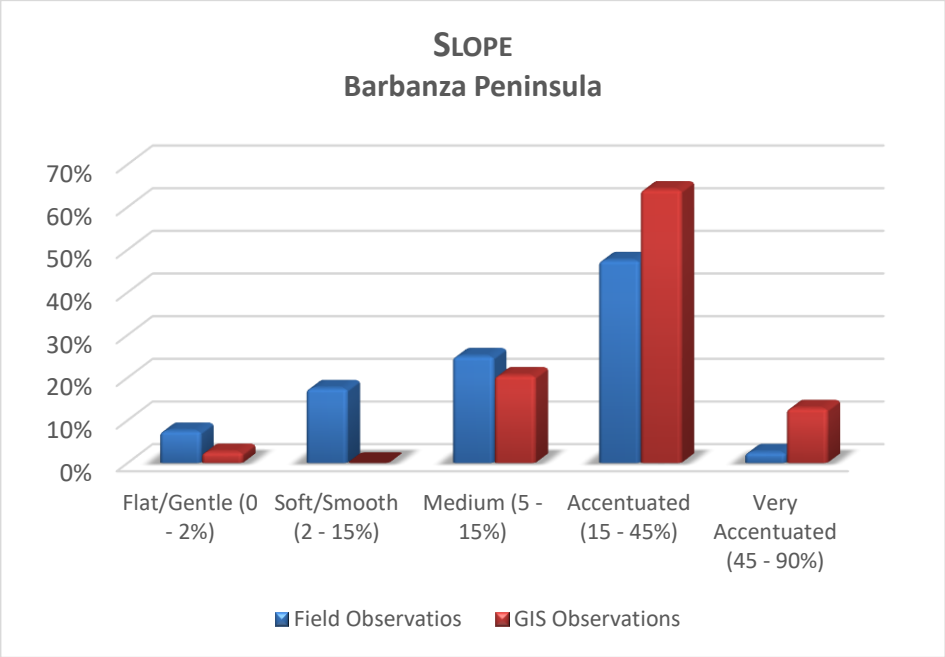


Figure 85 3D model of Liss captured through SfM. (3D Model by The Discovery Programme. Source: https://sketchfab.com/models/fcb44ed89f3043678477cf40990c06b0)

Figure 86 The flat landscape in which Liss is located. At the distance, the group of trees show the location of the Staigue watercourse, to the east of the carved rock, which can be seen sprouting from the ground in a central position. To the west, other mountains rise.

Barbanza's results show a significant number of carved rocks located in accentuated slopes, followed by medium inclination slopes. This tendency had been previously observed in a similar study but in which the gradients were categorized in slightly different classes (Rodríguez-Álvarez 2012:126).



Graphic 28 Percentage of Atlantic Rock Art sites in Barbanza Peninsula according to each defines slope class, as evaluated during fieldwork and GIS.

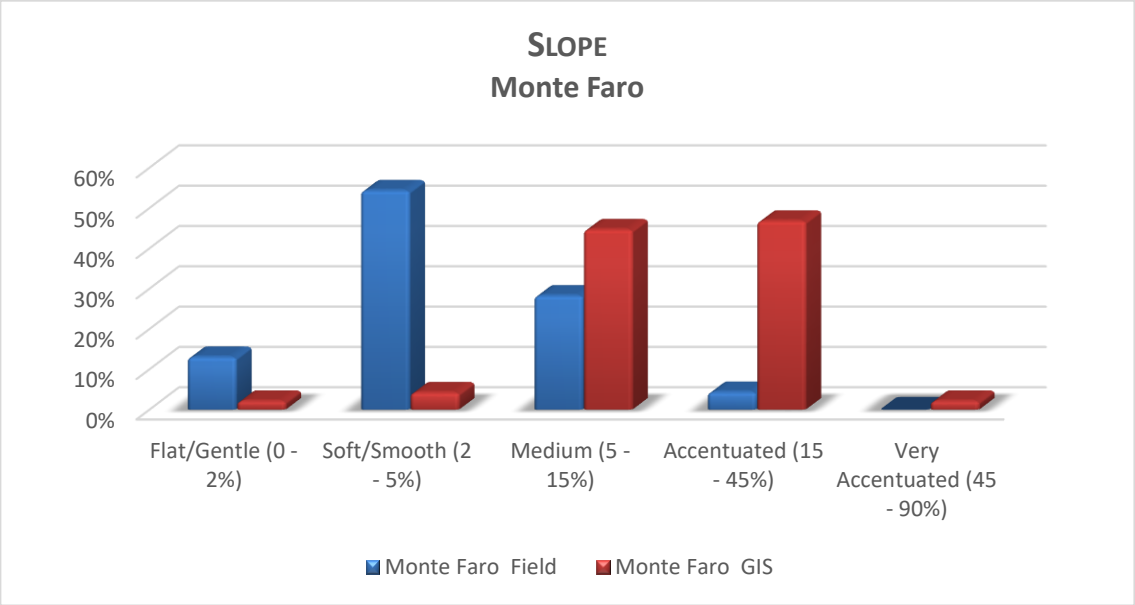
Both in GIS analysis and fieldwork confirmed this predisposition. A great number of rocks are located on the hillsides of Serra de Barbanza, an important mountain positioned in a central part of the peninsula. Nevertheless, these panels are not situated in the highest altitudes but between these and the coast, where granite, the preferred rock for the carvings is found, as opposed to the schist found in higher locations. Only a small number of carvings were created on this type of rock (e.g. Cova da Louza III). Besides the rocks located on slopes of the mountain, there are other examples situated in other types of areas such as fertile platforms (e.g. Fontandurín and Lamatrema). This is one of the main reasons why rock art has previously been considered a territorial or landscape marker, used to mediate tensions between different human groups using the same local natural resources (Fábregas-Valcarce and Rodríguez-Rellán 2012:51). Interestingly, a number of rocks are located on very low ground, including close to beaches (e.g. Basoñas, A Lagoa II and A Lagoa III), and other rarer examples in quite high altitudes (e.g. Cova da Louza III and Cova da Louza IV), which limited their accessibility. These rocks are more often related to the presence of motifs which are not quintessential Atlantic, such as animals (e.g. Gurita 1), although in the highest altitudes two

rocks were recorded, one bearing a cup-and-ring and the other a single cup-mark (Cova da Louza 4a and Cova da Louza 4b). Nevertheless, despite the steep trek to reach them, these were placed in a flatter area of the hillside, with privileged views over the *ría*. In general, the majority of carved rocks in Barbanza enjoy wide visibilities and good visual control over the coast, leading to authors considering that this would be a main feature for this group of rocks, as opposed to rocks acting as territorial markers or being particularly visible in the landscape (*Ibid*). Limited types of economic activities could take place in the vicinities of these sites, in most cases, not suitable for agrarian farming.

Figure 87 Gurita 1 is a large, flat outcrop located half-way up the slope (on the left). On the foot of the hill, a large outcrop extends, Gurita 4, which was used to carve a great number of cup-and-ring motifs.

Geomorphologically, Monte Faro and Barbanza belong to the same unit, the Iberian Massif, which means that they share a number of geophysical features. Here, at Monte Faro the landscape is dominated by a mountain developing towards the coast, on whose SW slope the rocks are located. Despite the rocks being situated at an average altitude of 400m OD, landscape perception reveals the experience of a gentle topography moulded by the rounded forms of ancient and weathered granite. During fieldwork the majority of engraved panels were identified as being placed in soft/smooth slopes (54.35%), followed by medium (28.26%) and flat gradients (13.04%). In contrast, the GIS analysis considered the carved rocks to be overwhelmingly related to slopes with medium (44.68%) and accentuated (46.81%)

inclinations (Graphic 30). Monte dos Fortes I is a group of rocks that GIS categorizes as being on accentuated slopes in contrast to the fieldwork experience. The main rocks of this cluster – Monte dos Fortes 1 (Figure 92) –, are located at c. 470m OD. Although these panels are currently close to a dirt path, it is possible that they would have been difficult to reach, considering the local topography, even if possibly quite visible in the landscape due to their size. The largest outcrop measures c. 7m long and it is composed of fine granite, upon which very large circles with multiple rings were carved. Some of these motifs bear between 10 and 12 concentric rings over 1.20m in diameter. The accentuated slopes mean that there are few interruptions in the visual field (Figure 92) and there is a good visual relationship between these stones and the group of Monte dos Fortes II (Figure 90), located on a lower plateau at the base of the hill. A great number of rocks can be found here, located in a relatively flat area. In general, GIS analysis placed only a small number of Monte Faro's carved rocks in gentle (4.26%) and flat (2.13%) locations.



Graphic 29 Percentage of Atlantic Rock Art sites in Iveragh Peninsula according to each defined slope class, as evaluated during fieldwork and GIS.

The perception of the landscape in the field, however, is that the majority of rocks in Monte Faro are located in accessible areas and gentle undulations. In many cases the carvings are organized in clusters on the top or nearby the summit of hillocks, as it is the case of Escaravelhão V and VI, although the latter is relatively conspicuous.

Figure 88 The rocks seen on the closest plan are part of the group Monte dos Fortes II, a lower bench of the mountain. From here, the summit of Monte dos Fortes is clearly visible. The rocks of Monte dos Fortes I are located closer to the top.

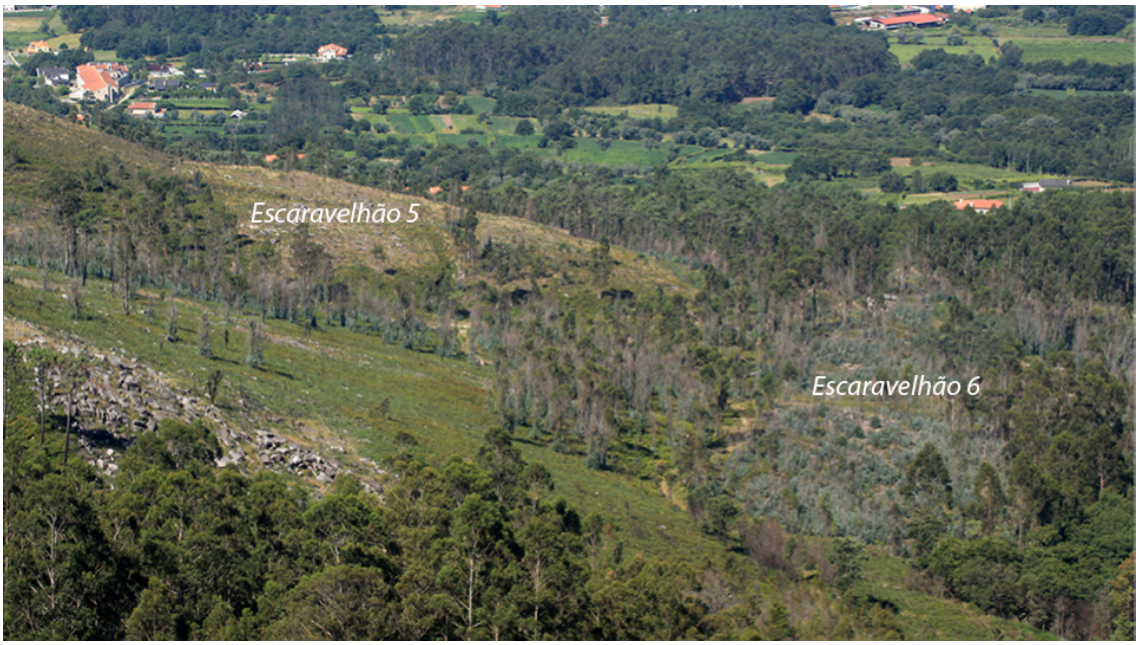


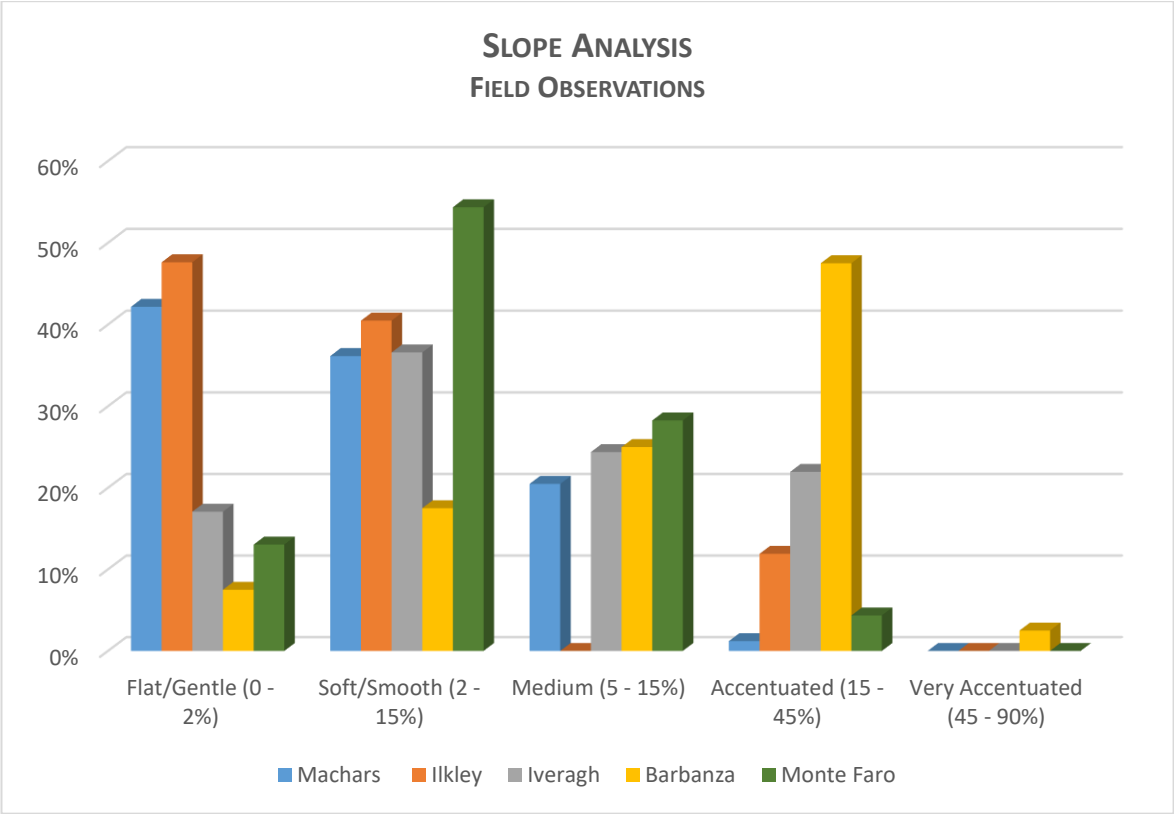
Figure 89 View from above of the groups of Escaravelhão 5 and 6, showing the terrain undulations on which the carved rocks are located (Photograph by Alves and Reis 2017a).

Today the landscape of Monte Faro is used only for forestry purposes and grazing. Semi-wild horses are still seen traversing the landscape. Similarly, during Prehistory this landscape would probably not be suitable for complex activities such as the development of crops, unless situated in small gardens of fertile areas near to the watercourses' banks. Nevertheless, the carved rocks are placed in relatively accessible areas and, with a few exceptions, would enable the presence of many individuals simultaneously. It has been suggested that they are located in corridors of movement both for people and animals (Alves and Reis 2017a).

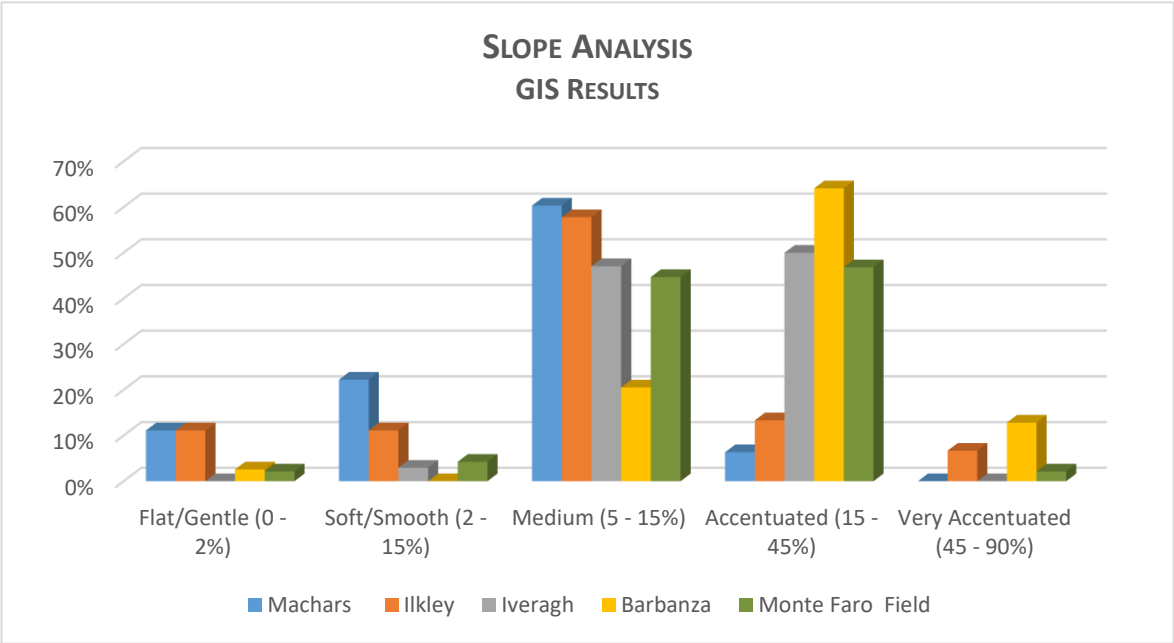
Figure 90 Landscape location of Monte dos Fortes Rock 1, facing SW (left) and the 3D model made through SfM (right).

Discussion

The identification of an overall pattern in terms of slope inclination, does not seem to be plausible across the various study areas. Remarkably, in most case studies the GIS results contrasted greatly with those gathered during fieldwork. Unlike what the latter suggested, no study areas are truly flat, besides the Machars, and there is obviously a disagreement regarding carved rocks located in accentuated slopes. Here too, the subjectivity of sensorial evaluations is tangible, when balanced with the dry character of computer algorithms.



Graphic 30 Comparison between results of slope observations gathered during fieldwork.



Graphic 31 Comparison between results of slope analysis calculated with GIS.

Testing for Significance

In order to conclude that there is a significant relationship between the carved rocks and the slope's inclinations, a non-parametric[39] Kolmogorov-Smirnov (K-S) test was conducted for each set of results. Similar to the chi-square used in the aspect analysis, this test aims to identify possible patterns of slope preference or whether the carvings placement on certain types of slopes is random.

H_0 = The carved rocks are evenly distributed across the different types of slope in the landscape.

The K-S test compares the cumulative distributions of both the sample and the population from where it has been extracted. If the difference between them is higher than a value derived from a theoretical probability, then the null hypothesis can be rejected and the sample can be considered to have a non-random distribution.

As with the chi-square method used to test the aspect, the obtained value is contrasted against a given minimum value. The calculation was compared with a significance value of $\alpha = 0.05$. Details on the K-S calculation can be found in Vol. 2, Appendix 9.3.

The location of each rock was contrasted with the affordance of the terrain, constituting the expectation sample, based on the known values of the landscape. The area of each slope type was calculated in order to find the number of expected sites for each of them and the number of sites is contemplated in the equation. The one sample K-S Test compared the groups of rocks being analysed against the characteristics of the population from which they were selected.

[39] Statistical method in which the data is not required to fit a normal distribution. Non-parametric statistics use data which is often ordinal, that is, it does not rely on numbers, rather on a ranking or order of sorts. It does not make assumptions about the data, contrary to Parametric statistics, which defines properties of the population distribution(s) from where the samples are drawn.

Table 9 Overall K-S Test Results.

STUDY AREA	**THRESHOLD VALUE AT 0.05**		**K-S VALUE**	**VERDICT**
Machars Peninsula ***Main Dataset***	0.1614	<	0.2893	Null Hypothesis Rejected
Machars Peninsula ***Comprehensive Dataset***	0.141	<	0.2308	Null Hypothesis Rejected
Rombalds Moor ***Main Dataset***	0.202	>	0.1009	Evenly Distributed
Rombalds Moor ***Comprehensive Dataset***	0.155	>	0.108	Evenly Distributed
Iveragh Peninsula ***Main Dataset***	0.231	>	0.12616	Evenly Distributed
Iveragh Peninsula ***Comprehensive Dataset***	0.12627	<	0.139431	Null Hypothesis Rejected
Barbanza Peninsula ***Main Dataset***	0.215	<	0.371218	Null Hypothesis Rejected
Barbanza Peninsula ***Comprehensive Dataset***	0.10625	<	0.337105	Null Hypothesis Rejected
Monte Faro ***Main Dataset***	0.1983	>	0.160081	Evenly Distributed
Monte Faro ***Comprehensive Dataset***	0.121	>	0.035569	Evenly Distributed

Results of this calculation are not conclusive in some of the study areas, and this may derive from the number of sites in each dataset and the areas involved. In the Machars, Iveragh and Barbanza, results suggest that the placement of the carved rocks in specific types of slopes was deliberate. In other words, the carvers would have taken into account the

inclination of the terrain in order to select outcrops or boulders on which to deploy their motifs. It is noticeable that the two more consistent datasets, however, that of Rombalds Moor and Monte Faro suggest that the carvings are randomly placed in the landscape, therefore not attending particular inclinations of the terrain. In Iveragh the information obtained through the main dataset and the comprehensive assemblage of rocks is contradictory but this could relate to the nature of the data itself. On the one hand, the main dataset is not extensive enough, since the test is designed for samples of 40 and upwards, and on the other hand the comprehensive dataset is known to have a number of inconsistencies, therefore not being completely reliable. It is possible that the finding of new rocks or the correction of grid references may influence these results in the future.

Table 10 Percentage of rocks attributed to each category of slope, according to fieldwork observations and GIS analysis.

STUDY AREA	FLAT/ GENTLE	SOFT/ SMOOTH	MEDIUM	ACCENT.	VERY ACCENT.
Machars *(Fieldwork)*	42.1%				
Machars *(GIS)*			60.32%		
Rombalds Moor *(Fieldwork)*		47.62%			
Rombalds Moor *(Fieldwork)*			57.78%		
Iveragh *(Fieldwork)*		39.59%			
Iveragh *(GIS)*				50%	
Barbanza *(Fieldwork)*				47.5%	
Barbanza *(GIS)*				64.10%	
Monte Faro *(Fieldwork)*		54.35%			
Monte Faro *(GIS)*				46.81%	

Discussion

Local topography can have a major impact on the accessibility of carved rocks, but it can also have influence in the type of economic and daily activities taking place in the vicinity of rock art. In general, it is considered that optimal arable farming locations, for instance, fall in areas with 0% to 12% of terrain inclination. Slopes greater than 20% would only be suitable for grazing and forestry practices (Fairén-Jiménez 2004a).

The calculation of slope's percentages, in relation to the location of rock art in the landscape, may provide an idea of how accessible these sites are or whether slope's steepness could constitute a challenge for observers moving around them. People's movement progression in the terrain would be highly determined by local topography.

In most of the study areas the rocks are generally accessible and located in places of the landscape that would allow for the congregation of various groups of people. Of course, this does not imply that the members of the groups would be visualizing the motifs simultaneously, because rocks and motifs are often too small, but can also be very weathered.

Although it is interesting to investigate the rock art *in situ* our perception of the landscape is very different from that of past artists as it may be significantly altered with modern constructions or quarries and dotted with numerous obstacles such as gates, houses, roads, field boundaries. Furthermore the assessment of accessibility is also biased by modern commodities available to us, such as roads. Nevertheless it is clear that there is no pattern of location regarding the slopes, with rocks located in various types of topography, perhaps serving different purposes.

Visibility Analysis and Viewsheds

'The visual appearance of a place is, in most cultures and for most people, the most significant impact a location has upon any individual's many senses'

(in Wheatley and Gillings 2002:201)

Visibility and intervisibility explorations epitomize spatial studies in archaeology. Evidence suggests that visibility, or the lack of, may have been determinant in the location of archaeological sites and activities. In relation with other natural features, visibility may provide an understanding of how different elements of a landscape are connected. Alternatively, our contemporary western cultures are generally imbued with an emphasis on the visual and may allocate more importance to this feature than it would have had in the past (Ouzman 2001). These suppositions can only be inferred and never thoroughly proven. In response to this, archaeological methods, both 'manual techniques' and those based on spatial technologies have been developed in order to investigate these further.

Visibility studies have ranged from ecological approaches (Gibson 1986; Llobera 2003) to others more focused on human activities related to rock art (Cruz-Berrocal 2005; Fairén-Jiménez 2004a; Gaffney *et al.* 1995; Valdez 2010), ritual landscapes (Exon *et al.* 2000) or funerary contexts (Garcia-Sanjuan *et al.* 2006; Roughley 2004). They can be grouped in three main trends: a) *informal studies*, mostly based in general interpretations and lacking a systematic methodology; b) *statistical studies*, emerging from Processual Archaeology and feeding into Renfrew's perception of Cognitive-Processual Archaeology (1994) later developed by Tilley (1994) and his phenomenological perspective; and c) *humanistic studies* epitomized by Barrett's (1994) and Thomas' (1993) approaches, exploring landscape transformations originated by power relationships and social reproduction (Lake and Conolly 2006; Wheatley and Gillings 2002).

Bradley's initial approach to visibility in his study of Atlantic Art fits well in the second group. Following Fraser's process in Orkney (Fraser 1988), the methodology aimed at a more scientific investigation, exploring the carved rock's visibility affordances and tangible evidence that these were located at important viewpoints (Bradley et. *al.* 1993a; Bradley *et al.* 1993b).

Despite the interest in visibility, appropriate methods and technologies were only systematically used in visual explorations in the 1990s. GIS opened an important number of possibilities to archaeologists, allowing them to undertake visibility-based studies in rapid, quantifiable and repeatable ways, through the selection of appropriate functions, whose results were used for archaeological interpretation (Gaffney and Van Leusen 1995; Lake and Woodman 2003; Llobera 2007; Wheatley 1995; Wheatley and Gillings 2000). The new explorations complemented initial approaches to visibility, focused on the visual phenomena, in determent of other parameters such as the acts of 'seeing' and 'looking', methodologically more difficult to assess, leading to a number of concepts recurrently used, such as 'panoramic', 'prominent' or 'hidden', but rarely delved into (Wheatley and Gillings 2002:201).

The Viewshed analysis' process is based on a DEM and the calculation of Lines of Sight (LoS) departing from a specific observer's point, to which a height may be attributed (Wheatley and Gillings 2002: 205). The outcome of the calculation is a binary map (visibility or Viewshed map) with positive results translated into number 1 and negative into 0, depending on whether the cells are visible from the viewer's point or not. Viewsheds can be calculated according to different algorithms, depending on the objective of the analysis: point-to-point (Woodman 2000), point-to-area (Fisher *et al.* 1997), cumulative viewshed (Wheatley 1995; Wheatley and Gillings 2002), and total viewshed (Llobera 2001, 2003). A series of parameters may be manipulated to refine the algorithm, such as the height of the observer (OFFSET A) or the target height (OFFSET B). A standard height of 1.7 meters is usually used to represent an adult and that measurement was applied to this study (Wheatley and Gillings 2000: 204-205).

Obviously, the models created for this study are not flawless, especially because the base-map represents the current situation of the land and this may have changed due to human and even natural actions throughout time. Furthermore, vegetation is not directly considered due to a lack of environmental studies and atmospheric conditions are difficult to include in these computational models. In addition, the human eye has a limited acuity of vision and loses precision at a certain range meaning that the longer the distance, the less detail is apprehended.

It is important to acknowledge these restrictions in order to analyse the results critically, but the calculations are nonetheless useful to compare the different affordances of the terrain between the sites themselves, and relate them to field observations.

To assess visibility patterns in the various study areas, simple viewsheds were calculated for each site[40] of the many groups. Each viewshed was evaluated and assessed for reach and intervisibility with other carved rocks. These were then added to create Cumulative Viewsheds, in which all the visibility basins overlapped. As a result it is possible to visually assess areas to which the multiple viewsheds converge. The algorithm was also used with the introduction of 'RADIUS 1' (default to 0) and 'RADIUS 2' (desired distance) to calculate visibilities towards the carved rock from the surrounding cells.

[40] Only the main datasets were used in this calculation.

These results were contrasted with field observations, since the computational processes can be quite limited, especially regarding sensorial elements that clearly affect our sense of vision, such as fog. Similarly to the other evaluations, results from both sources did not always coincide. This is mostly related to our human perspective of the landscape, bearing a cultural and social weight, not considered in mathematical algorithms. Some of the differences are quite striking, both in terms of how far viewsheds can reach in distance, but also in regarding intervisibility between rock art sites. Of course, should the DEM allow, the GIS process considers that visibility from rocks located on one side of the Machars peninsula, for instance, can reach outcrops situated on the opposite side, 12 km apart. In the field, however, it is apparent that this is not humanly possible due to i) distance, ii) natural and built obstacles, iii) weather conditions. Even if the areas where the engravings are located are clearly visible from a given point, the rocks specifically may not be identified due to lack of vision sharpness. This reminds us that computational spatial analysis merely provides the data for the reconstruction of landscape affordances, which does not necessarily translate human behaviour or capacity. For that reason, the carved rocks were assessed in terms of their visual prominence, according to specific distances which were defined following Higuchi's principle (1983). The introduction of these specific distances was an important step to nuance the computational analysis and introduce a human, more realistic side to the approach. This parameter investigated what characteristics or elements of the carved rocks could be seen at 10m away (motifs can be visible), 30m (rocks can be distinguished), 100 m (rocks can be distinguished but start to be confused with other features), 500m (rocks are probably not visible).

Visibility and intervisibility patterns were observed, documented and quantified in 'visual structures' using graphical methods and statistics. The creation of 'visual structures' enable the separation between the empirical documentation and quantification of the patterns and regularities, from their meaning and interpretation. As with any other analysis, before interpretation or answering any question unequivocally, it is necessary to empirically demonstrate that there are patterns emerging and explore how strong and significant they are (Wheatley *in press*).

The orientation and the extension of the viewsheds are main characteristics commonly analysed for archaeological sites. Several authors have claimed that wide vistas are an important factor in the location of rock art, or that these are located in landscape viewpoints (e.g. Morris 1979; Bradley 1993). These are believed to have preferential orientations towards a specific natural unit or monument. As such, visibility studies were conducted in order to confirm or disproof previous suggestions, and as part of the assessment

of rock art sites in the datasets. In general, a visibility pattern did not emerge amongst the study areas, although results from fieldwork analysis and GIS calculations largely matched.

Table 11 Preferred orientation of visibilities according to fieldwork data and GIS results.

	FIELDWORK RESULTS	**GIS RESULTS**
The Machars Peninsula	W / NW	W / NW
Rombalds Moor	S	NE / SE
Iveragh Peninsula	N / NE	N / E
Barbanza Peninsula	W	W
Monte Faro	W	N / W

What the visibility analysis seems to suggest, however, is that the carved rocks are visually related to specific natural elements of the landscape, reiterating an idea mentioned by O'Connor for the rock art of Co. Kerry (Ireland) (2006). In the Machars, some carvings indeed have extensive views, which is not surprising considering the flatness of the landscape, allowing for very long visualscapes. Undoubtedly, as Bradley suggested, there is an element of relationship with the coast, with rocks such as Glasserton Mains (Figure 93), Knock 1 and North Balfern overlooking Luce and Whithorn Bays. However, this is not exclusive, with other groups of rocks being clearly associated with specific undulations of the terrain, such as the remaining carvings of Knock located on the summit of a knoll, Big Balcraig in a peculiar bumpy landscape with a number of overgrown outcrops making it particularly irregular, or even plain wide-open areas with extensive views all around (e.g. Drumtroddan, Claunch). From some of these places the conspicuous northern and eastern mountains enclosing the peninsula are visible, however, apart from Culnoag, nowhere else are they situated at a converging visual point, rather being just another element in the background.

Figure 91 A) There is a definite relationship between Glasserton Mains 1 (until our fieldwork the only carved rock in the area, another one was found nearby) and the coast. B) This is a large outcrop with a very peculiar shape, nonetheless quite hidden in the landscape. C) Its top surface was carved with dozens of circular motifs.

The plateau of Rombalds Moor is in itself the dominant natural feature with which the rock art of the region relates to. Despite some of these enjoying privileged views over the valleys of the Wharfe and Aire, this does not seem to be a determinant factor for the location of their deployment. The majority of the rocks are situated on high terraces, naturally enclosed by the undulation of the terrain's edges. In general, short visibilities are quite good, and to some extent medium as well, but long distance viewsheds are often constrained by the local topography. This is the case of Backstone Beck's rocks, located in a flat area of the plateau, near a small watercourse, some of them being incorporated into what is believed to be a Bronze Age enclosure (IAG 1986). Badger Stone is another good example of this enclosed landscape situation, related to the interior of the moorland where it sits. Willie Hall's Wood is another peculiar rock, located isolated on the top of a small spur flanked by two watercourses, with a funnelled but wide visibility towards N. Of course, some rocks defy this pattern, and these are the cases of Pancake Ridge (Figure 82), very obviously located here due to its privileged position over the cliff and wide visibility over the valley, but also the conspicuous position of the carved stone itself, balanced on the top of a number of boulders and visible from lower benches of the hill.

In Iveragh this relationship with geomorphological units is translated through a clear interaction between the carved rocks and valley systems, which had previously been pointed out by Purcell (1994, 2002) and O'Connor (2006). Not only large complexes of carvings such as Derrynablaha and Derreeny to the South or Kealduff Upper and Coomasaharn to the North relate closely to these units, but isolated panels also hold this kind of association, as is the case of Liss. This particular outcrop is connected to the valley of the Staigue (from which gets its alias) but, on the other hand, it is also closely related to the nearby coastline. Another example is Dromtine, undeniably correlated with Lough Dromtine to which seems to be oriented visually. In terms of medium orientation, the panel is literally tilted, sloping downwards to the lough, along the gentle slope of the terrain. It is undeniable that visibility over valleys is an important factor in this study area and many rocks are evidently located in positions that visually control the entrances of valleys or lowlands where various types of activities could have taken place. Derrynablaha 8, the most iconic rock of the peninsula, is facing the entrance of Lough Brin, overwhelmingly dominating the landscape, and there is virtually no doubt that this is the natural feature that the artists intended to highlight. Similarly, Kealduff Upper 2 (Figure 94A) is a large outcrop with an E – W orientation, situated on the head of the valley towards which the rock is 'pointing'. Where today there are peat cuttings, there were once prehistoric field boundaries, some of which considered to be Neolithic (O'Sullivan and Sheehan 1996).

Visibility observations in Iveragh revealed that each group of rocks (at a medium scale of analysis) has a visual tendency towards a specific point in the landscape and that most of the rocks within that assemblage will be 'looking' in that direction. Derreeny and Derrynablaha's visibilities are very focused around the banks of the Kealduff River but also directed to strips of land towards the south, probably determined by the direction along which the valley develops. Smaller/individual scales of analysis showed that some panels have more extensive views than others and equally some rocks are intervisible whilst others are almost 'hidden'.

Figure 92 In Iveragh Peninsula, some rocks enjoy extensive views dominated by natural landscape features. A. Derrynablaha 8 (Kealduff Valley); B. Kealduff Upper 2 (Behy Valley); C. Dromtine (Sneem Valley).

The location of a large number of carved rocks on the northern half of the Barbanza Peninsula, on the hillsides of Serra de Barbanza, provides a sense of connection with the Ría de Muros e Nóa. Despite coastal change, the natural configuration of the inlet suggests that this would have been a wealthy resource in terms of natural ports, supporting seafaring and prompting the movement of people and goods. As a result, the visual control of Ría de Muros seems relevant. It is noticeable that a number of carvings (e.g. the rocks of Lagoa and Picota) were deployed on outcrops very close to the shore (Figure 95). The importance of the coast in the BA and IA periods is attested, for example, by the settlements of Castro de Baroña. Furthermore, viewsheds easily reach the opposite stretch of land, currently known as Muros, where more rock art is also recorded.

Figure 93 Visibility from A Picota towards Ría de Muros and Muros, on the opposite bank of the inlet (Photograph by Lara B. Alves).

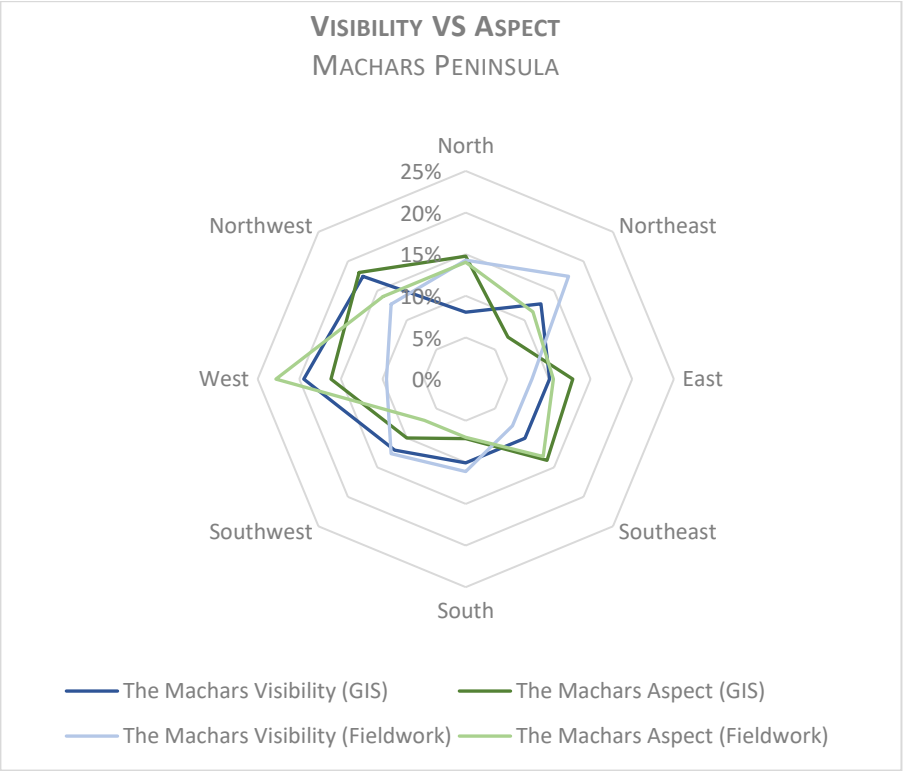
A similar pattern focusing on natural geomorphological units emerged in Monte Faro. The carved rocks seem to be organized in relation to specific topographic features. To the north, the groups of S. Tomé, Fonte Formosa and Santo Ovídio are intervisible and located on the eastern slopes of Monte Faro. The viewsheds of these groups convene around the hillsides where they are placed, but also the flat grounds dividing them from Santo Ovídio hill, where the cluster of 19 rocks of the same name is situated. These are distributed on the SW slope of this conic mount, crowned by a small Christian chapel. It has been suggested that the presence of this building translates a potential symbolic importance for the hill (Alves and Reis 2017a), as in NW Iberia these are common in conspicuous places where previous prehistoric remains (namely Iron Age hillforts) are known to have existed, in an attempt to Christianise them.

An intermediate part of the study area is that dominated by the complex of Alto do Escaravelhão (CNS 3220), a peak on the northern edge of a natural amphitheatre that seems to have had a prehistoric settlement at its top. Several rocks were dotted on the two spurs extending down the platform from the hill and conforming a plateau. Whilst the carvings located to the NW and W of the hill have preferential views towards the valley and the river Minho, a number of other panels placed on the southern plateau immediately below the peak bear extensive vistas over the western slopes of Monte Faro and the important platform of Chã da Quebrada, a central routeway through the landscape and point of access to the two main mountain ranges: Monte Faro and Monte dos Fortes. This is also where a significant *necropolis* of 11 burial mounds were built (Alves and Reis 2017a). Although several groups of rocks have visibility towards this platform (namely Fonte Volide, Monte da Laje, Tapada do Ozão and Escaravelhão 1), it is noticeable that a GIS calculation does not confer a lot of interaction between this area and the rock art assemblages, apart from Fonte Volide 1 where, interestingly, another group of burial mounds is known (Cunha and Silva 1980). However, Chã da Quebrada affords privileged views over the study area and a better understanding of the organization of the groups of carved rocks in the landscape, whilst Fonte Volide enjoys the most extensive viewsheds. In a transition area between Chã Quebrada and Monte da Laje, it mediates between the rocks in the amphitheatre and those in the western slopes of Monte dos Fortes. Visibility from here extends as far north as the area of Escaravelhão and to the south and southeast towards the two groups of Monte dos Fortes. In this central area, two carved rocks are seemingly peculiar, not only because of the exuberant decorations but also their position in the landscape. Tapada do Ozão holds a central position in the natural amphitheatre, providing access to the summits of Monte Faro and Monte dos Fortes, despite

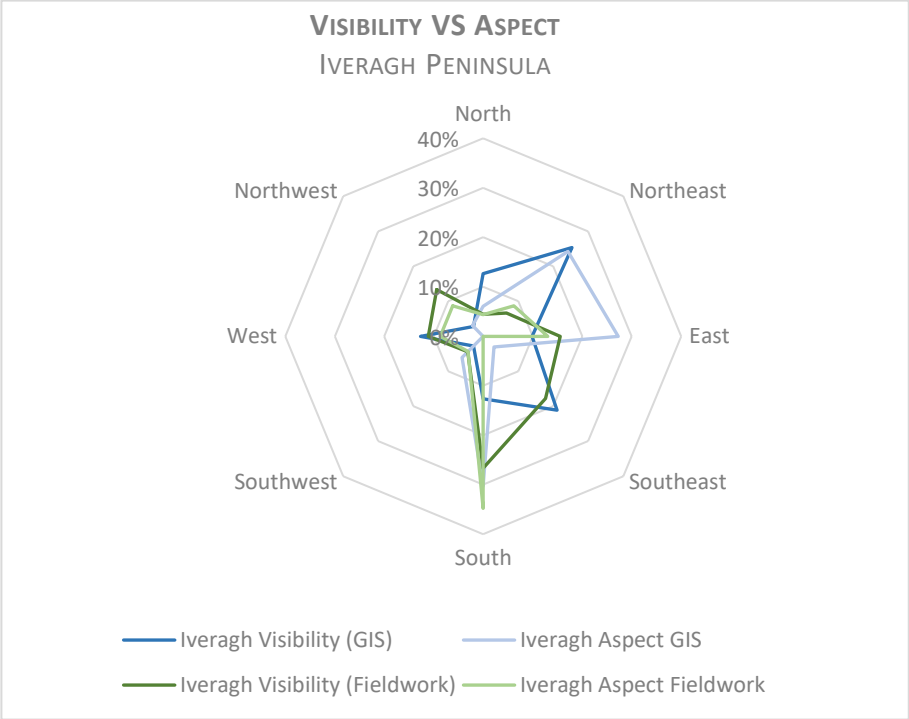
having rather short views of the landscape (Alves and Reis 2017a). Monte da Laje, on the other hand, is atypically located on a long spur with abrupt slopes and very few rocks, but it is visually connected to a number of groups such as Escaravelhão 1, Talhos, overlapping views with Fonte Volide and even reaching Pinhal do Rei to the W, according to field observations (*Ibid.*).

Discussion

Results of visibility analysis were contrasted with those for aspect, in order to identify a possible correlation between the two. It would be expected that if a specific rock is located on a north facing slope, then its preferential views should match this orientation. However, this relationship is not clear and vistas do not seem to be necessarily influenced by this. In the cases of the Machars and Rombalds Moor, results show that aspect and visibility coincide, and therefore one may infer that the topography influences the rocks' views. The same comparison for the region of Iveragh showed that Visibility and Aspect hardly match, suggesting that the carved rocks were situated on these specific places due to their visibility affordances. The variability in the rocks' locations may suggest this degree of intentionality. In the Kealduff Valley, for instance, there is seemingly a tendency for the engravings to be directed towards E, but the valley is heavily dominated by the presence of Knockaunanattin Mountain to the north, on whose southern slopes a number of rock art sites are located (Derreeny) and Mullaghanattin/Knocklomena mountains, where Derrynablaha panels are distributed. Whilst several carved boulders are located on or near the valley floor, others use higher locations up the slopes to the north and west sides of the valley. In some cases, such as the rocks located on the NW spur of the Mullaghanattin, visibility can be quite extensive towards the south, ranging as far as the Beara Peninsula, in others it is confined to their immediate surroundings.



Graphic 32 The contrast between Visibility and Aspect analysis results (both from fieldwork and GIS), show that in the Machars these two features are relatively coincident.



Graphic 33 The contrast between Visibility and Aspect analysis results (both from fieldwork and GIS), show that in the Iveragh these two features have little relation with each other, despite the preference for eastern orientations.

Table 12 Main preferences per region regarding the overall orientations of Visibility and Aspect (fieldwork data + GIS analysis)

	OVERALL VISIBILITY RESULTS	**OVERALL ASPECT RESULTS**
The Machars Peninsula	All Directions	All Directions
Rombalds Moor	N / NE / E	N / NE / E
Iveragh Peninsula	NE / SE	S
Barbanza Peninsula	W	NW / W / S
Monte Faro	N / W	SW

This pattern is repeated in both study areas of Iberia, in which the visibility results show a certain discrepancy in relation to the aspect, even if not completely contrary.

The local topography and even micro-topography can have a determinant effect on the panel's visibility and intervisibility. This is particularly noticeable in the Machars, for instance, where large numbers of rocks are sited on small hillocks and knolls. Since none of the carved rocks are located in predominantly high grounds, the undulation of the terrain plays an important role in the visual engagement of the engravings with their surroundings, and each other. Examples such as Blairbuy, Big Balcraig or even Knock, where the rocks are located very close to each other, illustrate this point rather well, considering that despite the distances, the decorated surfaces are not always intervisible (e.g. Knock 2B and the group of rocks Knock 3, Machars). In Iveragh, for instance, the hilly topography of the Kealduff Upper Valley is highly influential in the visibility affordances of the carved rocks. In every corner the many meanders of the river and the turns of the mountains present obstacles to the available views from a panel, even when located at a short distance.

The visual relationship between carved rocks is a second favourite topic approached by rock art researchers. In fact, the intervisible connection between engravings has corroborated the idea that the panels were used in the landscape to enforce a sense of territoriality, spatial organization and dominance (e.g. Parcero-Oubiña *et al.* 2013; Santos-Estévez 2008). As such, this feature was equally explored in this study and yielded interesting results. Some carved rocks are obviously meant to be visible by others, since they are located in nearby areas without obstacles, in a direct line with or in short distances of other panels. Various carvings, despite their size, are seemingly secluded in the landscape, whilst others

can be related to a very specific panel even if there are others nearby. In the Knock area of the Machars an interesting situation occurs. All the rocks in the Knock group are located at a short distance from the sea, although Knock 1 is the only one placed directly over the conspicuous cliff. The remaining panels of the group are a few metres further inland in a small area confined by a road and modern boundary walls, in which a number of small knolls dot the landscape. From Knock, it is possible to look over the area where most of the Blairbuy rocks are located (on the base of the imposing Fell of Barhullion, c. 1 km to NE), although none of the outcrops are identifiable at this distance. Despite this, most of the Knock rocks are not intervisible.

It is now clear that there is no transversal pattern of visibility preferences across the study areas. Even at the scale of each study area there are noticeable differences and the locations of the rocks are seemingly related to immediate needs rather than a pre-existing rule. Similarly, the requirements for wide ranging views is clearly a misconception. If some panels are indeed associated with wide-open landscapes with very extensive views, others are limited to a few hundred meters and conditioned by a number of elements, amongst which the micro-topography plays an important role. Drumtroddan (Machars) is located in an open landscape but its primordial relationship seems to be with the carved rocks scattered in small groups separated by a few meters. It is, however, possible that this place had a relationship to the sea, which could be clearly heard during fieldwork, but hardly seen due to vegetation. There are a number of modern obstacles in the landscape which can blur our assessments, despite the intentional attempts to disregard them. On the other hand, the presence of standing stones, should they be contemporary with the carved rocks, could have been more significant than the coastline. A group of three of these monuments is located at a short distance of Drumtroddan and would hold visual contact with the group, if we disregard the vegetation between the two sites.

Similarly, the intervisible character of the carved rocks has also been overemphasized. It is true that some rocks are visible from others, but the majority of carved media is composed of small, low-lying outcrops or boulders that are fairly invisible in the landscape. In some instances it is possible to view the area in which these rocks are located, but should the observer not have knowledge of their specific location, seeing the area at a distance may not hold much meaning. This is true in the Machars but especially in Rombalds Moor, where the carved panels are mostly of small sizes, very flat, close to the ground and almost only perceptible once the observer is on top of them. In landscapes such as that of Monte Faro, with great chaos of granite blocks, one could consider the carvings to be relatively secluded

as well since finding them is not an easy task. Of course, the physical character of the carved rocks, potential intervisibility between rocks, and this element is not taken into account in GIS analysis. The actual height of the rocks was not introduced in the calculation, although this could have been an option. However, most of them are flat and low-lying. When the algorithm produces results showing intervisible rocks, these should be considered with caution, as they only refer to a point in a specific area. Once again the question of vegetation must be raised here (Figure 96). It is possible that some of these carvings had a seasonal character. Vegetation evolves and transforms throughout the year and a great number of rocks could have effectively been covered during specific periods, either by soil, turf or just very dense plant growth.

Figure 94 Very hidden location of Panel 19 of Rombalds Moor, which can be seen highlighted through a red circle in its wider landscape. The central image shows how small it is, and the right-hand 3D model reveals the motifs carved on the surface.

In addition, it is possible that carvings were not very visible against their rock media. So far there is no evidence for these motifs to have been painted, which would make them more noticeable in the landscape. Although more and systematic experiments are needed, a few examples of modern carvings suggest that the natural patina would form relatively quickly disguising the motifs against their background. In fact, a modern carving in the Archaeological Park of Campo Lameiro, made a couple of years ago as an experiment, looks almost genuine due to rapid weathering (see also Lamdin-Whymark 2011). This means that potentially, once the colour of the rock's core, revealed by fresh grooves dug onto the rock face had faded (visible changes after 1, 2 years), the natural weathering processes would make them invisible in the landscape. The idea that Atlantic Art was meant to be visible and that it marked special features in the landscape has been challenged by Fábregas-Valcarce and Rodríguez-Rellán who believe that they were in part to be secluded, especially after finding motifs carved inside rock shelters (2012). In line with this idea, our fieldwork suggested that despite being placed in open-air contexts in the majority of cases, Atlantic Art has an overall hidden character in the landscape. In this study it was observed that many carvings were

deployed in rather small, low-lying and flat rocks, which does not confer a very prominent position. People would either encounter them by chance, should they be visible at that time, or need to know about their location and look for them deliberately. In Ilkley, Bradley's suggestion that they are located in pathways was confirmed. It is a fact that these panels are placed along modern pathways that, may or may not have existed and been used during Prehistory. As a result, while traversing the plateau one may come across carved rocks even when not searching for them intentionally. Furthermore, while the rock itself may not be prominent, the location where it is found will occasionally be naturally appealing for those in search of rock art. In fact, after a while this seemingly becomes a rather intuitive process. A Picota (Barbanza) is not particularly a large surface and is neither the most prominent within the group of boulder of which is part (Figure 97). But it is placed in the only small knoll in the landscape where a number of boulders are piled, and obviously upon arrival our attention was instantly directed towards it. The engravings are now very weathered and should we not know what to look for, we probably would not have found it.

Figure 95 A) Location of A Picota and its environs; B) Detail of the very weathered carved surface; C) 3D model of the panel.

Some of these, despite being small, have visible engravings at certain distances. On the other hand, large boulders may be quite noticeable in the landscape, but with very small numbers or nearly-invisible motifs. Derreeny 1 (Figure 98) is a very conspicuous boulder in the Kealduff Valley (Iveragh), being prominent even amongst the surrounding chaos of rocky blocks. Nevertheless, only a very small surface of the rock bears carvings which are currently very difficult to visualize.

Figure 96 Location of Derreeny 1 in the landscape, the carved surface (centre) and 3D model (right).

Conversely, some panels have a very deliberate sense to them and were probably meant to be seen and to be found. Badger Stone in Ilkley (Figure 99) is the only visible large boulder on the high-terrace where it is located (apart from another flat surface on the hillside bearing only cup-marks) and its very exuberant motifs are visible at distances further than 50m away.

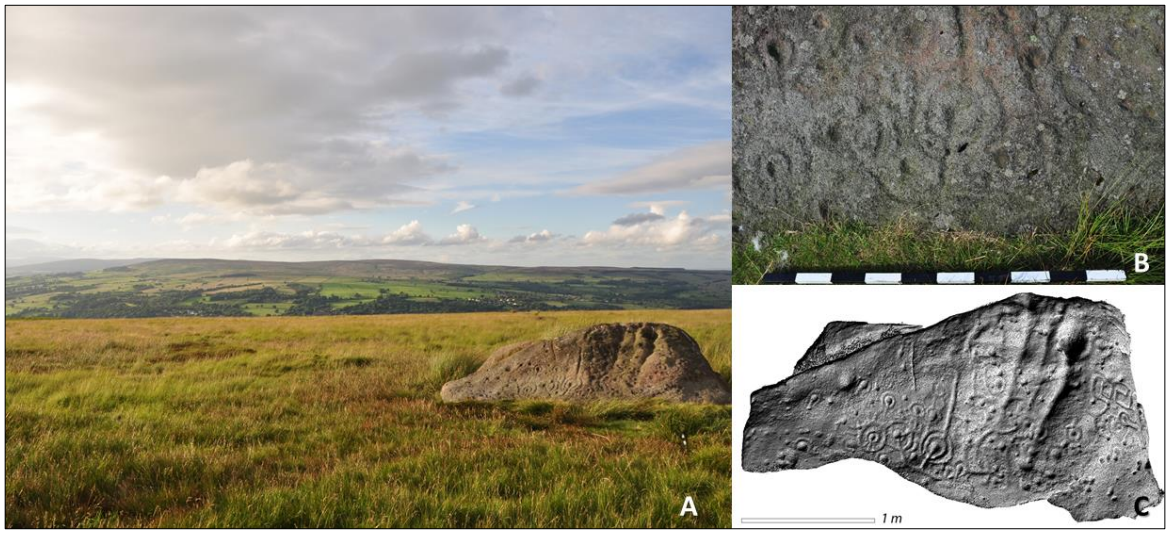


Figure 97 A) Location of Badger Stone in the landscape; B) Detail of the carved motifs; C) 3D model made with SfM.

Visibility towards the rocks was assessed both during fieldwork and through GIS analysis, using RADIUS 1 parameters. General results show that in the majority of the study areas the rocks, or the points by which they are represented, are not immediately visible in their surrounding environs, even when at distances of 50 m. In fact, they are seemingly more visible from further away locations, which unsurprisingly, correspond to higher grounds than those where they are placed. This means that, for instance, in Kealduff Upper (Iveragh) there is obviously a good perspective over the valley when the observer is high on the mountains

surrounding it. As such, the computer analysis considers that the area in which the engravings are located is quite visible from the top but without taking into account the characteristics of the outcrops or boulders which, as seen previously can be rather small. In most of the study areas, results of this analysis revealed that the carved rocks are not highly visually perceptible in the landscape at any of the defined distances. However, similarly to Kealduff they, or the areas where they are located, may be visible from higher points, such as the Fell of Barhullion in the Machars. Whilst in Barbanza most of the rocks are best viewed or more visually prominent from the coast (even the sea, according to the GIS analysis), carved rocks should be perceptible from the slopes of Monte Faro and Monte dos Fortes, but despite the proximity of Alto do Escaravelhão to several groups, these do not seem to be necessarily distinctive from this mount. Interestingly, in Rombalds Moor both groups of carved rocks are more visible from northern areas, Ilkley from Delves ridge in the southern area of Middleton Moor, where more carved rocks are known along with cairns and burial mounds on Round Hill. Some of the Ilkley Moor rocks are seemingly perceptible from Bingley Moor as well, overlapping with preferential areas of visibility towards Baildon Moor. The assemblage at Baildon is quite 'invisible' from the local surroundings, the area being best perceived from Bingley Moor. There is no visual relationship between the top of the Moor and the valley. The Machars is the study area where the visibility towards rocks, from their immediate environs, presents more nuances. In fact, similarly to the other areas a number of groups are not perceptible in the landscape even when looking towards them at short distances. However, a few of these assemblages are actually noticeable, either because they are located on higher areas of a plain, such as Drumtroddan, or because they are placed in relation to a hill or a hillock, as at Eggerness, Blairbuy or Knock. In some of these cases, not only the location of the rocks and the media themselves are noticeable, but the carvings as well. In Knock, some of the motifs in Knock 3, despite being rather weathered, were actually visible from the road (c. 50m away), under favourable lighting conditions.

One of the surprising conclusions drawn for this study is the fact that individually the carved rocks have quite short vistas, despite some obvious exceptions. However, it is noticeable that the study areas are remarkably controlled visually, a result that can be assessed through a total Viewshed or a cumulative Viewshed calculation, summing the individual vistas. Although such a suggestion would need further investigation and confrontation with other contemporary archaeological sites that could eventually be involved in this relationship, it seems that the several groups of rock art in the various regions were indeed connected through a network of visibilities that 'control' the territory. In other words,

all the assemblages of rocks are intervisible with, at least, another group of panels or even an individual surface. These are then connected to others, creating a kind of a visual lattice that covers almost the entirety of the study areas. Of course this may not be that significant and result from the dense distribution of rock art.

All things considered, visibility may have been an important factor in the selection of the media to carve, as suggested by some examples, but it could have also been a product of chance. While roaming the landscape, it is sometimes difficult not to consider the backdrop and how far our eyes can see. This may be a product of bias and a pre-conceived idea that wide viewsheds are important for Atlantic Art. Furthermore, our analyses may also be influenced by modern concepts of landscape that are relevant to our current cultural backgrounds. The cases evaluated in this study exemplified a multitude of situations and it is difficult to establish a pattern, but rather identify preferences. More importantly, one should bear in mind that many factors that are not tangible to us now may certainly have interfered with visibility. Even rocks that are located in viewpoints or those that command extensive views would have been conditioned, for instance, by climatic circumstances, especially considering the Atlantic phytoclimatic characteristics in which all these areas are situated. On many occasions during fieldwork, climatic conditions were a great obstacle to the appreciation of the landscape, namely regarding visibility studies. Constant mist and rain dramatically reduced our visibility over the rocks and the landscape in general, conditioning the sensorial approach. Notably, sounds were an important factor as well, whether during storms or in areas where the flow of watercourses was so intense that we could not hear each other, even when standing side by side.

7.3. SOCIAL NETWORK ANALYSIS: A RELATIONAL, MULTI-SCALAR APPROACH

So far, the approach developed in this study involved the application of a number of methods, focusing on its multiple characteristics at different scales. The multi-scalar methodology, along with the categorical scheme in which the data was organized, were based on a relational approach, in order to produce a dynamic overview of the rock art assemblage and enable the perception of the relationships connecting sites and their features. The last stage of analysis involved the examination of the dataset through a relational perspective in order to identify emerging similarities and differences in Atlantic Rock Art. The data was studied through a Social Network Analysis (SNA). To do this, dedicated software was used

and all network representation and analysis was performed using the freeware Visone v.2.16 (Visone project team 2017).

SNA is a sub-field of Sociology and it was established in the 1970s. Recently, it has been applied to a number of subjects, from Physics to Economy, Biology, Neuroscience, Computer Science and Sociology, due to its ability to study a diverse range of relational phenomena (Brughmans 2013:624). Archaeology has also benefited from the increased use of network analysis, and the potential to explore relationships/interactions between humans and objects and their multiple relationships with a wider social structure, as well as the possibility to overcome asocial static typologies (Coward 2013:248; Knappett 2011:7-8, 2013:7).

Network analysis has mostly been used in archaeology to explore datasets and model past processes (Östborn and Gerding 2014:75). Some of the overarching archaeological themes that have been explored through SNA include diffusion of innovation (Coward 2013:250), the transmission of ideas (Graham 2006), the movement of people and objects (Brughmans 2010; Brughmans and Poblome 2012), the identification of social and cultural boundaries (Terrell 2010), interregional interaction (Mizoguchi 2009) or maritime connectivity (Knappett *et al.* 2008). This diversity of applications is made possible because networks enable us to consider social and physical dimensions in dynamically interrelated ways, combining these spheres into a social space (Knappett 2011:9).

For the purpose of Atlantic Rock Art study, the used dataset was that resulting from the extensive categorical scheme. Composed by more than 300 attributes distributed over more than 10 categories and 262 individual panels (details of the sites and attributes can be found in vol. 2, Appendix 2 and 8), the dataset turned out to be very extensive and complex, not easily manageable. To make the most of it and to enable a relational study of all its components, the dataset was explored using SNA methods. This formal method enabled an effective relational analysis of the dataset encompassing all its complexity, through the development of a system of nodes (carved panels) connected by a set of relationships (the attributes) (Coward 2013:248; Knappett 2013:3). Beyond the direct relationship between panels and attributes (one-mode network), SNA was also capable of exploring the behaviour of entities and the social implications of the relationships (Coward 2013:249; Knappett 2011). Specifically, SNA was pivotal in contrasting the hypothesis set out in Chapter 4, in which a package containing the 'quintessential' characteristics of Atlantic Art would have initially travelled and been adopted in the study areas, later giving place to regional traditions of carving. This would imply strict networks of cultural transmission and intentional teaching

of iconography, skills, details of practice, imagery, landscape location and a whole ideology underpinning the use of the imagery. Networks are effective dynamic ways of thinking about diffusion of innovation and/or material culture through the examination of formal similarities between sites and assessing the strength of their social relationships (Coward 2013:273). Cultural transmission often involves the manipulation of materials such as clay tablets, or pottery (van der Leeuw 2013:339) and in this case through rock art and its making. Furthermore, material culture plays an important role in the maintenance of relationships between entities (Appadurai 1986; Coward 2013), social interaction, memory (Connerton 1989) and cognition (Malafouris and Renfrew 2010).

The data used to pursue this investigation was that collected in the categorical scheme, translated into SNA through a set of nodes (carved panels) connected by a set of relationships (the attributes) (Coward 2013:248; Knappet 2013:3). The assemblage was input in an Affiliation Network (see Brughmans 2014:51 or Colla *et al.* 2015:24 for details) typically visualized as a two-mode network encompassing the whole dataset contained in a binary matrix. Two-mode networks are those in which two sets of nodes represent two different types of data and where carved panels are connected directly to their attributes (Brughmans 2013:638). In this case, first mode refers to the carved panels (rows in the table) and the second mode to the attributes (columns) with which they establish relationships. The attributes include the designs, rock media, landscape locations, but also the structural variants and behaviours, the carving techniques and field observations such as the visibility affordances. The association between a panel and the presence of a specific attribute is represented by an edge of the network. Edges represent relationships between two pairs of nodes, identified through the lines connecting them (Collar *et al.* 2015). The number of attributes at the site is stored as an attribute of the edge and as such, edges can be directed or undirected, and have different weights (Brughmans 2013; Collar *et al.* 2015).

The structure of two-mode networks is quite complex, and in this case the sheer number of attributes and sites required a more structured way to interpret the network. As such, the two-mode network was projected as a one-mode network. Two-mode networks can be transformed into one-mode network by focusing on a particular set of nodes. In this case, only the nodes referring to the carved panels were included, since what we are interested in is exploring similarities and differences between the carved panels. This projection means that two pairs of rocks were connected by an edge, should they hold a relationship of at least one node of the other mode in the two-mode network (Collar *et al.* 2015). This also means that when a pair of carved rocks is connected by an edge, they share an attribute. The different edge weights represent the numbers of attributes shared by a specific pair of sites.

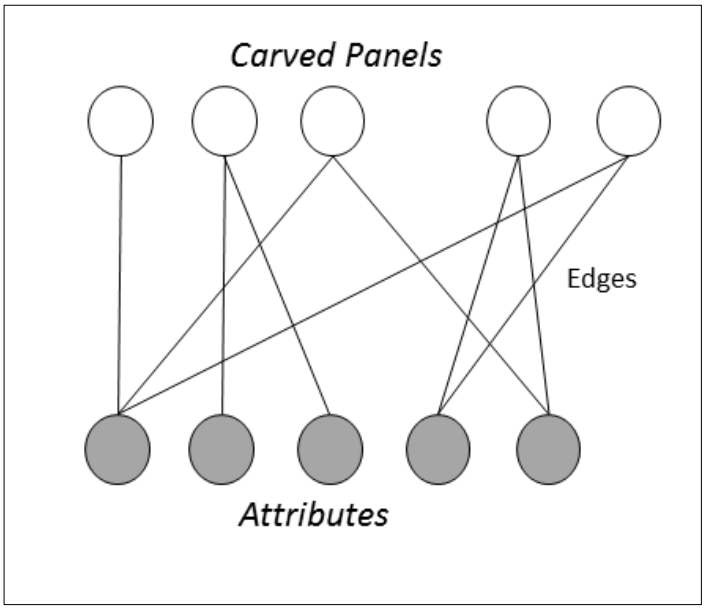


Figure 98 Representation of a two-mode network in which white nodes represent the carved panels and are connected to the grey nodes, representing the attributes. They connect to each other through edges, representing the relationship between the two sets.

As argued previously, the data seems to suggest that there was a package, containing specific knowledge, which was spreading across Atlantic Europe during the Neolithic, and further developed regionally. SNA was used to enhance the understanding of this social behaviour and transmission of ideas, as well as explore the interregional interaction between the study areas. By relating the sites with motifs and motifs within themselves, it was possible to investigate variability within the dataset and determine which are most closely related.

The analysis of the dataset was made through two different methods, both projected as a one-mode network. In the first case, a relational network of co-presence was created representing pairs of carved panels and their relationship through edges that represent the attributes shared by those pairs of sites. An initial inquiry was performed with the introduction of the full dataset comprising the categories used to characterize Atlantic Art. At a first glance, the analysis of shared attributes demonstrated the high level of similarity between all rocks from the five study areas. Some of this similarity, of course, was accounted for by the ubiquity of a small number of attributes, resulting in a lack of variability. This is illustrated by the dense network of similarities below (Figure 101), in which all panels are

connected to nearly all other panels, since they share at least one, but probably a few attributes.

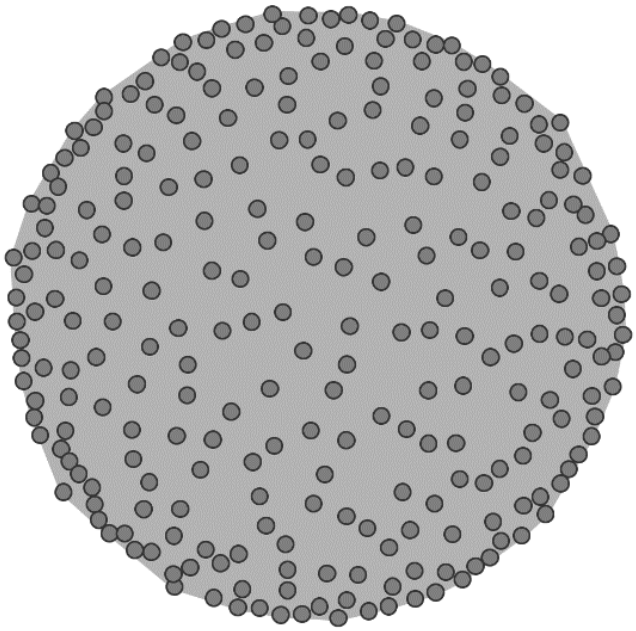


Figure 99 This 'fur-ball' demonstrates the dense network resulting from the categorical system used to study Atlantic Rock Art. All sites are connected to all attributes, at least once. In this image, the dark spheres are the nodes, that is, the sites.

Despite the dense similarity of the network demonstrated above, resulting from the number of attributes that each region share with each other (also see Appendix 10 in Vol. 2 for more details), there are differences between the regions. For example, the Machars and Iveragh, were the most similar datasets with 288 (out of 341) shared attributes whilst Rombalds Moor and Monte Faro with only 240 (out of 341) shared attributes illustrated the highest degree of difference. Perhaps these differences constitute important archaeological information and need to be investigated further. However, the simple co-presence of attributes does not allow for the identification of details and therefore another method was used to explore similarity and difference.

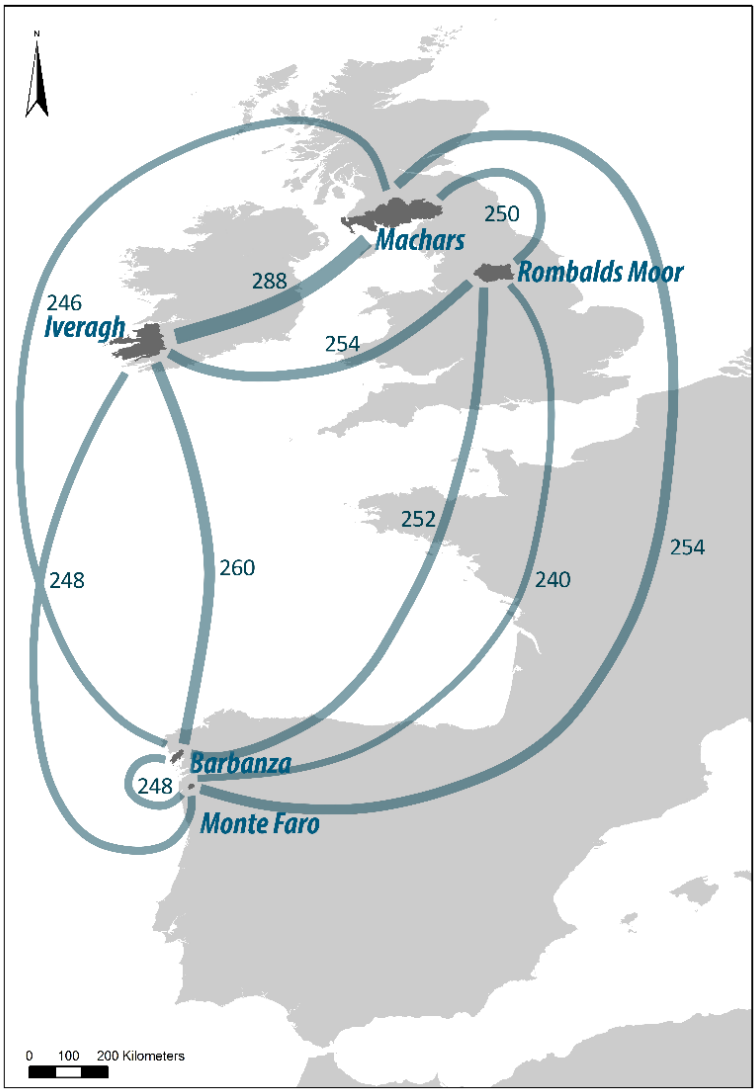


Figure 100 Spatial representation of the relational network of co-presence of attributes between the regions. The values represent the numbers of attributes shared between the regions connected by the edges which, in this case, are undirected.

A possible way to overcome the limitations of these results would be to use a threshold value on the edges of these similarity networks in order to exclude edges with a value lower than 2 or 3, which would remove most ubiquitous attributes and the weakest links between nodes. The definition of a threshold, however, would involve an arbitrary decision which can compromise possibly important patterning in the dataset by ignoring parts of it. Ubiquitous attributes are still important features of the networks contributing to the production of overall patterning and preference should be given to comprehensive approaches in which additional patterning can be identified by drawing on the complete richness of the dataset without having to exclude data. This can be achieved by using a network measure which includes a relationship value, that is, the number of attributes

present at a pair of panels, as a relationship weight: a pair of sites with more common attributes represents a stronger similarity link, and a pair of sites with fewer common attributes represents a weaker link.

In order to overcome the limitations of this method, a formal network analysis was produced. A second approach to the network involved the use of Louvain Modularity, or community detection method. This algorithm measures the density and weight of the edges within and outside groups of nodes, optimizing the relationships and rendering the best possible groupings for the nodes within a network. This calculates which edges should be removed in order for the network to fall into components that are very strongly connected (i.e. when sites in the same component/community have many attributes in common). The weakest links then emerge as well (Blondel *et al. 2008*). As such, the Louvain Modularity enables an assessment of similarity and difference that, considering the complexity of the network, would not otherwise be possible to assess. Here too, the community detection was performed on the same one-mode network of carved panels, in which a pair of sites is connected if they share an attribute and where the edge weight represents the number of attributes shared by that pair of panels. The examination of the dataset was done through three main phases, mirroring the approaches mentioned previously for the PAM. The first one considered only the attributes that compose the package of 'quintessential Atlantic Art' characteristics. The results were contrasted with three more renderings of the network – 1st, 2nd and 3rd approach (see Appendix 7, vol.2, for details on criteria for each approach) – each of them more complex than the previous, including more attributes of the categorical scheme, introducing more variability to the dataset. The 3rd and final approach encompassed the whole categorical scheme in its 341 attributes. One of the values of the SNA used here resides in the ability to identify meaningful patterning in the relationships created between hundreds of attributes and sites encompassing a broad view of Atlantic Art, and not only one featuring the typological characteristics of the motifs. A global picture of the assemblage is portrayed in these networks which include parameters relating to the type of selected rocks and their characteristics, carving techniques, landscape location plus important observations regarding their location in the landscape and particular affordances, encased in the attributes.

The use of Louvain Modularity in the package network confirmed the great similarity shared between the study areas, hinted at in the co-presence of attributes analysis. By including only the main characteristics by which Atlantic Art is usually known, the results did not display any regional logic to the grouping and panels of all study areas were indiscriminately clustered together. This demonstrates that there are in fact strong similarities between the rock art of all regions, visible on a subset of all attributes present at

all or most sites. The pattern suggests that the package is shared by sites from all regions, and therefore characterizes Atlantic Art as a global event. The map below (Figure 103) shows how all the regions are equally connected with edges bearing very similar values.

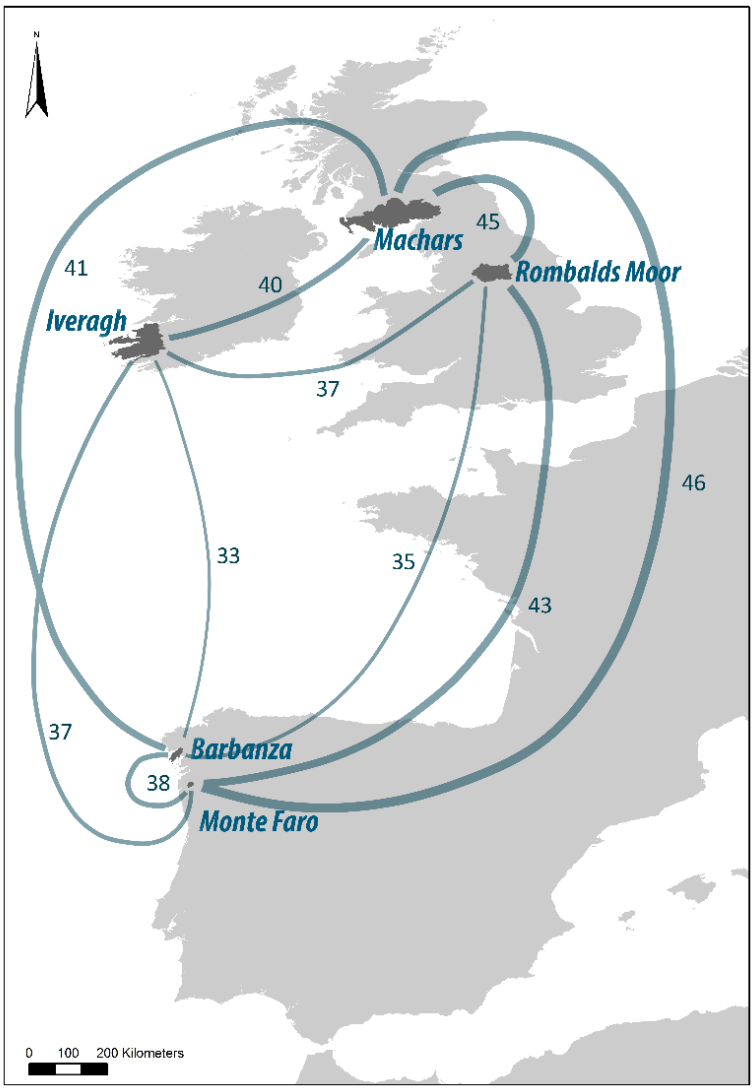


Figure 101 Spatial representation of the package network demonstrating great similarity between all regions.

The same principle was applied to further approaches to the dataset. Two theoretically-derived datasets were set out to be analysed through the same method, in order to identify the degree of similarity between the regions. This time, the first order of analysis, or first approach (Figure 104), included all the main categories that constitute the categorical scheme, but with no discriminated attributes. For example, the category of cup-and-rings

represents only the presence of these motifs, but it does not account for details such as numbers of rings. Of course, it includes more categories, and therefore it intrinsically encompasses more variability than the previous dataset. Besides the attributes related to motif morphology, the landscape location also features in this approach. A slight pattern of regional logic can be teased out from this network.

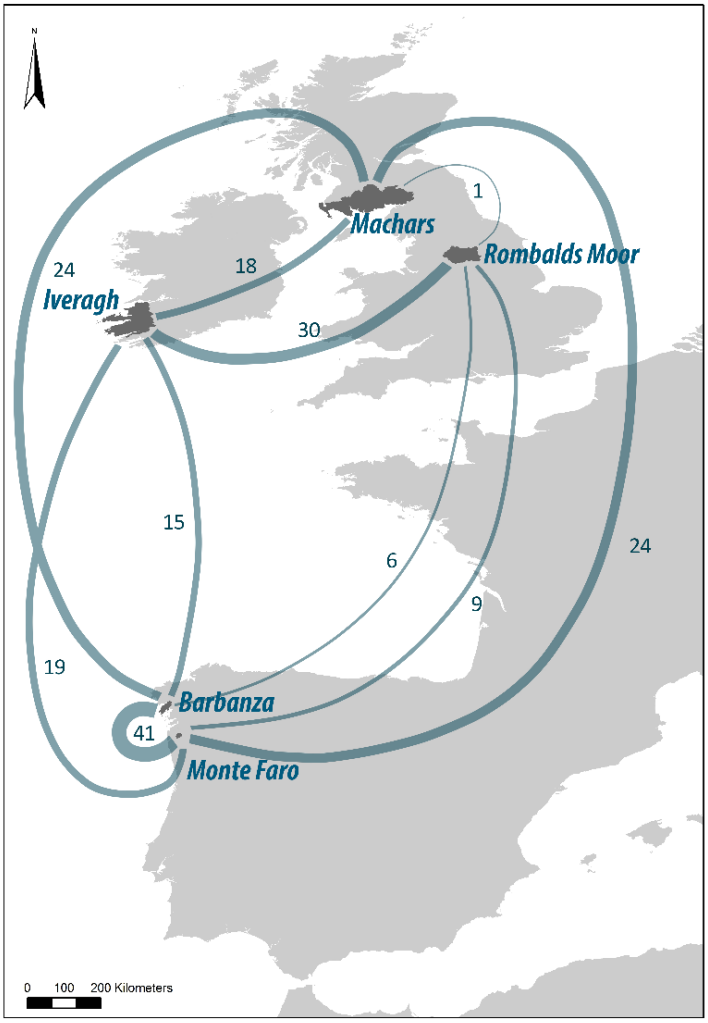


Figure 102 Representation of the network resulting from the First Approach of analysis in which only the main categories, but no attributes, were used. There is a small degree of variability emerging reflected in the emergence of a regional logic. Differences, however, are not very striking.

Similarly, the introduction of more variability in the second approach (Figure 105) intensified this pattern. In this case, more details that are usually referred to characterise Atlantic Art were included. This comprises attributes such as the *Clustered cup-marks*, *Dumbbells* and *Wavy Lines*, the refinement of the numbers of concentric circles surrounding a cup-mark, or whether rings are complete or gapped. A number of other features were

included, and therefore more variability is known to this approach. At this stage, the characteristics of the media on which the motifs were carved was also included, as was their location in the landscape and carving techniques. A total of 130 attributes was used in this network, as opposed to 42 in the previous dataset (see Appendix 7, vol. 2).

As a result of this approach, and when comparing the map below with the previous one, it becomes apparent that some edges intensify, namely the relationship between the Machars and Iveragh with Barbanza, whilst others become weaker. In fact, this approach sees the study area of Rombalds Moor gain a strong sense of regionality, with only four of its sites placed in a different community. These are Badger Stone, Pancake Stone, Hangingstones and Backstone Beck 04. Interestingly, the first three panels are amongst the most emblematic of the whole assemblage in Rombalds Moor and their inclusion in a different community is probably related to their motif variation. Whilst most of the rocks in this study area were carved with a combination of cup-marks and lines, these three have a relatively varied iconography. Hangingstones and Pancake Stone are also particular for their location in the landscape (Figure 105).

Despite the emergence of this regional character of Rombalds Moor, the assemblage still shares similarities with a number of sites from other study areas, its strongest connection being with Iveragh. Here too the iconography is relatively mono-thematic and there is a consistent use of cup-marks.

Notwithstanding the growing sense of a regional logic in these two approaches, more structured than in the package network, these two networks result from arbitrarily limiting the dataset and still do not reveal any striking internal logic to the assemblage. A third approach was then developed (Figure 106), this time encompassing the comprehensive dataset, including all the 341 attributes. These include morphological details of the motifs that are rarely identified but were scrutinized in depth throughout this thesis, and other particular characteristics of Atlantic Art that were identified and studied in order to understand the nature of this rock art.

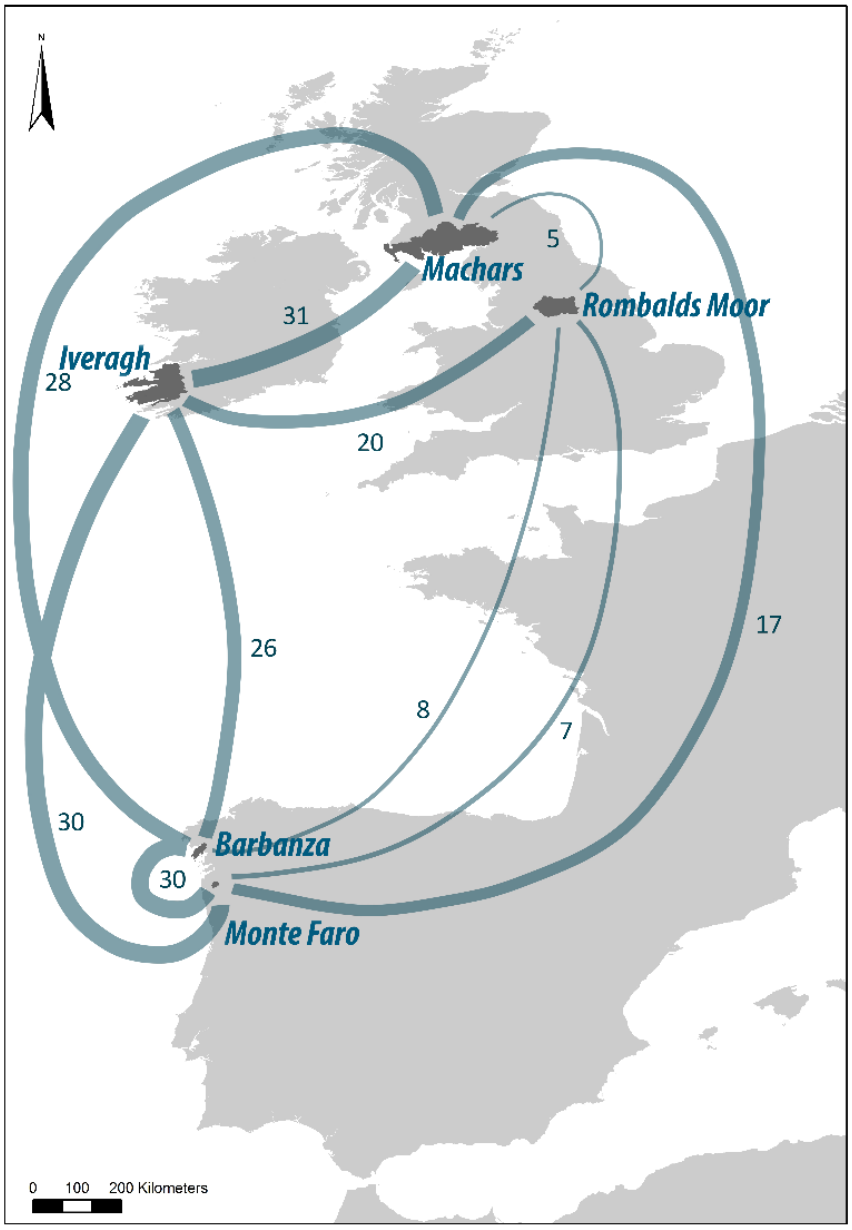


Figure 103 Network resulting from the 2nd approach.

Very interesting results emerged when the method was applied to the comprehensive dataset, in the third approach, which included all attributes and variants of the categorical scheme. Even though all sites are rather similar, the analysis was successful in teasing out distinct groups of panels which are particularly similar. The introduction of detail and variability revealed a clear regional logic, illustrated in the map below (Figure 106). This is particularly obvious when compared to the previous approaches.

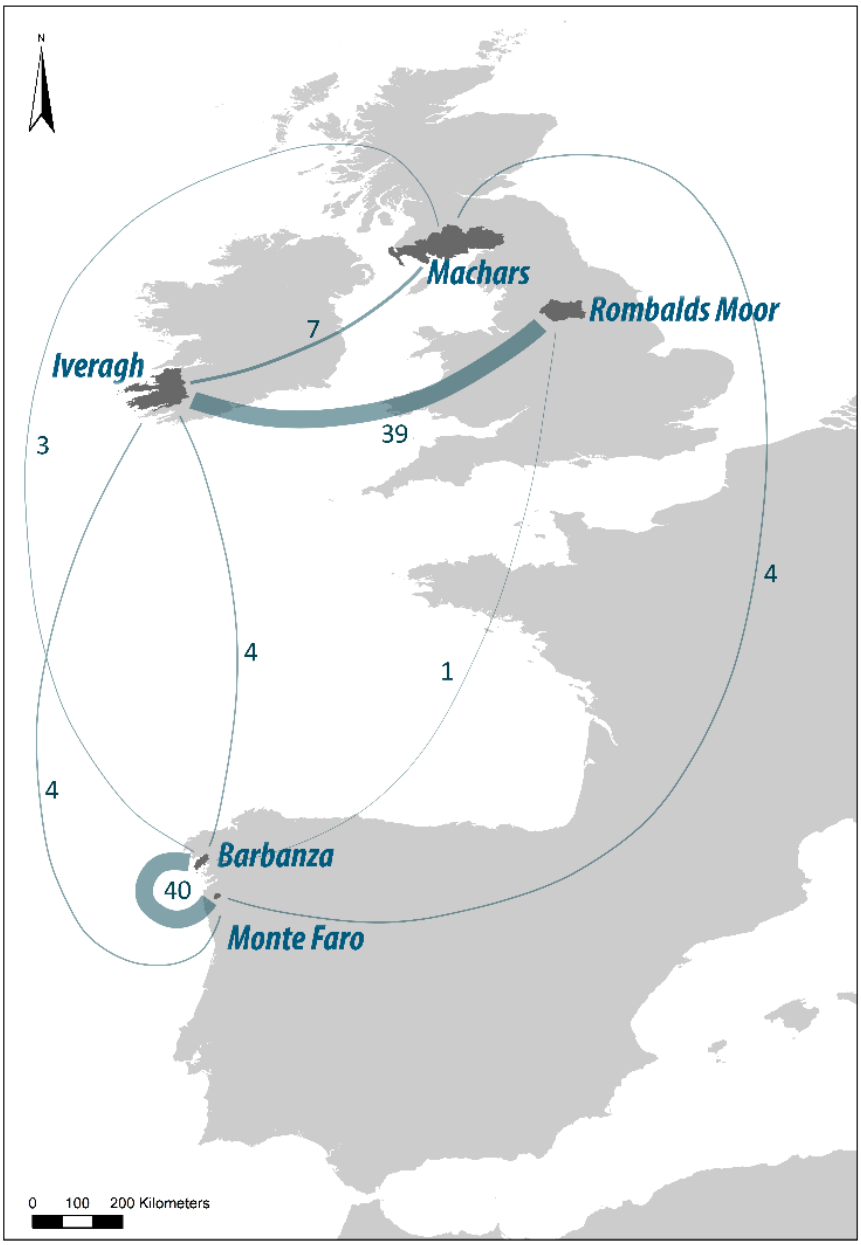


Figure 104 Third and final approach demonstrating clear regional patterns of Atlantic Art.

Although this is the same network shown previously in the 'fur-ball' image (Figure 101), in this case the Louvain clustering algorithm enabled the identification of three distinct communities of sites sharing strong similarities (Figure 107). These are established according to the number of attributes common to each panel. At a first glance, the network reveals a strong connection between Rombalds Moor and Iveragh, grouped together in the same community, although the latter has a few sites that fit better within other groups, and therefore are represented together with panels of other regions. This is the case of

Rossacoosane, which was included in the group of Iberian rock art, and several rocks of Kealduff Upper, sharing more similarities with the rock art of the Machars than the remaining assemblages of Ireland.

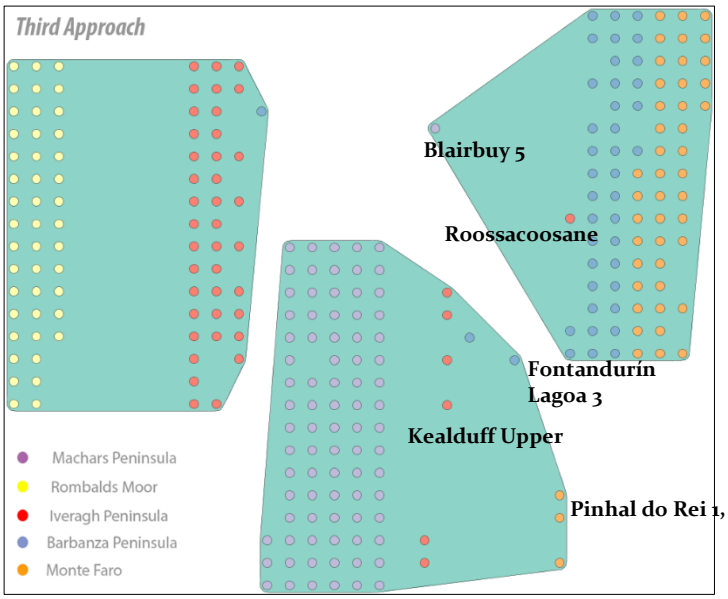


Figure 105 The Louvain algorithm applied to the full dataset extracted three well defined communities from the large network. Each of these groups include sites that share strong similarity between each other. The regional character of Atlantic Art is striking in this approach, as opposed to the previous networks. For the purpose of clarity, the edges were removed from this scheme.

It is noticeable that Rombalds Moor is the only group for which all sites are within the same component, illustrating the particularly homogenous character of this dataset. Unsurprisingly, the rock art of Monte Faro and Barbanza appear closely related in this analysis and, interestingly, both groups have a few panels sharing resemblances with the rock art of the Machars and Kealduff Upper. From Monte Faro, these are the sites of Pinhal do Rei, and from Barbanza these are Fontandurín and Lagoa 3. The main characteristics that probably led to the grouping of these sites are the low-lying and very flat outcrops, with the exception of Lagoa 3 which is a boulder, upon which a small number of circular motifs were carved. However, if in the case of Kealduff Upper, Fontandurín and Lagoa 3 the carved motifs are mostly concentric circles, in Pinhal do Rei the engravings are slightly different, with circles or circular enclosures filled with small cup-marks and the very interesting concentric ovals embedded in a larger similar motif. Throughout the three approaches, the study area of Monte Faro and Barbanza maintained a strong relationship of similarities, which

demonstrate that, even when considering only a few attributes, the two areas share strong affinities which, considering their geographical proximity, is probably not at all surprising.

Finally, although a number of panels from different regions were grouped together with the assemblage of the Machars, the resulting community of this study area displays cohesion, since only one of its sites was placed in the Iberian group. This is Blairbuy 5, in itself an odd looking motif. It is an asymmetric cup-and-ring with very large grooves and a relatively plastic appearance.

The application of Louvain Modularity was particularly interesting in the observation of the evolution of Atlantic Art, depending on the considered attributes. These were introduced at different phases in order to investigate the similarities (and differences) between the regions and better understand the evolution of the assemblage in each of the study areas. The algorithm was particularly interesting in the identification of cases in which all or most rock art sites from a specific study area are grouped together, specific sites from different groups as compared with all other panels from the same region are more similar to each other, and finally cases where there is no regional logic to the groups. The package previously outlined fits the last situation, in which a set of features potentially crosses through all regions and can be considered the core group of attributes that determines the similarity, or the homogenous character, of Atlantic Rock Art as a whole. Nevertheless, the three approaches to the dataset, based on different numbers of attributes, confirmed that, despite the overall similarity of Atlantic Art, there are strong regional personalities to the assemblage, which had been previously hinted at by some authors (Alves 2012a; Bradley 1997; Santos-Estévez 2013).

Atlantic Rock Art was represented through a network of extreme complexity, considering the number of sites and attributes involved. Although a qualitative analysis produced interesting results which were explored earlier, it was necessary to introduce a formal method of analysis in order to explore the dataset quantitatively as well and assess certain factors that otherwise would not be identifiable. This SNA was particularly useful in the identification of similarities and differences, contrasting some arguments that were put through in earlier stages of this thesis. The idea that Atlantic Art was deliberately taught at its basic level of representation seems clear by the overwhelming presence of the package in all the regions, which does not account for any particular patterns. Furthermore, the suggestion that this package evolved according to local preferences is also evidenced in the

further approaches to the package, and particularly the third where the regions display a strong individuality, underlying the shared characteristics.

In this sense, the use of SNA had an important impact in the idea of cultural transmission through Atlantic Rock Art. A very broad-scale pattern of similarity was formally confirmed with this method, meeting conclusions of previous analysis. This formal contribution to the qualitative work is important, as it enables the reproduction of relevant results. Furthermore, the fact that the two methods resulted in similar conclusions stresses the robustness of the outcomes. This formal method of analysis revealed a regional logic inherent to the complexity of the dataset that could have not been discerned without it. SNA was also important in the management of a very complex dataset.

Overall, the attributes that seem to contribute to regional similarities are, of course, related to carved motifs on one hand. It is noticeable that, for example, the only sites that are extracted from Rombalds Moor, are those with a wider iconographic variation, in a region where the depictions are mainly based on cup-marks and lines. However, on the third approach, the sites that had been previously extracted from this community return to it, which means that there are other attributes contributing to a sense of identity in Rombalds Moor. It is the only assemblage located on a high-plateau, which contributes to certain particularities, namely in terms of landscape affordances such as visibility.

Nevertheless, iconography is definitely not a determinant factor for regionality, and this is demonstrated in the second approach, where Rock 1 of Escaravelhão 1 of Monte Faro was grouped in a different community to that of most sites in this study area. This panel bears a depiction of several linear zoomorphs and was grouped within a community composed mainly of rocks from Rombalds Moor and Iveragh, but also two from Barbanza, one bearing cup-and-rings and another just a simple cup-mark. Clearly, the logic behind this grouping is not related to imagery, but more likely to the proximity of other archaeological sites, a feature that most of the rocks have in common.

SNA was able to validate the hypothesis set out in Chapter 4. The fact that the assemblage is indeed widespread and present in all study areas accounts for the possibility of it having been deliberately taught and passed on. The combination of these types of motifs with their location in the landscape as well as other characteristics were assimilated by these past communities and practiced intensively to the extent that it is today known in several modern countries and over large territories. Despite the underlying general understanding of the assemblage, people were still using it in their own way and therefore there is an interesting combination of general similarity but particular difference in the carving

tradition. In fact, even at closer scales Atlantic Art seems to have been used in specific ways and therefore we could even consider micro-regionalities. Perhaps what we see is a degradation of the package transmitted in early stages of contact, opening the possibility for reinvention and the development of local traditions. The fact that we still find some of these preferences in other study areas (e.g. rosettes in Ireland, Scotland and England, or some of the rings described above, only shared by 2 or three regions) suggests that contact was recurrent and probably quite systematic.

Although no directionality is suggested, it is interesting to note that both Ireland and Spain share relationships with three other regions and that they both have similarities with the Machars. Furthermore, the third approach demonstrated the strong affinities between Portugal and Spain and also Ireland and England. These results, however, may not be surprising given the global similarities between the areas in the Iberian countries, which go beyond the rock art, and the relationships between Ireland and England through the Irish Sea, which have been intensively studied (Cummings and Fowler 2004; Robin 2008; Jones 2004; Sheridan 2004).

These results also demonstrate that, not only were there connections between the areas involved in this study during prehistory, but that they were also quite intense which is attested in other types of material culture and other more intangible evidence. Only a dense network of systematic connections would allow for Atlantic Art to thrive spatially and temporally.

7.4. THE CASE OF THE PICTISH ART

A group of carved rocks located in the Machars was recorded but not included in the discussion above, as they belong to a different tradition of rock art. Some of these panels have been considered, in the past, to belong to a Pictish cultural sphere (van Hoek 1995). The initial group of exogenous panels are mainly located in the area of Eggerness, to which a few more were added, situated in the neighbouring area of Penkiln but also Knock, on the opposite coast of the peninsula. The separation of these carvings from the main group of Atlantic Art is an example of the efficiency of the methodology. Similarly to the main dataset, the motifs, execution techniques, media, spatial organization and morphology of the assemblage were examined with the same parameters.

The first rocks to have been individualized were those previously identified by van Hoek: the horses and stags of Eggerness, and the potential shields in Knock, although these are not very clear and there have always been doubts about their origin. Thematically, none of these figures can be included in the quintessential Atlantic Rock Art imagery. Although in Iberia there are depictions of animals associated with cup-and-rings, these relationships are virtually unknown in the British Isles and the representations of animals are rare, belonging to other traditions and chronological periods. The vertical panel of Ballochmyle (Ayrshire, Scotland) is believed to have a few representations of animals, alongside cup-and-ring marks. However, the former has been interpreted as Pictish.

The distinction between the two groups of rock art in the Machars was not purely based on the morphology of the motifs. The general composition of the panels, the arrangement of the designs on the rock surface as well as the relationship with other contiguous archaeological sites have also been taken into account.

The area of Eggerness, in the eastern coast of the Machars, has the highest number of carved rocks with odd designs. It includes the famous stag and a two more panels with horses. The first is a fine example of a stag made with swirly grooves, easily placed within a Pictish tradition. The horses, however, are relatively stylized and all represented with their heads facing backwards. The style with which they were carved is not clearly diagnostic. Whilst the stag has been compared to similar motifs from Grampian, Highland regions and Grantown, the horses were directly related to Celtic Art and ascribed to a period between 100 BC and 11 AD (Morris and van Hoek 1987c:38). Although the panels are located in the same farm, they are located c. 1 km apart. To the SE of Eggerness 1 (the stag), however, a flat panel with spirals is found. Van Hoek established a parallel between these motifs and Passage Grave Art, to which he assigns the images (1986).

Figure 106 *S*tag and horse from Eggerness (left); Shields from Knock (right) (Photographs by Joana Valdez-Tullett, except centre photo by Maarten van Hoek)

In this thesis, I will argue for a possible Iron Age chronology for both the animal depictions and the spirals, based on a number of facts. The attribution of the animals to a later period seems relatively straightforward, considering stylistic comparisons. Furthermore, Eggerness 5 (stag) and Eggerness 1 (spirals) (Figure 108) are located in relation to a settlement, officially catalogued as Iron Age and/or Pictish. Fieldwalking in this site enabled the identification of a single bank which incorporates natural bedrock outcrops to the N and W of the perimeter, displaying a potential entrance to the west. Eggerness 1 is part of the outer face of the northern bank, and the carved stag (Eggerness 5) seemingly marks the northern edge of the plateau. Several depressions within the enclosure suggest the presence of structures. Although this is not enough to establish an association between the two types of sites, it is potentially a good indicator showing that the animals belong to a different cultural background. A deeper and more extensive investigation would be needed to assess these relationships and potentially place the carvings in a tighter cultural and chronological context.

The region of the Machars is fairly well known for its number of (potentially) prehistoric carvings of spirals. A few meters further to the N of Eggerness 5, the flat outcrop of Eggerness 1 can be found. *In situ* evaluation of these panels revealed a lack of sense of familiarity of the motifs, which are quite different to quintessential Atlantic Art. Unlike what van Hoek concluded, the spirals are not carved with incised lines, but with rough pecking, similar to the technique used on the stag and the horses of Eggerness 6. Besides the

technique, the panel with spirals share a similar workspace organization to the latter. In both cases, spirals and horses are framed on the surface by the multiple natural crevices and fractures of the rocks. Furthermore, the lack of motif variation is seemingly a characteristic of this group of carvings. Eggerness 1 is overwhelmingly dominated by spirals, while Eggerness 6 follows a similar principle, with depictions of imagery mostly based on the horse. Considering the combination of features described above, and despite the lack of archaeographical data, it seems reasonable to suggest that these carvings effectively belong to a distinct group of rock art and can potentially be dated to the Iron Age. Following these observations, other rocks meeting the mentioned criteria were identified and included in the Machars Iron Age rock art group. Such is the case of examples located in Penkiln, near Eggerness. The motif of the spiral is repeated here and the carvings share morphological attributes.

Figure 107 Panels included in the Iron Age group of rock art: A) Eggerness 1; B) Eggerness 2; C) Eggerness 6; D) Eggerness 5; E) Penkiln 5; F) Penkiln 3 (All photographs by M. van Hoek except A and D by Joana Valdez-Tullett).

A similar pattern was later recognised in the site of Knock where two strange, unidentified, images were carved. These have been interpreted as potential shields and once again their origin is yet to be discussed (Figure 110 A). The panel is located on a knoll alongside a number of other rocks making the assemblage of Knock 3 (Figure 111). The many panels composed an assorted range of motifs that are, in many ways, quite original. Besides the 'shields', this place also holds an important number of spirals (Figure 110 D and E), but also more typical cup-and-rings, cup-marks and grooves (Figure 110 C and Figure 111). A closer

observation revealed that the carving techniques used were rather original, in some cases the circles being made with irregular rings composed of very small cup-marks. Some motifs were depicted on steep near vertical surfaces, namely the serpentiform, a combination of a very wavy and curvilinear line embracing a cup-and-ring motif (Figure 110 D and E).

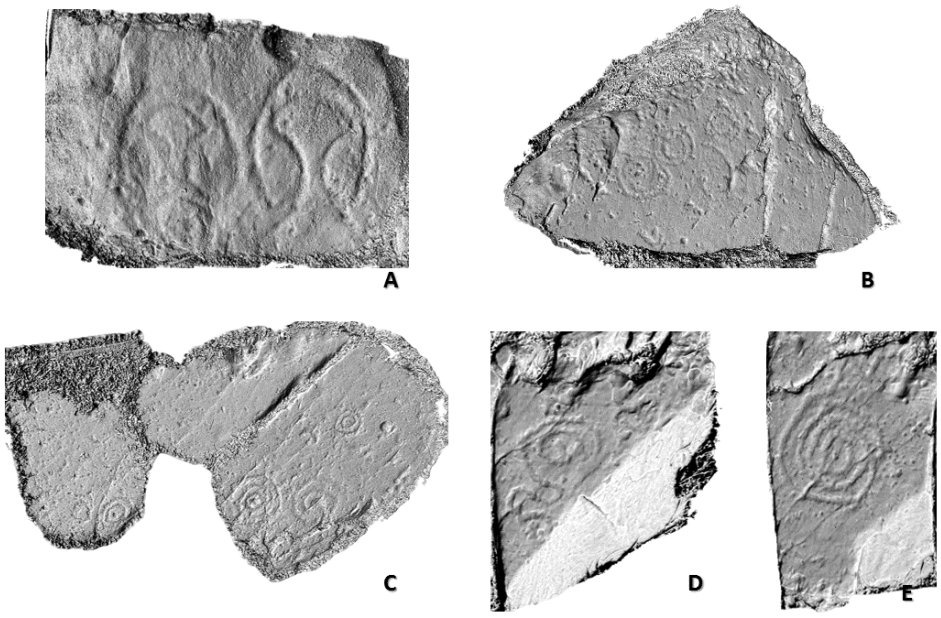


Figure 108 Some of the unusual examples of rock art in Knock 3. A) Knock 3E featuring the shields; B) Knock 3B; C) Knock 3A, where seemingly quintessential cup-and-ring motifs (upper left corner of the front panel) are carved on the same surface as a very peculiar motif of two concentric circles carved with a very incipient technique (bottom of the front panel); D) Serpentiform embracing circular motif in panel Knock 3D; E) Another peculiar motif of Knock 3D.

In fact, the whole assemblage, including types of motifs, carving techniques, location on the landscape and position in relation to each other, is seemingly different from the main characteristics of Atlantic Art and more in line with what was previously described for the Iron Age carving tradition. Also, considering that most of the circles, besides all the mentioned abnormalities, do not have the very typical central cup-marks of Atlantic Art, suggests the possibility that there are more examples of that tradition. It should, however, be mentioned, that in all described cases (Eggerness, Penkiln and Knock), this kind of art occurs alongside Atlantic Art and in the case of Knock there is a great physical proximity between the rocks, sharing the same knoll. Here too, there is an example of a panel being shared both

by Atlantic and Iron Age motifs. One side featuring a classic cup-and-ring image, whilst a circular image of the other tradition was carved on the opposite end of the rock (Knock 3A).

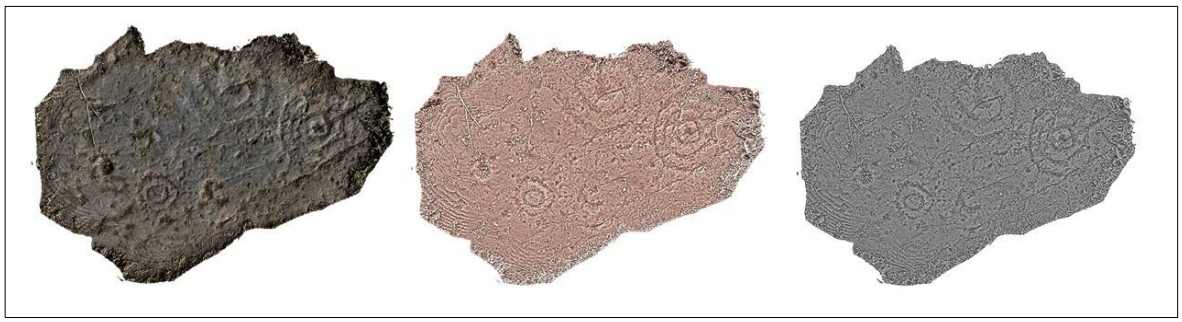


Figure 109 Detail of the 3D model of Knock 3A, displaying unusual circular motifs (bottom left) alongside more classic forms of cup-and-rings (top right).

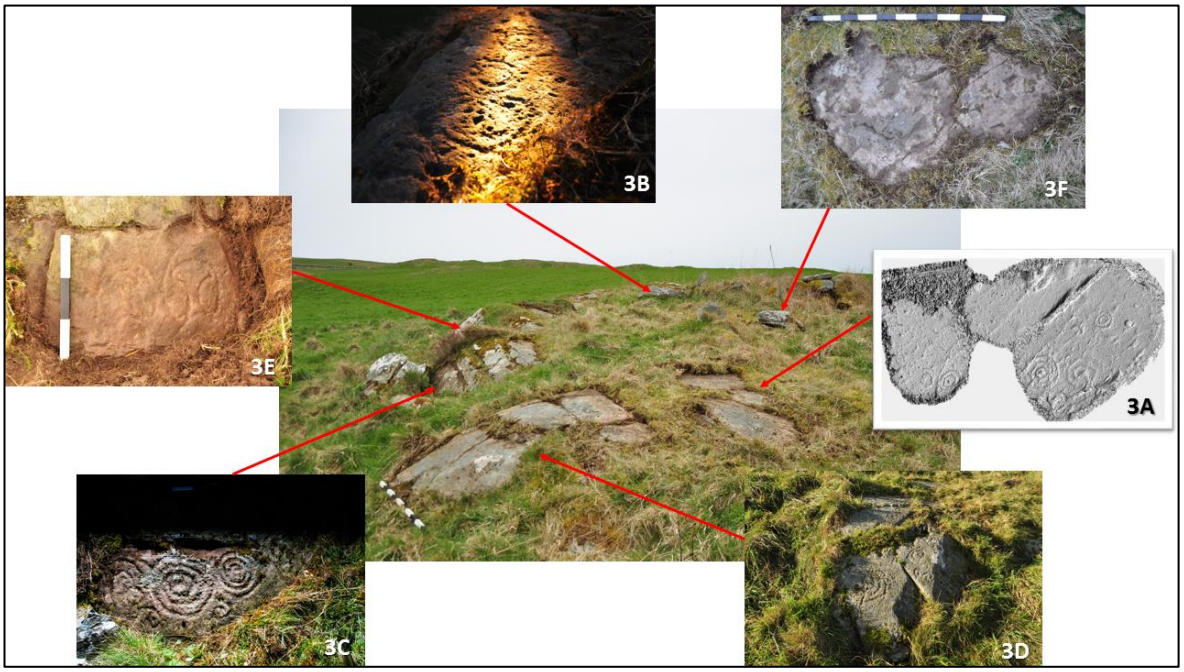


Figure 110 Spatial relationship between the decorated surfaces of Knock 3, located on the west coast of the Machars.

The creators of the spirals must have been influenced by the prehistoric images, possibly even attempting to replicate their motifs, although interpreting the cup-and-rings as spirals instead. Alternatively, this shift of perspective could have been intentional, to mark a difference from one group to another. The mimicking of prehistoric rock art is also noticeable in the landscape location of the Iron Age panels. The motifs are carved on similar types of media in general open-air, flat and low-lying surfaces.

Besides the analysis of style of depictions, type of motifs, carving techniques, internal organization of compositions and the spatial relationship between the carved rocks, these were also assessed in terms of their spatial location and affordances. In terms of visibility, the Eggerness group of rocks revealed restricted viewsheds with an inwards preference, towards inland and therefore to the outside of the settlement. Equally, Knock 3 (Figure 112) and Penkiln have preferential visual relationships with their local surroundings.

Similar characteristics were identified in another Scottish site, this time in Midlothian. Gorton House (Figure 113) is a small recess above the river Esk, currently of difficult access. On vertical and horizontal surfaces of this shelter, a number of motifs were very roughly pecked, resulting in quite large grooves. The images depicted have been interpreted as 'Circles, spirals, triangles, one S-motif, a shield and other geometric marks and grooves are incised on the rock. These figures are quite unlike the more normal Bronze Age markings, and may be of a different date' (Ritchie and Ritchie 1972:31-32) resonating the descriptions described above for the Iron Age rocks of the Machars. Following the previous discussion, it is obvious that we agree with the authors of this statement, confirming a distinction between these motifs and those of Atlantic Art. It is interesting the mention to circles and spirals, but also the concentric rings without central cup-mark, also found in some of the Knock panels. This motif has been interpreted as a shield (*Ibid*). Furthermore, although until now not included in the Iron Age group, there is also a panel with a double 'S' spiral in Gallows Outon (Figure 114), roughly located in the north-western area of the Machars Peninsula. Perhaps this panel should too be included in the later group of carvings.

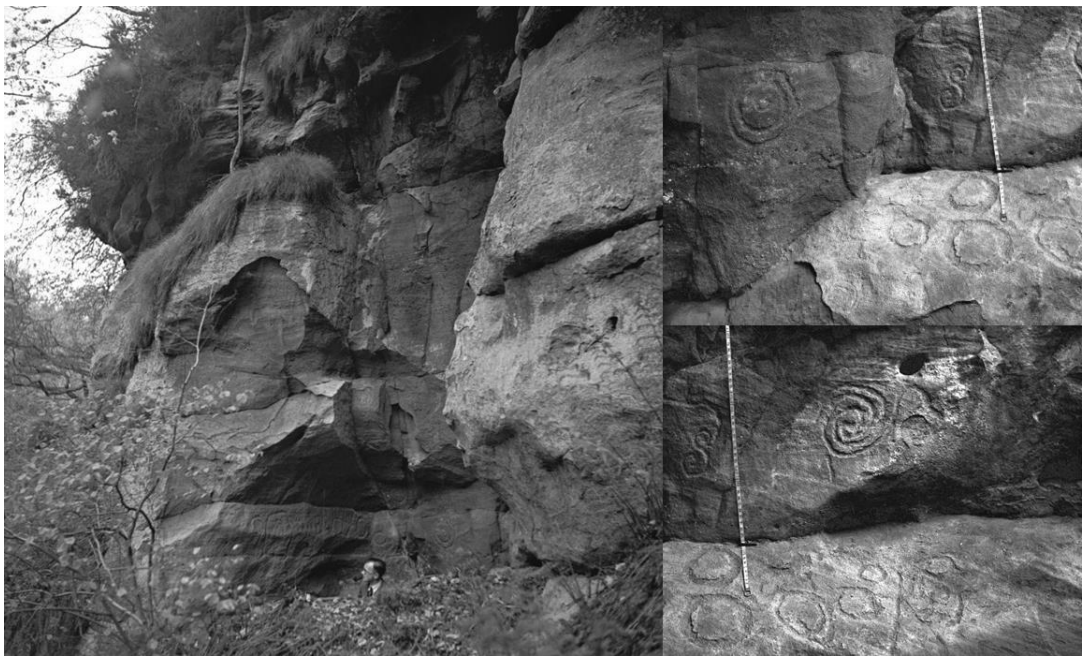


Figure 111 Gorton House. On the left, the setting of the shelter, and the carvings can be seen at a distance. On the right, details of the motifs depicted. (Photographs from Canmore, Historic Environment Scotland at http://canmore.org.uk/collection/563310 and 563312 and 563313).

Figure 112 An 'S' spiral from Gallows Outon (Machars), similar to that from Gorton House. Also note the rough pecking and the very flat surface, in line with other Iron Age examples mentioned in this text. (Photograph from http://ukra.jalbum.net/brac/).

CHAPTER EIGHT: ATLANTIC ROCK ART: ART OF ILLUSION

In chapter 7, I approached the data through the three scales of analysis, namely the Graphic Scale, The Sensorial Scale and the Environmental Scale. These were conducted through three approaches starting at a rudimentary level of evaluation with more detail and intricacy of inquiry added at each stage. These allowed us to see that at a high level the quintessential Atlantic Art package holds together across all of the regions but as the level of detail increases apparent regional variations start to appear in the data. This chapter will explore the variations and links within the data before contextualizing it against the transformations that were taking place during the Neolithic and explore the connectedness within the regions that facilitated its flow.

8.1. MATERIALITY

The formal similarities between the rock art in the five study areas are undeniably striking. The main motifs identified in the package (chapter 4) are effectively present in all the regions. We can then safely say that 'quintessential Atlantic Art' is composed at its core by cup-marks, cup-and-ring motifs and a set of linear grooves, which are often used as connectors. None of these motifs are static and they take different positions and interact in multiple ways with other motifs and the rock surface. The adoption of this package led to the development of local variations of the assemblage, however, keeping a certain coherence with main premise of the tradition. We find specific motifs being used in certain areas, such as keyholes in the Machars or rosettes in both the Machars and Iveragh. More extremely, in Iberia we may see the introduction of animals and weapons, although the chronological relationship between these and Atlantic Art is not clear. Whilst it is possible that the animals were being depicted more or less at the same time (except for riding scenes), the weapons were certainly introduced in later periods, as halberds and daggers can be finely dated to the Chalcolithic and the BA. However, the fact that we currently associate cup-and-ring motifs with the Neolithic also does not exclude the possibility that such designs were still being produced by the same people carving the weapons in later periods. Apart from some obviously decommissioned rocks overlain by Iron Age structures (e.g. at Santa Tegra, Galicia), abstraction in Iberia has known many contexts and chronological periods (Alves 2012b) and there is a continuity in swirly and curvilinear designs on stonework in NW Iberia, evident in the decorated lintels or bath structures of some hillforts (e.g. Pedra Formosa of Citânia de Briteiros, Guimarães, Portugal – Figure 115), and pottery (Figure 116).

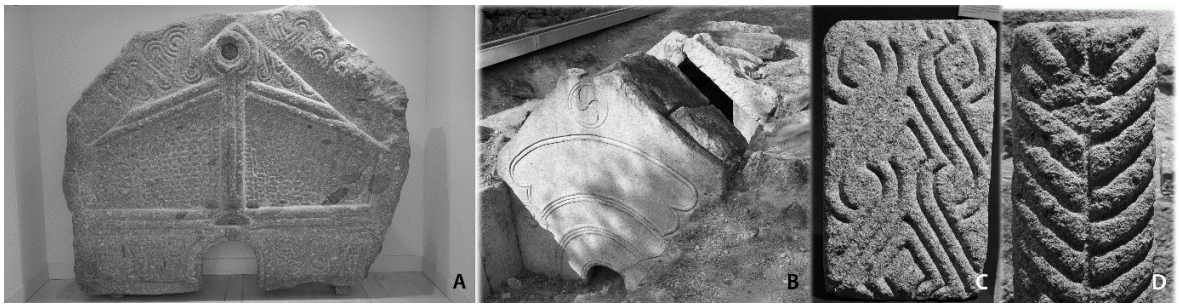


Figure 113 Architectonic elements of Citânia de Briteiros on display at the Museu da Cultura Castreja (Guimarães, Portugal). A) Pedro Formosa, the main block of a bath structure; B) second bath structure *in situ*; C) and D) lintels.

Figure 114 Iron Age pottery and ceramic spindle whorls with ring decorations from Citânia de Briteiros on display at the Museu da Cultura Castreja (Guimarães, Portugal).

An important variant of the Motif Category are circles, quintessentially Atlantic and typically representative of the tradition. Although in many cases they are simply composed of a central cup-mark surrounded by a varying number of concentric circles (usually between 1 and 3, but can have many more than 10), the variation in the making of these figures is quite relevant. Some details used in the structure of the circular motifs are very specialized, leading to the conclusion that they had to be intentionally taught in order to be reproduced successfully. Such is the case of the *Gapped and Complete Combination of circles (*),

documented in all study areas. All the other variants of circular motifs display regional preferences, which are reflected in the results of the SNA. *Rings with Converging Ends* () are common to Rombalds Moor, the Machars and Monte Faro, whilst *Rings with Conjoined Ends* () are interestingly represented in the Machars and Monte Faro. The individual analysis of Monte Faro and the Machars seems to indicate the presence of similarities between the two regions in terms of the iconography used. However, the results of the SNA did not seem to highlight this relationship which demonstrates that regional preferences and therefore the local personalities of Atlantic Art, are not only related to the iconography used, but an assemblage of factors. In the Machars, the *Conjoined Circle* motif is used on a large, flat low-lying outcrop, a surface which was profusely decorated and is mostly depicted alongside other derivatives of cup-and-rings. In Monte Faro, the motif was documented on rock 1 of Fonte Volide, a small boulder with a single depiction, and also on the eccentric Monte da Laje, known for its idols and daggers. The motif was also carved on rock 1 of Escaravelhão VI, a conspicuous and irregular boulder located on the top of a small hillock where most of the 3D designs are located, but also on rock 5 of the same assemblage, where it is again in the company of a range of motifs including idols. Other forms of specialized circles such as the *Ring with Terminus Convergence*, present in all study areas or the *Ring Extended,* observed in all regions except the Machars, illustrate the results of the SNA and support the idea of an intentional cultural and technical transmission of knowledge. Similarly, the specialized use of cup-marks, the most common motif of Atlantic Rock Art and an essential component of the iconography, demonstrate a series of closer connections between some regions and others. There is a generalized use of cup-marks associated with grooves and in clusters, which can be randomly positioned on the workspace or in a central position within the circles (). However, there are preferences in the articulation of these elements with the circles, for example, with *Cup-marks Adjoining Rings* () being used in all study areas except Monte Faro, or the carving of *Cup-marks between Rings* () being common everywhere except in Barbanza. Furthermore, *Cup-marks in Ring gap* are very particular to the Machars and Rombalds Moor () and the intestinals, which are also a carving technique, are common to both regions of Iberia and the Machars. According to the SNA these regions are effectively connected through similarities of various orders.

Despite a few exceptions of panels with exuberant visual features, Atlantic Art appears to be a relatively simple carving tradition, in terms of type morphology, but also the

organization of the workspace, with a majority of rocks having a small number of motifs encompassing a frequency of 1 to 2 types at a time. Complex panels are relatively rare, but in general there always seems to be a large heavily decorated rock near other simpler ones. There is, in fact a tendency for clustering, which was observed during fieldwork but also demonstrated through the spatial analysis. However, we cannot say that these clusters revolved around a specific rock for being more decorated or placed in more conspicuous locations than other panels. Nonetheless, in all cases there are more prominent carved rocks than others, for their complex compositions and numbers of designs. Unsurprisingly, these are often large outcrops or boulders where the workspace was intensely used. In the Machars this is obvious in Drumtroddan and Glasserton Mains, the first case surrounded by a number of small panels with single motifs, and the second initially presumed to be isolated but now accompanied by, at least, one other carved rock with a single motif which was identified during fieldwork. In Iveragh this pattern is repeated, with Derrynablaha 22 and Kealduff Upper 2, on opposite sides of the peninsula, two heavily decorated boulders that are part of dense clusters of rocks with few motifs. The pattern is repeated in Rombalds Moor where a great number of rocks are known, with some heavily carved but most being small boulders with few motifs. In Monte Faro, Monte dos Fortes I is an impressively carved rock on a higher position in the landscape, but Monte da Laje, Tapada do Ozão and rock 5 of Escaravelhão 6, whose 3D model revealed a great complexity of carvings all deserve detailed study in the future. In Barbanza, Rego do Corzo is the best example of a densely carved surface amongst other simpler ones.

The different geologies of the study areas (e.g. sandstone in Iveragh and Rombalds Moor, greywacke in the Machars, mostly granite in Iberia) could account for different carving techniques, but the diverse ways of producing motifs were identified in most of the regions. A generalized technique which involves pecking is represented in every study area. It could be argued that sandstone being softer than granite could explain the common rough pecking in Iveragh, whilst the use of a chisel would probably be more necessary in granite or greywacke in order to have more control over the grooves and shapes to carve. Also, a combination of pecking and abrasion was more frequently identified in Iberia, perhaps as a necessary treatment to break into the rock surface and produce the desired motif. It is interesting, however, to see that in Monte Faro and the Machars (and indeed other parts of Scotland) there is a tendency for the creation of "sunken motifs" which are not necessarily carved but in which grooves are made through depressions on the rock surface, as if pressure had been applied to it. These were probably achieved through grinding and polishing of the stone, also known in other Neolithic contexts such as the Ness of Brodgar (Thomas 2016:363), embodying an important metaphor for the period (Cooney 2002; Cummings 2002; Thomas

2016). At that important archaeological site, grinding mortars, quernstones and polissors, related to polishing and grinding practices, acquired great symbolic importance (Thomas 2016:363).

Regional variation is also found in the category of *Types of Depiction* which characterizes the visual aspect of Atlantic Art and its making. It is divided into Planar, Plastic and 3D assessing the appearance of the motifs in relation to the rock surface. Despite the carving techniques used in the production of motifs being (almost) the same in all regions, the perception of the rock surfaces was seemingly different. In Iveragh, imagery 'simply' deployed on rocks resulted in flat motifs with shallow sections. In other regions the making of the designs involved a high degree of interaction with the boulders and outcrops, with motifs embracing the stone and acquiring a three-dimensional character. Not only would the making of these panels involve a deeper bodily engagement with the natural features, but there is also a more intense interaction between these and the carved motifs, often including elements of the rock surface (e.g. basins, solution holes, crevices and fissures or even the panel edges). This is particularly visible in Monte Faro, where a number of decorated panels have rings surrounding natural convexities or take advantage of the rounded contours of the granite. Tapada do Ozão and rock 6 of Monte dos Fortes II are good examples of this relationship. Similar situations were observed in other regions, such as Rombalds Moor, and it is interesting to note that despite all the other resemblances between Monte Faro and Barbanza, only a small number of the latter's sites display this 3D character. Nevertheless, this is more exception than rule, since the majority of the rocks, despite interacting with the rock surface, were only classified as Plastic decorations, meaning that motifs are, in general, responsive to the micro-topography of the stone and incorporate a number of natural features (O'Connor 2006; O'Sullivan 1986, 1993), but do not create almost bas-relief compositions, characteristics of the 3D type (Alves and Reis, 2017b). The use of natural features in the making of art is also accounted for in the Ness of Brodgar (Thomas 2016), and the transformation of natural elements, at small or large scales, is seemingly quite important for the Neolithic way of life.

The analysis of the media selected to carve identified a few preferences which may be due to local natural conditions. Such is the case of Iveragh and Rombalds Moor where most of the rocks are carved on boulders. Investigation of the landscape in these places revealed that there are very few outcrops compared to lose boulders. This suggests that there the carvers were not overly preoccupied with the type of rocks to carve, since they did not specifically seek out outcrops, which are the normal media in the remaining areas.

Furthermore, the texture of the rocks did not seem to play an important role in their selection and in all study areas there is an equal division between carvings on smooth and rough surfaces. In the Machars, where the use and incorporation of natural features is well documented, a large number of carved rocks also have large numbers of fissures, solution holes and natural hollows, some of which were enveloped by circular motifs (e.g. Knock 5). The marks of glaciation are well attested in the region and many of the natural outcrops and boulders bear striation marks. None of the remaining study areas display such outstanding natural features on their rocks, instead being characterized by the presence of fissures and cracks. The majority of the carved media is composed of small rocks, particularly on Rombalds Moor and Iveragh.

The location of Atlantic Rock Art in the landscape shows local preferences which, similarly to the type of rock chosen to carve, could be determined by the local geomorphology. Both field observations and GIS analysis confirm this conclusion. The Machars Peninsula, for example, is an extremely flat unit and unsurprisingly the majority of carved rocks are located at low altitudes and in lowlands. Similarly, Rombalds Moor is a plateau, located on high altitudes, and therefore this geomorphological characteristic determines that all the rocks are placed in highlands and enjoy extensive views. Finally, more variation is observed in both Iveragh and Iberia. In Iveragh, this is due to the large study area which encompasses varied types of landscape and geomorphologies. Despite the great mountains shaping the local landscape, no carved rocks are located at high altitudes, in general preferring valley bottoms (or nearby) and hillsides. In Monte Faro and Barbanza there is a predilection for rocks located in slopes or platforms located on hillsides where occasional knolls emerge and on which the carvings are deployed. What the study of the landscape location of the rocks seems to imply, is a relationship with the coast and mainly the sea (except for Rombalds Moor, of course). But this suggestion may be given by the general location of the study areas, all of them by the coast, since, for example, Kilmartin is situated near the shoreline, but the landscape closes upon itself and once in the glen there is no perception of the proximity with the sea. More importantly, in all cases the rocks are located in areas where life could develop, suitable for the location of settlements, pastures and there is a common connection with watercourses and irrigated lands.

Visibilities are often valued when assessing Atlantic Art, but this issue was found to be overvalued and not necessarily relevant for location. No strict relationship was found with routeways, except in Rombalds Moor where they are clearly associated with the passage corridors that cross the plateau, that are in use today. In the Derrynablaha and Derreeny areas

of Iveragh, however, not far from the carvings, there is a prehistoric pathway covered by peat (O'Sullivan and Sheehan 1996).

Previous studies have attempted to demonstrate that rock art was effectively part of quotidian ritual rather than sacred or religious ritual (Fábregas-Valcarce and Rodríguez-Rellán 2012; O'Connor 2006; Shee Twohig 2012). Conversely, Atlantic Rock Art is spatially associated, in all study areas, with funerary monuments. For example, a number of burial mounds in Monte Faro (near Fonte Volide, Escaravelhão I, Santo Ovídio and São Tomé) (Alves and Reis 2017a), and around 130 such monuments in the whole of Barbanza Peninsula (Fábregas-Valcarce and Rodríguez-Rellán 2012a:37). Previously, it has been suggested that the two have different distributions with burials mounds occupying the crests of hills and rock art the hillsides (*Ibid.*47). As we will see later, this dichotomy is overcome at the end of the life of Atlantic Rock Art.

Considering iconography, techniques used to carve and location in the landscape, the tradition of Atlantic Rock Art was seemingly used in a similar fashion across all study areas. As a result, it can be inferred that there was a global understanding of it, beyond merely copying the motifs, which is evident in the way these were executed, placed and situated. Despite these assumptions it is difficult to define a social background for Atlantic Rock Art, due to the lack of associated contexts and even clear spatial relationships with other types of contemporary archaeological sites, namely in Barbanza and Monte Faro.

8.2. TRANSFORMATIONS

The Stoupe Brow Monument at Flyngdales Moor (North Yorkshire, England), categorised as an EBA burial cairn, although its origins date to the first half of the 3rd millennium BC (i.e. British Late Neolithic), is the perfect metaphor for the Neolithic period. It incorporates a number of decorated stones, two of which are quite complex, but despite the ones with cup-marks, none of them are related to the study object of this thesis. However, the biography of the monument itself embodies the transformative vision of the Neolithic period, revealing great complexity. Throughout the *c.* 600 years of its conception, use and abandonment, ten different stages of action were identified (Vyner 2011), the last two related to discovery and modern investigation. An initial phase refers to the existence of a standing stone, decorated with geometric patterns similar to those of Passage Grave Art and Grooved

Ware Pottery, both datable to the 3th millennium BC. In a second stage, the stone was broken and re-shaped, in order to produce Decorated Stone 1, with further implements being added. During the mid-3rd millennium BC or slightly later, two other standing stones were added to the assemblage, set up in pits. From this stage onwards, actions developed much faster through five more stages, which include 1) the making of Decorated Stone 2 displaying cup-marks and grooves framed by a deep groove bordering the stone; 2) the re-working of Decorated Stone 1 which is then retrieved from the monument, re-decorated and partially broken before being refitted in the monument; 3) the excavation of curvilinear gullies dependent on standing stone; 4) a number of flats slabs, including Decorated Stone 1 and 2 are located contiguously in the gullies, compacted with small blocks of stone; 5) a detached fragment of stone was placed at the foot of Decorated Stone 1 and 6) the interior of the stone ring was infilled with rubble, including a number of small carved blocks, creating a small cairn (Vyner 2011: 10).

Transformation seems to be the word that best describes the Neolithic, a succession of technical and social developments prompted by the introduction of new technologies and economies, which resulted in a change of perceptions. Perceptions relating to others, to the environment and to the ways in which relationships were built around these elements. Other authors have also drawn on the concept of transformation and evolving assemblages in order to make sense of Neolithic contexts (e.g. Hodder 1990, 2010; Fowler 2013; Garrow and Sturt 2017; McFadyen 2006; Jones and Sibbesson 2013; Pollard 2013; Thomas 2016).

In a period of social transition, Atlantic Rock Art fits well with the idea of transformation since it is, in itself, the artificial transformation of a hard natural surface. The idea of modifying something so hard and durable could represent a highly significant act of appropriation of a natural element, similar to the transformation of the landscape through the construction of monumental architectures. The gestures implied in carving would significantly impact the surface but the result of this intrusion could also be transformed if re-carved or added to throughout time. Atlantic Rock Art compositions often included fissures, crevices and other features of the carved surfaces, once again implying the transformation of natural elements, or their incorporation in the same symbolic narrative. Stonework was seemingly important during the Neolithic and the EBA, beyond the wide use of this resource for construction and tool manufacture. In Britain and Ireland this importance may be inferred through the presence of a few examples of stone artefacts, namely querns that have been transformed through the addition of cup-marks, and re-deposited in unusual funerary contexts. For example, such is the case with the broken quernstone found in the EBA cairn of Weetwood (Northumberland) (Mazel 2007:242-243) and the cup-marked saddle

quern found in Lingmoor Barrow with other nearby examples deposited in cremation pits (Mazel 2007:242-243; Brown and Chappell 2005: 120; Thomas 2016:333). The re-use of these artefacts and their deposition in ritual and funerary contexts suggest their ongoing importance.

As their meanings changed over time we see some carved outcrops being quarried and incorporated into other monuments (Cummings 2008:154). These were perhaps the most visible and important acts of transformation documented in the Neolithic; the appropriation and transformation of some monuments into others. Could this relate to a generalized respect of the ancestors and a will to be part of the same assemblage, or would these be acts of defiance and intend to demonstrate sovereignty over the past? The fact is that the archaeological record accounts for the transformation of standing stones into passage tombs (e.g. Bueno-Ramírez *et al.* 2010; Sanches 2008/2009) and other forms of megalithic monuments (e.g. Vyner 2011), but also passage tombs into henges (Shee Twohig 2001) and timber circles into stone circles. Atlantic Art is brought into this cycle of transformation through the inclusion of its rocks and boulders, into monuments and standing stones. This is a cycle that probably reaches its end around the 2nd millennium BC, with the introduction of yet another type of social and economic organization that breaks significantly with previous traditions.

8.3. INTO HIDING

If transformation is seemingly implicit in the Neolithic world, the theme of hiding is recurrently emerging. Typically, the idea of hidden elements is particularly applied to funerary monuments in which large structures of stone are often covered by earth mounds or stone cairns. The decorations of these monuments can also be hidden. On one hand, they are enclosed within heavy stone structures that envelop towards each other creating a chamber of difficult access once closed. On the other hand, the motif within the monuments can be located in areas where they are even less noticeable (Robin 2008). For example, it has been suggested that typical Atlantic Art motifs have been deliberately positioned in 'invisible' locations within large monuments, such as Newgrange, and Knowth in Ireland, contrasting with the exuberance of Passage Grave Art (e.g. Bradley 1997; O'Kelly 1973; O'Sullivan 1986; Robin 2008; Shee Twohig 1981, 2010). Some elements of the latter are also 'hidden' within the structure of the monument (Robin 2008). The practice of hidden carvings is also known

amongst the Breton monuments, although unlike in the British Isles, authors do not associate it with acts of re-use (Cassen 2000). The act of hiding decorated elements is also accounted for in domestic Neolithic contexts at Skara Brae and the Ness of Brodgar. In these sites carved stones were deliberately placed in particular spaces of the structures, and these have been interpreted as part of the specific moments of the structure's biographies, including their death. Such is the case of the cup-and-ring found in Structure 10, although this motif is exceptional within the wider assemblage (Thomas 2016).

Following a similar logic, it seems clear that Atlantic Art is also part of this concept of concealment. Despite being located in the wider landscape, the majority of outcrops and boulders are of small to medium sizes which does not make them prominent. A great number of them are flat and close to the ground meaning that they are often only visible once the observer is almost on top of them. Furthermore, in landscapes such as that of Ireland and to a certain extent Monte Faro, with huge numbers of rocks dotting the landscape, the carvings become automatically invisible as well. The difficulty in finding the engravings during fieldwork attests to this. Additionally, the motifs themselves are quite hidden on the rocky surfaces, mostly due to weathering processes. Glasserton Mains, in the Machars and Derrynablaha 22 in Iveragh, are good examples of how large outcrops can actually be quite hidden in the landscape. The former is a large outcrop in size but only when very close do we have full perception of its presence. As for the latter, located in a high area of the slope (one of the highest in Iveragh) it is practically invisible from the valley and lower altitudes of the hillside, being more visible from the top. What we do know is that once carved, the motifs fade quite quickly and within two years already look rather old (Lamdin-Whymark 2011). One could think that in landscapes devoid of outcrops and boulders finding the rock art would be easier. Once again this is not the case. In these kinds of landscapes the carvings were limited to the available surfaces, often of very small size and completely flat to the ground. With the added 'invisibility' of the weathered motifs, the engravings continue to be difficult to locate. The recent find of Atlantic Art in shelters has also been considered as an element of 'hiding' (Fábregas-Valcarce and Rodríguez-Rellán 2012). Furthermore, vegetation would have played an important role in the visibility towards the carved rocks. On one hand, it is now known that areas such as NW Iberia were, by the 5th millennium BC, covered by a stable oak and pine tree vegetation (López-Sáez 2013; Morales-Molino *et. al.* 2012; Santos *et. al.* 2000; Vyner 2011), whilst parts of the British Isles were covered by woodland during the first half of the 3rd millennium BC until the 2nd millennium BC, at which point the vegetation is gradually cleared and transformed into heathland (Vyner 2011). Of course, this is subject to local variabilities and more studies are required to fully understand the prehistoric environment. However, trees surrounding a carved rock would make its identification difficult or even the area

impenetrable. Alternatively, if heathland or other kinds of bushy vegetation prevailed, then the rocks would again be well hidden until they were reached. There is also a sense of seasonality to the vegetation that comes and goes throughout the year. Perhaps this would play an important role in the visualization of the carvings, including larger boulders that often get caught on this type of vegetation. For these reasons O'Connor suggests that these kinds of rocks standing on their own in the landscape would perhaps be located in clearings, making them more visible (2006). In this context, we may conclude that the great majority of rocks in Rombalds Moor are effectively completely disguised and hidden in the landscape (with the exception of more prominent boulders such as Badger stone, Hanging Stones or Pancake Stone).

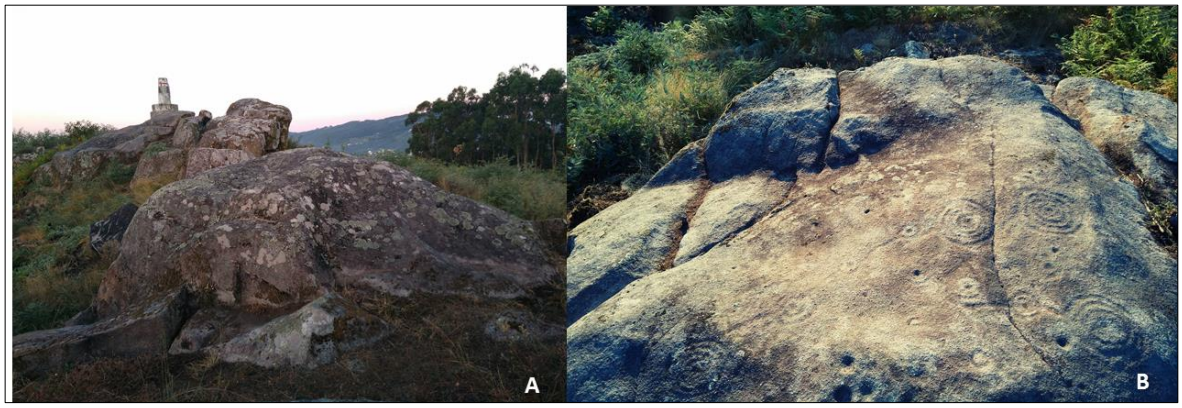


Figure 115 Carved rock at Castro de Sabroso (Guimarães, Portugal). A) Viewed during the day and the motifs are hardly identifiable; B) Viewed with the first light of the morning, and the motifs, although very weathered, are quite visible (Photographs by Gonçalo Cruz).

The invisibility towards the rocks can also be related to atmospheric conditions and our senses. During fieldwork, particularly in Ireland, the effect of the weather on the perception of the carved rocks became very apparent. Fieldwork was conducted in typical Atlantic weather for most of the days, with rain, wind and most importantly the mist, often negatively affecting visibility. This evidence and the experience of fieldwork has led to the conclusion that visibility studies and the idea that views were an important feature to rock art is probably overestimated. With the right sunlight, however, it is known that the carvings become quite vivid (Figure 117) due to a game of shadows played between the grooves and the light. Perhaps some carvings were located in specific places in order for the sun to highlight its motifs at specific moments. Similar situations have been observed elsewhere

(e.g. Penedo dos Sinais, Figure 118, see also Valdez and Oliveira 2005/2006) and flat outcrops are particularly prone to good visualizations of their motifs with the low light of sunrise and sunset. The preference for flat, horizontal surfaces may reflect this requirement.

Figure 116 Penedo dos Sinais on the slopes of Citânia de Briteiros (Guimarães, Portugal). (Photograph by CNART).

Finally, most of the study areas are located on the coast and as a result there is a relationship between the rock art sites and the sound of water. Once again this was most striking in Ireland, where the constant flow of the watercourses would mute our voices. In these conditions, even the noise of hammering could be hidden.

Figure 117 Top surface of Haystacks Rock (Ilkley Moor) under a sun setting light.

8.4. THE *BECOMING* OF ATLANTIC ROCK ART

Rock art or, in this case, the carvings resulting from the application of a set of techniques onto a rock surface, can be seen, in Ingolds's words, as a *thing,* implying that we are dealing with something alive and continuously evolving (Ingold 2008). A *thing* is an entangling element which brings together the many threads of life in a specific environment (Ingold 2008; J. Valdez-Tullett 2016). Despite the fossilized character of rock art, the fact that the motifs were applied on hard rocks and made with stone tools may be significant, as the raw-material was meaningful and a constant in people's lives (Cooney 2008). The practitioners were aware of the durability of rocks and the motifs once depicted, but also took advantage of the malleable character of the stones (O'Connor and Cooney 2010: xxii) and potentially their fluidity and mutability (Ingold 2013). Rock is in constant change, although at different rhythms. The transformation is not only physical but also social and cultural. Whilst created according to a specific context, the motifs endure on the hard rock and are inevitably incorporated within the cosmogonies of generations to come (A. Valdez-Tullett 2016; J. Valdez-Tullett 2016:73). We do not have complete access to Atlantic Art's life cycle, only to its last moment. It is likely that in some cases panels were carved in a single instant, but others may have experienced several phases of engraving associated with different social events. Rhythm is an appropriate characterization for Atlantic Art, which as an assemblage embodies 'the interaction between a place, a time and an expenditure of energy' (Lefebvre 2004:xv). But also, 'there is no rhythm without repetition in time and in space' (*Ibid*.6) and repetition does not necessarily refer to a faithful copy (Deleuze 2004; LeFebvre 2004). Therefore the recreation of Atlantic Art on the rock face may have known differences in terms of its social and cultural practice over time. Different spheres of rhythm can be related to Atlantic rock art, beginning with the *chaîne operatoire* (Conneller 2011) and the selection of the rocks to carve. Then we move to the rhythms of carving which relate both to individual motifs but also the creation of the whole composition. Each of the carving techniques would imply different rhythms when and how used. For example, incision is relatively rare in Atlantic Art but its application would probably require less effort and precision than pecking. The gestures involved in pecking would be different and involve a different bodily engagement to those related to abrasion, polishing or pecking. Each of these actions imply different tempos. Furthermore, when considering the chronological span of Atlantic Art from the Neolithic until the BA, it is easy to see that it knew different rhythms of use. Over this period, it is possible that the perception of the carvings changed and ultimately, the archaeological record seems to suggest that by the end of the BA a completely different view

of them is held. Many motifs are incorporated in other types of monuments, such as those associated with funerary practices. As for the rocks remaining on the wider landscape, there were certainly rhythms of forgetfulness which ultimately led to recent acts of finding the carved rocks. Processes of natural weathering play a role in forgetting, as carvings grow less visible. Future generations lose an understanding of the symbols and the knowledge to relate to them with. Failure to recognize the shapes can add to the difficulty in perceiving the engravings. A good example of such a situation occurred in the Portuguese valley of Sabor where a carved rock – Fraga Escrevida – was known for its cruciform motifs, both of prehistoric and medieval/modern chronologies. Recently, a carving of a Palaeolithic aurochs was identified in the background of the crosses, although it is likely that the most recent cross carvings were only depicted because of the similar prehistoric shapes, whilst their authors were probably unaware of the large animal in the background. The medieval/modern carvers were indeed able to relate to the images of the prehistoric crosses, through their own belief system which attached a Christian significance to the rock and hence led to the addition of further crosses onto its surface (A. Valdez-Tullett 2016:134). However, they did not relate to the aurochs and since the groove is rather faint, probably failed to identify it. Other carved rocks were never forgotten and kept alive in the local people's cosmogonies, however this connection was mediated through the introduction of new narratives. For example, in Iberia they became associated with legends of the Moors, who commonly represent ancestry and the ancestors (Alves 2001; Valdez-Tullett *in press*), and in the British Isles with the fairies or giants. Local contexts are pivotal in this process, since each site would be involved in the creation of local relationships between people and place, experiencing their own rhythms of making, use and abandonment (if ever abandoned). Thus, rock art is a dynamic process in motion implying a moment of creation, visualization and use, a movement of the cosmogonies involved (from person to person and across generations) and the compositions on the rocks which may suffer additions by their initial creators, and later by others (Pollard 2013). The re-working and appropriation of carved rocks indicate that their meaning was not static and that they were open platforms for the addition of more motifs (Thomas 2016:326) which, in a way, makes them 'public' as any passers-by can add to the stones (Sköglund 2016). From the moment of creation, rock art was deeply embedded in people's lives as a *thing*, integrated within political and biographical spheres, as part of everyday life dynamics or special occasions of ritual character (J. Valdez-Tullett 2016:73).

Ultimately, rock art is strongly associated with memory and the ancestors (e.g. Barrett 1994; Bueno-Ramírez *et al.* 2010; Hamilakis and Labanyi 2008; Parker Pearson and Ramilisonina 1998; Shee Twohig, 2001; Thomas 1996; Thomas 2016) because of the durability of stone and its intrinsic embodiment of a relationship between gesture, repetition and the

senses, acting as a fundamental element in cultural transmission, the creation of collective memories and social identities (Connerton 1989; Hamilakis 2010; Jones 2007; Nora 1989). Bloch's study of the decorated wooden doorways of the Malagasy (Madagascar) demonstrates the importance of process and rhythm in decorations, which could be applied to other forms of art such as stoneworking. In this case, wood was a symbol of relationship and family, as the doorways were consecutively carved, representing the maturing union of a couple, alongside with the house in which they lived. The carved doorways, with its added motifs and superimpositions were the embodiment of the family's biography, although the motifs themselves did not have any specific meaning (Bloch 2005). The act of carving represented in itself the duration of the relationship, since 'the house is the marriage' (Bloch 1995:215). Examples such as this, enable us to think about Neolithic art beyond its formal features (Cochrane 2009) and open new avenues of investigation towards a social role.

Drawing a picture of the Neolithic in Western Europe, and specifically across the Atlantic façade is a hard task, mostly due to the uneven amount of data and the contrast between available scales of analysis. In the British Isles it is easier to understand the context in which Atlantic Rock Art emerged. Typically, the Neolithic is perceived as having arrived to the British Isles in the transition from the 5th to the 4th millennium, a full Neolithic assemblage recognized in southern England around 4050 BC but with considerable differences from that of the continent (Garrow and Sturt 2011; Anderson-Whymark and Garrow 2015; Garrow and Sturt 2017). Several elements currently recognized as Neolithic features in Britain are likely to have come from parts of central and southeast Europe (Whittle 1996), as well as the eastern Mediterranean and Near East (Pollard 2008:7). The Neolithic presents differences of inception and development between Britain and Ireland (Cooney 2000; Sheridan 2004; Thomas 2008). It is a nuanced period, with great contrasts, founded on a shift from hunter-fisher-gatherer subsistence, to an economy more reliant on domesticated livestock and cereal cultivation, which was accompanied by technological novelties and new social relations, personhood and ideologies (Pollard 2008:7; Thomas 2008). In the second quarter of the 4th millennium BC, the Neolithic populations were consistently building monuments of stone, wood and earth, where people would celebrate the living and the dead, exchange material culture and mark special places and events (Cummings 2008). Stone was indeed an important element in people's lives during the Neolithic and many well-known monuments had their stones procured in quite distant places. It has been suggested that this reflects the importance of the place where the stones were sourced (Edmonds 2004), but many reasons from colour to texture, sound or a combination of other factors could be

involved in the selection of rocks (Tilley 2004; Thomas 2016). Stone-built architecture was made to endure (Bradley 1993) and so was Atlantic art, carved onto outcrops and boulders, maintained in their original places. Henges, stone and wood circles, large mounds but also large ceremonial centres were changing the landscape considerably (Barrett 1994; Pollard 2008:7). The monuments were deeply connected to the landscape, and this is the logic in which Atlantic Rock Art emerged. It became a privileged *loci* for the establishment of social relationships and the development of contacts, exchange, and identities. The same energy, however, was not applied to the construction of dwellings, which we mostly identify through pits, post and stake holes and surface scatters of material, suggesting that people were living in relatively light and provisional houses, perhaps because they were not completely settled (Pollard 2006:41, 2008:7). Nevertheless, recent evidences suggest that Neolithic populations in some regions enjoyed a high degree of sedentism (O'Connor 2006:15).

In NW Iberia the Early Neolithic period begins around the end of the 6th millennium, extending until the end of the 4th millennium BC (Bettencourt 2013; Lopes and Bettencourt 2017), at which point the British Neolithic begins. The Neolithic period in Iberia is still rather poorly understood. This is partly because of modern demographic pressures, and partly due to a lack of investigation in this field (Bettencourt 2013). There also appears to be a hiatus in the archaeological record perhaps due to an inability to identify Neolithic contexts or because the perishable remains of these occupations do not survive in the archaeological record. The Neolithic sequence here follows that known in Brittany, and is characterized by a complex process of monument construction and transformation beginning in the mid-5th millennium BC (Cochrane and Jones 2012; Scarre 2011). The best preserved and most widely studied features of the Neolithic in NW Iberia are the megalithic monuments, clearly dated to the 5th millennium BC, extending well into the end of the 4th/beginning of the 3rd millennia BC (Bueno-Ramírez *et al.* 2010; Cochrane and Jones 2012; Sanches 2008/2009). A few shelters and open settlements are known, usually associated with well irrigated and humid areas. These dwellings are mostly built with perishable materials and the archaeological record only preserved post-holes, pits, hearths, pottery and lithic artefacts, suggesting temporary occupation and an economy still largely based on fishing, hunting and gathering activities, despite evidence for domestication and proto-agriculture (Bettencourt 2013; Jorge 1999; Rodrigues 2000; Sanches 1997). This pattern continues throughout the 5th and 4th millennia BC, although at this stage we see the erection of standing stones, marking the beginning of monumental landscapes and significant places dedicated to communal activities (Bettencourt 2013:14). This is also the period in which large clusters of megalithic funerary monuments with mounds are built, forming great *necropolis* (*Ibid*:15). During the 4th millennium BC these monuments see their orthostats decorated with paintings, carvings or

a combination of both (Bettencourt 2013; Bueno *et al.* 2010; Sanches 2008/2009). Unlike Loughcrew, Co. Meath (Ireland) there are seldom examples with decorations mirroring the motifs of open-air Atlantic Art, even in the surrounding areas of the rocks. However, some examples, such as Orca dos Juncais (Viseu), have depictions of animals, which may have parallels with Iberian Rock Art (Sanches 2008/2009; Shee Twohig 1981). These require further and detailed investigations. It has been argued that societies were capable of maintaining more than one style of decoration, each dedicated to different contexts (Layton 1991; Alves 2008). Notably, in this geographic area, Atlantic Art shared the space with Schematic Art, which is known as carvings in open-air contexts and paintings, mainly in shelters. Due to formal similarities with motifs depicted in monuments, it has been suggested that this too is a Neolithic tradition (Bradley and Fábregas-Valcarce 1999; Bueno-Ramírez and Balbin-Behrmann 2000; Sanches 2008/2009). In some occasions, Atlantic and Schematic Art occur in great geographical proximity (e.g. Monte de Góios), although little or no interaction is known between them and each of the assemblages have very specific and different landscape settings (Valdez 2010a, 2010b).

By the end of the 4th and mid-3rd millennium BC there is a shift in settlement patterns, which grow more permanent, occupying a variety of places in the landscape such as plateaus, hills, and valley bottoms, embodying important social and cultural changes and demarcating the new societies from previous periods (Bettencourt 2013; Lopes and Bettencourt 2017). These changes are accompanied by the introduction of new types of material culture, namely copper objects, new ceramic forms and decorations such as Beakers, idols and funerary practices. The large monuments are not built anymore, instead there are smaller cists, that can be re-used, and the manipulation of human remains is often evident (*Ibid.*). In this context, the perception of Atlantic Art changed, although the presence of specific types of metal weapons on the rocky surfaces indicated that the practice of carving open-air outcrops was ongoing. It has been suggested that the Late Neolithic/early Chalcolithic was the most intense period of use of Atlantic Art (Bradley 2000).

In the British Isles similar transformations take place in a slightly later period, c. 2500 BC, where we see typical Neolithic features, such as henges and Grooved Ware pottery then the introduction of metal, Beakers and single burials (Needham 2012). The new interest in copper contributed to the intensification of certain exchange networks, and several authors related the diffusion of Atlantic Art with metal prospectors at this stage (e.g. MacWhite 1951; van Hoek 1995). Although there is little archaeological evidence to support strict relationships, it is interesting to note that, for example, Kilmartin Glen (Scotland), well-

known for its rock art and monumentalized landscape, seems to have been and important gateway to the introduction of copper exploited between 2400 – 1900 BC in Britain, coming from Ireland (Jones *et al.* 2011; O'Brien 2004), also an area with numerous examples of carvings. As with Iberia, the social changes during this period are quite deep, reflected in the relationship between people and the landscape. Whilst there seems to be an "appropriation" of the Neolithic monuments by Chalcolithic communities, a tradition of building large ceremonial complexes continued (O'Brien 2004:18), unlike the abandonment verified in NW Iberia. People are mostly buried on their own, although there is some variation as to whether the graves are located away from the living or near where people lived, and the funerary furnishings that accompany bodies (Fowler 2013:231-231). In the British Isles this period is quite short, reason why it is not always recognized, as opposed to Iberia where it lasts for over a millennium. Nevertheless, in both regions the transition into the EBA is fixed c. 2200 BA. This is a period marked by wide networks of exchange through which metal and other objects were circulating and it has been argued that an interest for the west was increasing due to the need for tin (Kristiansen and Larsson 2005). The Beaker Complex marks the intensification of single burials, which has been associated with the emergence of elites, now also buried in round barrows and cists. In some instances, the bodies were cremated before the final deposition (Fowler 2013:234). There is seemingly no longer a need for the construction of large monuments and the ones being built now are less elaborate and smaller (Brück 2008). Despite the new economic complexities, settlements are still rather ephemeral indicating that societies were not completely settled and to a certain degree were still moving around (Barrett 1994). However, contrasting with the funerary, domestic spheres are slowly becoming more visible, particularly during the 2nd millennium BC (Brück 2008). Regional variations emerge through the construction of monuments, types of pottery and other types of material culture (Darvill 1987).

In NW Iberia the settlement pattern during the EBA varies with dwellings located in hillsides with good conditions for agriculture, but also in estuarine and coastal areas (Bettencourt 2013). Sedentism is implicit in environmental samples indicating agro-pastoral practices, complemented by the collection of molluscs, salt extraction and careful management of the woodland and forestry (Bettencourt 1999, 2013; Figueiral 2000). Settlements are still mostly post built constructions utilising perishable materials. From 2200 BC there is a discontinuity with previous funerary practices and burials are now less visible in the landscape, with small *tumuli* over cists without chambers (Bettencourt 2013:24). Alongside the new constructions, there is occasional re-use of previous structures, an action that has been linked to the emergence of elites and the burial of important people, often with material offerings such as daggers, gold spirals or diadems, due to the effort implied in the

opening and altering of these structures (*Ibid*.25). Similar to the British Isles, there is an increase in the circulation and manipulation of metal, with the reinforcement of exchange networks that facilitated the movement of materials, people and ideas *(Ibid.*). According to Barrett, the BA is characterized by a 'place bound sense of *being*' (1994: 147, author's emphasis), developed mainly through the 2nd millennium, which contrasts with 4th and 3rd millennium BC societies' imbued in a process of *becoming.* The growing importance of metalwork seems to have played a role in these transformations, and the carving of metal weapons is practiced in open-air outcrops, namely in NW Iberia, occasionally accompanied by the deposition of their material counterparts in natural crevices of the outcrops (Alves and Comendador-Rey 2009). Representations of numerous bronze flat axeheads have also been carved on two of the stones of Stonehenge (Abbott and Anderson-Whymark 2012; Simpson and Thawley 1972), on kerbstones of cists in Kilmartin (Bradley 1993; Jones and Riggott 2011) and possibly in stones of Carn More cist, Co. Louth (O'Connor 2006, vol. 2). The growing importance of metal may have doomed the significance of stone, so important for previous Neolithic societies. The new worldview certainly affected the perception of rock art which in many cases is re-interpreted and incorporated in other types of monuments (Bueno *et al.* 2010; Bradley 1997; Cochrane and Jones 2012; Shee Twohig 1972, 2001; Waddington *et al.* 2007). Such is the example of Cairnholy 1 in Dumfries and Galloway, where a remarkable cup-and-ring carved on a portable block was found *in situ* in the main chamber on top of a pile of packing stones (Figure 120). A primary burial was identified in this monument associated with 'western Neolithic pottery', a jadeite axe and a leaf-shaped arrowhead. The carved block, however, was seemingly associated with a secondary cist containing food vessel sherds (Piggott and Powell 1949). It is not clear if the carved block could have been initially included in the initial burial and later transposed into the cist. However, the well adapted character of the multiple ring motif to the block suggests that it was purposefully carved on that stone, instead of having been quarried from a nearby outcrop.

This suggests a shift of perception in the use of Atlantic Art motifs, which are no longer associated with the tradition of open-air sculpting. The inclusion of the imagery in dark, enclosed, funerary contexts contrasts sharply with the free environment they previously enjoyed in the wider landscape. Of course, the cup-and-ring iconography could have been used in different contexts for different purposes simultaneously, perhaps through the articulation of various motifs in different combinations. We have seen before that societies can hold more than one artistic style simultaneously (Alves 2008; Layton 1991). In fact, O'Connor (2006) treated Atlantic Art as a combination of traditions based on the use of the

same motifs, but applied to different contexts, which would be interrelated in complex systems. In this sense, we see the cup-and-ring imagery being used in open-air outcrops and boulders, standing stones, stone alignments, wedge tombs and stone circles, which experience re-use from one to other. Similarly, portable rocks with cup-marks and cup-and-ring motifs were also found within monuments in Loughcrew (Co. Meath) (Shee 2001), Crumlin cist (Co. Louth) (O'Connor 2006), Teeromoyle cist (Co. Kerry) in Ireland, Weetwood Bank and Fowberry Cairn (Northumberland) in England (Beckensall 1974) or Balnuaran of Clava (Inverness) (Bradley 1997) and the Eday Manse and Pickaquoy stones (Orkney) in Scotland (Shee Twohig 1981).

Figure 118 Carved rock in secondary burial at Cairnholy 1 (Dumfries and Galloway, Scotland. Photograph: Historic Environment Scotland at http://canmore.org.uk/collection/1331055).

An interesting relationship also exists between open-air rock art and standing stones. It has been previously hypothesised that some carved megaliths could have been quarried from formerly decorated outcrops (Jones and Riggott 2011:252-253). As with open-air rock art, the dating of decorations on standing stones, and the moment of making and erection of the stones themselves, is also chronologically problematic. In Brittany, decorated standing stones may occasionally pre-date other monumental constructions and are erected, used and

subsequently broken and re-used from the mid-5th millennium BC (Cochrane and Jones 2012; Scarre 2011). The production of rock art in the landscape and the construction of standing stones may have, at some point, been contemporaneous with each other in all regions, and in some areas there is a striking spatial correlation between the two types. Unfortunately, not many of these survived in NW Iberia, apart from a few undecorated examples, typically dated to the 5th millennium BC, often associated with megalithic *necropolis* (Bettencourt 2013:58) and examples in the south of Portugal which can display simple geometrical carvings (e.g. Calado 2002). Some of these standing stones were re-used and transformed into other monuments (Bueno-Ramírez and Balbin-Behrmann 2000; Bueno-Ramírez *et al.* 2010; Sanches 2008/2009) and it is expected that many may have succumbed to the pressures of modern demographics. However, in Barbanza there is the example of the Menhir de Cristal, a standing stone with cup-marks and depressions which were probably done by the grinding of the stone (Fábregas-Valcarce and Rodríguez-Rellán 2012: 37). In the British Isles, where some prehistoric landscapes are better preserved, a great number of standing stones dot the landscape, and their spatial correlation with rock art panels cannot be overlooked. They are usually dated to the Late Neolithic/EBA period (Vyner 2011). In addition to a spatial proximity some standing stones were also decorated. Whilst most of these display only undiagnostic cup-marks, others bear impressive combinations of cup-and-ring motifs and other associated images. Such is the case of the Atlashane and the Ardmore standing stones in Inishowen Peninsula, or even the other Ardmore stone, part of a stone alignment, in the Dingle Peninsula (Ireland). The last two were extensively discussed by O'Connor who uses them, alongside other data, to propose a Middle Neolithic chronology for the origin of Atlantic Rock Art (2006). In England, Long Meg and her daughters are a well-known stone circle, with some of its monoliths being decorated with quintessential Atlantic motifs, alongside spirals and concentric arcs, more common to Passage Grave Art. Furthermore, examples of carved standing stones are also known in Scotland, such as Ballymeanoch in Nether Largie, Kilmartin, as part of a monumentalized landscape which includes many exuberantly carved rocks.

Figure 119 Nether Largie standing stone (Kilmartin, Mid-Argyll). This stone is located in a central position in relation to other standing stones and displays a group of cup-marks with a few cup and one ring motifs on its surface. On the back of the stone a few cup-marks were also carved, as well as in one of the other stones.

In Ireland there is a close spatial relationship between carved rocks and standing stones, but the number of these monuments in the peninsula is remarkable and therefore there is the risk of creating unsubstantiated associations between the two. The Machars and Rombalds Moor have fewer standing stones but nevertheless, the pattern is repeated. In the Machars, the standing stones of Drumtroddan, Claunch and the Torsehousekie standing stones and stone circle are examples of spatial relationships with decorated panels; Rombald's Moor has, for example, the 'Twelve Apostles' stone circle. Of course, these associations may not be more than spatial correlations, and in some instances standings stones have been dated to much later periods, including the Middle to Late BA (Jones and Riggott 2011:253). This is replicated in other regions outside of the study areas such as Kilmartin, Scotland and Inishowen Peninsula, Ireland.

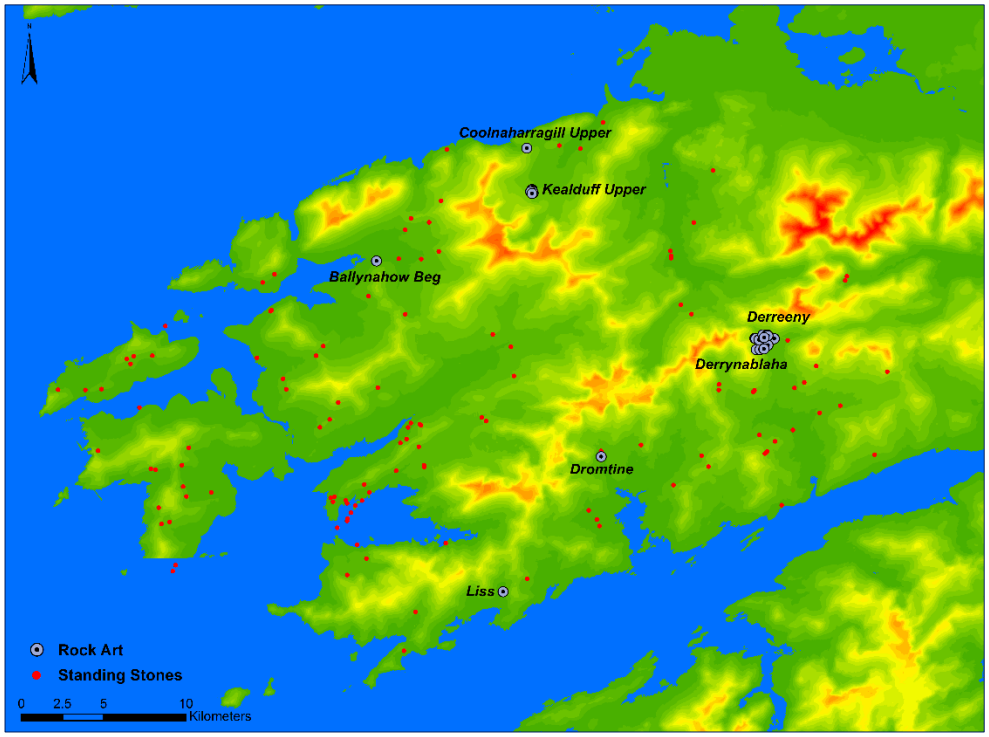


Figure 120 Representation of the spatial relationship between the carved rocks used in the study and the known standing stones in Iveragh Peninsula. (Data for the standing stones from National Monuments Service of Ireland: https://www.archaeology.ie).

Figure 121 Drumtroddan stone circles, less than one kilometre away to the SE from the assemblage of carved rocks with the same name, and to the NW of Big Balcraig group of carvings.

Nevertheless, at some point open-air carved rocks and standing stones crossed paths, and were considered relevant for communities who decided to quarry the symbols of the ancestors (O'Connor 2006) and make them more visible by erecting them in the landscape or, if effectively dated to such late periods as suggested by Jones and Riggott, they demonstrate the re-enactment of old traditions (2011: 253).

There are a few examples of what could be considered imagery related to Atlantic Art within domestic contexts. Such is the case of the cup-and-ring motif stone ball found in a Neolithic domestic setting in North Uist (Scotland) (Armit 1988, 1989) and the cup-and-ring slab discovered during the excavations of Structure 10 at the Ness of Brodgar (Thomas 2016). The latter represents an exception in the main iconographic assemblage of the settlement, and was found with its carved face down within the rubble filling of a structure at the moment of its decommission. It was interpreted as an integral part of a votive act performed at the building's closure. It was seemingly carved just before its incorporation within the filling of the structure (*Ibid*.). Although many cup-marks are found in the Ness of Brodgar (*Ibid.*), the carving of this cup-and-ring has large grooves and appears crude rather than a classic motif.

Ultimately, Atlantic Art seems to blend with a Neolithic worldview, in which the main elements are organically related to each other. In this network of relationships, the re-use of monuments and parts of the structures, and open-air carvings, seems to be open and receptive. As with everything else in the Neolithic, Atlantic Art is deeply connected to the landscape. The permanence of this relationship is materialized through the durability of the rock medium and it has also been suggested that the motifs depicted on the rocks often refer to conspicuous elements of the landscape, namely prominent hills or surrounding mountains (Alves 2012b). Behaviours such as this have been interpreted as processes of 'mimicry and visual reference' linking natural features and representations of a wider world, through the construction of monuments (Bradley 2000; Cummings and Whittle 2004; Pollard 2013; Richards 1996).

Transformation is a constant element of the Neolithic and Atlantic Art, whether reflected through the engraving of a rock, transforming its natural features, the shape of the landforms, or the transformation of pre-existing monuments into others. Change is a constant in the multi-layered life of the Neolithic, persisting until the BA with the introduction of many technological and economic novelties that are consequently reflected through the sophistication of social organizations and relationships. Furthermore, in a world of growing inter-continental connections and intensification of exchange networks, it is not surprising that Atlantic Art takes multiple forms, and regional variations, despite being overwhelmingly used in the wider landscape and based on an underlying concept, here

explained as the Atlantic package. The tradition, however, has its origin and use in the Neolithic, relishing from the period's flow of 'substances, cosmic power, people, histories, etc. into moments of creation and form' and therefore we should interpret Atlantic Art as a 'constant state of coming into being, in effect as being in motion, as being alive' (Pollard 213:185). This lively period only ends when, and using Antonia Thomas' (2016) metaphor for the structures of the Ness of Brodgar, the carving tradition is 'killed' through the incorporation of its parts in different contexts, such as the BA cists, evidence of a shift of symbolic perceptions. The decommissioning of Atlantic Art from its initial role is well illustrated by Witton Gilbert cist (Northumberland), a monument whose capstone is profoundly decorated with cup-and-ring motifs carved alongside evident marks of breakage; but also Fowberry cairn (Northumberland), where several small stone blocks carved with cup-and-ring motifs were found, as well as a possible cist quarry where a cup-and-ring motif was engraved after the extraction of stone (Bradley 1997, plate 28). Barbrook II (Derbyshire), a BA ring cairn, is another example, in which besides the decorated capstone with cup-and-ring motifs, several pieces of broken engraved stones with cup-marks and grooves were recovered and refitted (Hewitt 1991; O'Connor 2006), suggesting their intentional symbolic discharge.

8.5. ATLANTIC ROCK ART CONNECTED

'It is because of such long-distance links that we are entitled to consider "Atlantic" rock art as a unitary phenomenon"

Bradley (1997:67-68)

The Early Neolithic period represents an important social and cultural shift when compared to previous periods. The introduction of technological novelties, such as pottery, polished stone tools, and the beginning of domestication and agricultural practices, led to the development of new social and cultural systems, social organizations and inter-social relationships. The new dynamics are reflected in the renewed perceptions of the environment and the landscape, which ultimately leads to more visual appropriations of the surroundings through, for example, the construction of monuments.

Although this trend is widely accepted as a global phenomenon, the Neolithic period did not have uniform moments of introduction and development. For the geographical areas concerned in this study, it is worth recapping that whilst the Neolithic 'package' is recognized

in Iberia from at least the 6th millennium cal BC (Bernabeu-Auban and Pardo-Gordo 2017; Martins *et al.* 2015), reaching its NW 1000 years later, and identified in NW France (Brittany) around 5200 BC, it only arrives to the British Isles in 4050 cal BC (Garrow and Sturt 2017; Whittle *et al.* 2011). This discrepancy has important cultural implications, considering that Britain would be receiving its first strand of Neolithisation at the time that Brittany's Early Neolithic, in which the decorated menhirs, long mounds and stone rows are included, was coming to an end (Scarre 2015:92). The transition from a Mesolithic worldview into a Neolithic is still poorly understood in general, but some recent studies shed light on this process. In most cases, explanations involve maritime expeditions and networks of connectivity which promoted the exchange of ideas, materials and techniques (Anderson-Whymark and Garrow 2015; Bernabeu-Auban and Pardo-Gordo 2017; Garrow and Sturt 2011; Garrow and Sturt 2017; Martins *et al.* 2015; Pétrequin *et al.* 2013; Sheridan 2003, 2004, 2007; Zilhão 1993, 2000, 2014). This tendency endured in time and intensified in the following periods.

Of the Sea and Boats

We know today that Prehistory was not a static period. Materials of various types (e.g. pottery, alpine jade axes, jet) are evidence of circulation (Murrieta 2012), but more importantly new techniques applied by archaeological science have been able to demonstrate effectively that people were moving around (Garrow and Sturt 2015; Sturt 2015). Such is the case of genetic research and isotopic analysis providing evidence for long journeys taking place during Prehistory, of which the Amesbury Archer is a good example (Fitzpatrick 2011). Although we cannot put a number to the people travelling, it is clear that the distances covered could be quite significant (Sheridan 2004:9). An all-encompassing study on the 3rd millennium BCE Bell-Beaker Complex demonstrated that the success of its widespread distribution related not only to cultural transmission but also migration, namely into geographic areas such as Britain (Olalde *et al.* 2017). The Bell-Beaker Complex, overwhelmingly present in western and central Europe, illustrates the ability for the spread of ideas and innovation in Prehistory. If in some cases genetic studies showed that these changes were introduced via the arrival of settlers, in other areas, such as Iberia, cultural transmission played a more prominent role (*Ibid.*). Unfortunately, this degree of detail is not known for previous periods and although material evidence testifies to interaction, it is not clear whether cultural and social changes resulted from movements of people or ideas (Anderson-Whymark and Garrow 2015:59). Furthermore, the directionality of prehistoric contacts remains unclear (*Ibid.*), despite attempts to organize the main strands of movement contemplating the adoption of technologies, skills and behaviours (Sheridan 2004, 2010) as

well as geomorphological conditions (Sturt *et al.* 2013; Westerdahl 1995). Nevertheless, evidence of boat building and seafaring skills reinforce the notion of journeys that would have enabled cultural connections and the exchange of raw materials or manufactured artefacts (Seán 2009; van de Noort 2015). Several theoretical hypothesis of long-distance seafaring have been proposed explaining the relations between France, the British Isles and Iberia (Cunliffe 2001; Rodríguez-Rellán *et al.* 2015). More tangible evidence is provided by similarities between built monuments and pottery, lithic tools, megalithic art and, of course, open-air rock art.

The last period of glaciation caused the necessary geomorphological changes to prompt seafaring and navigation in the Holocene (Seán 2009; Sturt 2015). A series of these processes conferred the coasts of northwest Iberia, Scotland and Ireland its irregular appearance with spacious natural harbours (Seán 2009:171). Environmental studies show the introduction of species such as oak (*Quercus sp*.) in 8000 BC and lime (*Tilia sp.*) from 6000 BC, which played an important role in boat building (*Ibid*. 168). A conjunction of favourable conditions led to the settling (e.g. Ireland) and re-settling (e.g. Britain) of islands since 7000 BC, demonstrated by the occupation of a number of Atlantic Islands during the Mesolithic and Neolithic periods (e.g. Hebridean and Danish archipelagos, but also the Orkneys) notwithstanding the sea being used as a means of mobility since the Upper Palaeolithic (Cunliffe 1994:80; Dennel 1983:25; Seán 2009). Maritime connections and seafaring intensified after 6000 BC, particularly after 4000 BC, according to evidence provided by the introduction of domesticated animals and cereals from continental Europe into Britain and Ireland (Anderson-Whymark and Garrow 2015; van de Noort 2015). This is also the context in which Atlantic Art may have navigated the ocean, reaching the various regions. Suggestions of maritime connections, however, have not been matched by material culture, and only a few boats are known to the archaeological record, none of them being incredibly fit for the Atlantic journeys (Arnold 1995; Delgado 1997; Alves and Rieth 2007; Lanting and Brindley 1996; Seán 2009; van de Noort 2015). No doubt the Neolithic seamen were skilled, as recently Neolithic occupation of the remote island of St. Kilda has been confirmed (Cooper 2017).

Connections between France and Britain are easily explained through the crossing of the Channel, but routes used to link the former and Iberia are not so straightforward. On one hand, navigation may have followed direct maritime contact between Finistérres, avoiding the dangerous Bay of Biscay (Cunliffe 2004; Fábregas-Valcarce *et al.* 2012), which is effectively the second possibility, considering the great endeavour implied in the first case and the suggestion that this would not be possible before the late stages of the 3rd millennium BC (Rodríguez-Rellán *et al.* 2015). The Pyrenees also feature as an important entrance point for

products in Iberia with similar materials being found on either side of the mountain range (Fábregas-Valcarce *et al.* 2012). Geographical and ecological conditions would determine, on one hand, the time and necessary energy to pursue the journeys (Lehman *et. al.* 2008 cit. Coward 2013:257) and on the other the scale of network connectivity, having a direct impact over the distribution and dissemination of material culture and other social practices (Coward 2013; Gamble 1999; Knappett *et al.* 2008:1011).

The Material Culture

More tangible archaeological evidence for connectivity is found in the material culture of the time. Some specific types of pottery (e.g. Carinated Bowls) and monument traditions (e.g. Late Castellic), are observed on both sides of the Channel (Sheridan 2010). Early contacts between the Morbihan (Brittany) and Iberia are attested around the mid-5th millennium BC, when fibrolite and variscite of modern Spain was being imported into the region and Breton-style Alpine axeheads were being copied in northwest Spain (Pétrequin *et al.* 2008; Sheridan 2010). The Morbihan communities are also viewed as responsible for the introduction of different strands of the Neolithic into Britain and Ireland (Sheridan 2010), dating to c. 4075-3975 cal BC (95% probability) in southeast Britain (Whittle *et al.* 2011).

Jadeite axes sourced from the Alpine Region have been found to have travelled 1700 km away from their source areas, reaching the shores of the Atlantic to the west and the Black Sea to the east during the 5th and 4th millennia BC (Pétrequin *et al.* 2015). Distributional analysis of the alpine axes demonstrated their wide spread including into core areas of this study (Fábregas-Valcarce *et al.* 2015; Pétrequin *et al.* 2008; Pétrequin *et al.* 2012, 2015). We also see polished axes, stone rings and beads, arrowheads, halberds, some daggers and jewellery circulating from the 4th millennium BC, alongside pottery making traditions, whose forms are imitated elsewhere (Anderson-Whymark and Garrow 2015:67; Fábregas-Valcarce *et al.* 2012:1122; Garrow and Sturt 2017; Peña-Santos 2003: 70-72; Rodríguez-Rellán *et al.* 2015:137-138). Ceramics are one of the main traits of the Neolithic and are extensively used to characterize strands of Neolithisation and prehistoric movement (e.g. Bernabeu-Auban and Pardo-Gordo 2017; Cruz-Berrocal 2012; Fábregas-Valcarce *et al.* 2007; Fábregas-Valcarce *et al.* 2012:1122; Jorge 2014; Rodrigues 2000; Sanches 1997; Sheridan 2007, 2010, 2010a; Whittle 1997; Whittle *et al*. 2011; Zilhão 1998).

Funerary building traditions are also witnesses to the prehistoric connections of the Atlantic coast. Unique monuments, such as the simple passage grave of Broadsands in Devon, illustrate connections between Britain and Ireland (also demonstrated by the SNA), with a probable origin in the Morbihan, where they were initially built several centuries before

(Anderson-Whymark and Garrow 2015:71; Sheridan *et al.* 2008; Whittle *et al.* 2011:520). The arrival of causewayed enclosures in Britain and Ireland suggest continuous contact between the islands and mainland Europe, although the phenomenon shows different perspectives of the Neolithic societies (Anderson-Whymark and Garrow 2015:72; for detailed discussion see Whittle *et al.* 2011).

The networks established during the Neolithic intensified in subsequent periods, gaining great expression during the 4th and 3rd millennium BC with the widespread of the Bell Beaker complex. Often corresponding to the Chalcolithic, with special emphasis on the generalized use of copper, it is also characterized by the presence of other elements in a 'package' that included beaker vessels, weapons and funerary practices (Vander Linden 2012). The generalization of this package demonstrated the strength and long-lasting character of the ongoing inter-continental relationships. These were reinforced towards the end of the Chalcolithic and beginning of the EBA periods during which the variety of exchanged items increased, now including rare exotic materials such as jet (Jones *et al.* 2011; Pétrequin *et al.* 2012), amber and gold (Eogan 1994; Needham 2011, 2012; Standish *et al.* 2015:149). Furthermore, stable isotope analysis applied to human remains have recently confirmed the movement of people (Fitzpatrick 2011; McKinley *et al.* 2013; van de Noort 2015) during this period.

Sharing Atlantic Rock Art

Previous discussions have demonstrated that long distance connections were established during the Neolithic and maintained throughout subsequent periods. The evidence for boat building, seafaring skills and the distribution of material evidence account for networks of communication and contact through which people, material and ideas may have travelled across wide territories. I have argued that Atlantic rock art, in the form of ideas and techniques, was being carried by these prehistoric explorers. The evidence for this argument is not only the formal similarities of the carved motifs, which we have ascertained have numerous regional and local variations, but a whole concept based on an assemblage composed by the style and tradition of carving, the techniques required to reproduce the motifs, the micro structures of the shapes, a shared understanding of the landscape revealed in the way the sites were built. As such, a system of emulation and teaching (Stade 2017) was in place in Atlantic Europe during the Neolithic and succeeding periods, fostering the widespread distribution of Atlantic rock art. Arguably, a similar process may have occurred later, illustrated by the spread of the Beaker package, visible through various examples of

Beaker burials re-enacted in the British Isles, for instance, built for individuals of local populations, such the one in Achavanich (Highland, Scotland), dated to the 3rd millennium cal BC (Hoole *et al.* 2018). Furthermore, during the Neolithic there is a tendency for specialized manufacture and trade, which may have been important mechanisms for long distance contacts between groups and/or individuals (Coward 2013:257).

More than the differences and similarities between the study area's rock art, the small details (e.g. the carving of Ring Terminus Convergence, Combined Rings, Gapped Rings on one side or Extended Rings, etc. in more than one region) of the carving techniques and the composition of the motifs identified on the designs suggest strong connections between the regions. Atlantic Rock Art seems to represent tangible evidence of prehistoric interactions between the British Isles and Iberia, although the directionality of travel is not clear. The *in situ* analysis of many carved rocks in the five study areas revealed that there is a core-group of motifs, termed 'quintessential Atlantic' (after O'Connor 2006). This is mostly composed of cup-marks, cup-and-rings and wavy grooves repeated in every region which, along with other characteristics, such as the carving techniques, sense of composition and placement in the landscape, were included in the 'package' discussed in Chapter four. The analysis of this package through SNA confirmed that all the defined characteristics are equally present in the study areas and no pattern emerges, as opposed to the study in detail of each study area suggesting a strong sense of regional personality. The idea is, therefore, that these main traits of the package have been transmitted across the regions, assimilated and then originated local variations of the assemblage. The diffusion of the tradition, however, was probably not achieved solely through verbal events or visual transmission. Even when one is familiar with a specific shape, not holding the know-how may make the replication impracticable. The production of Atlantic Art may be seen as a specialized practice requiring the knowledge of specific skills, tools and an underlying understanding of the surfaces being carved in order to produce the intended compositions. The use of natural features or the incorporation of the panel's edges into the compositions, as well as the juxtaposition of motifs certainly required a certain amount of skill and control over the practice. Furthermore, a shared global understanding of the assemblage and its underlying ideology, is also visible in the way it was used on the landscape, reflected in the type of rocks selected, techniques used to carve, and even its wider context of landscape location and association with other types of archaeological sites. In Chapter 4 I outlined some of the main strategies of cultural transmission identified in Developmental Psychology, previously applied to other archaeological studies (Stade 2017): *Emulation, Imitation,* and *Teaching*. Given the specificities of Atlantic Rock Art and the overall similarities of the style across the regions, *Imitation* and *Teaching* seem to be the best suited strategies, the former implying a copy of

the behaviour which originated the final product and the latter the intentional conferring of knowledge at an individual level (*Ibid.*). The practical results of these stages of cultural transmission explored in a project that involved the copying of Palaeolithic handaxes leaves little space for doubt that imitation, or more probably teaching, was involved in the spread of Atlantic Art, considering the standardized character of the practice and its wide geographical distribution. A certain amount of instruction, or at least visual copying of the creative process was certainly involved in the replication of Atlantic rock art. Should the reasons for copying the motifs be purely aesthetical, then we would probably be finding them in more diverse types of contexts and media. The reproduction of the iconography by *Emulation* would certainly result in morphological differences.

The cultural transmission of Atlantic Rock Art would have been made at two levels: a local/familiar and global/inter-group. Being in use for several centuries, and applied over extensive areas in a systematic fashion, the tradition was certainly passed on from generation to generation, contributing to the social identity of the groups. It is easy to picture a scenario in which youngsters accompany accomplished carvers in community activities or others, progressively learning and getting involved in the decoration of stones (Edmonds 1995, 2004) through an 'education of attention' (Gibson 1986b) in which they would learn, not only the techniques, but also worldviews and social conventions. Observation and mimicry would be essential in the learning process, as was learning through practice (O'Connor and Cooney 2010:xxiv). Anthropology provides examples of stone work learning from childhood, as is the case of the Djenné (Mali) in which apprentices were initiated as children. On site, they would begin by carrying out 'small tasks' such as the cleaning of stone tools, whilst simultaneously 'getting immersed in the concerns, worldviews and social performance' of their mentors (Marchand 2006:53).

Potentially, a similar process of learning was involved at an inter-group scale. It is hard to imagine that the knowledge of such a widespread carving tradition was transmitted at an individual level. Furthermore, the open-air character of Atlantic Art may suggest that this was a public activity involving communities and the concentration of groups of people, amongst which technologies and cosmologies were shared. The lack of associated archaeological contexts does not allow for a more refined interpretation of the rock art sites. A better understanding of this would be pivotal, as the meaning and perception of a given site very much depends on their context (Appadurai 1986). However, drawing once again on anthropological evidence, the Aborigines of the Darling River area of Wilcannia (Australia) remind us of the relationship between art and culture, enabling the re-production, re-

construction and re-presentation of identities as an interactive process between people and things, also recognising 'art's power to (…) communicate cultural values and concerns' (Gibson 2008:295-296). This is certainly also the case of the Comanche whose use of rock art in the Rio Grande Gorge (Taos, New Mexico) was used to perform narratives of battle, honour warriors, organize battle strategies, but were also used in other domestic spheres, representing tipis, and all these depictions would be placed in different types of locations, depending on the purpose and the motifs represented (Fowles and Arterberry 2013).

Although we can only infer about the meanings and significances of Atlantic Art it is undeniable that this prehistoric style of carvings must have held great importance, when considering its geographic extent and the frequency with which the motifs were adopted and carved on the rocks. Repetition of behaviours may indicate social and cultural exchange and a flow of innovations may explain the long-lasting character of the tradition (van der Leeuw 2013:340).

CHAPTER NINE: CONCLUSIONS AND FINAL WORDS

9.1. FUTURE DIRECTIONS

The path to understanding Atlantic Rock Art is just starting. This study enabled the empirical verification of suspected regional variations and proposed a model to explain the overwhelmingly uniform character of a type of rock art present in many distant regions. Pursuing this avenue of investigation and applying similar analyses to other areas with Atlantic Art would be beneficial for a broader understanding of the inter-continental connections, also crossing the result with other types of contemporaneous traditions and artefacts known to have been exchanged. In order to achieve this, it is necessary to, amongst other things, explore the process of making the motifs in detail, which will provide a clearer idea of the design's regional variability. The documentation of the carved surfaces with 3D digital techniques is recommended in order to identify these details, and explore in depth loose ends in this thesis, such as the role of conjoined motifs and particularly superimpositions within the compositions. This would contribute to the sequencing of the motifs, which would be crucial for a chronological understanding of the phenomenon. Furthermore, the documentation of previously recorded rocks will probably identify other overlooked motifs. The 3D models will refine the knowledge of the techniques and tools used to carve, a line of investigation that should be complemented with a systematic programme of experimental archaeology.

The chronological question is one of the big conundrums of Atlantic Art and is still not completely resolved. More archaeological excavations would be required to assess a pattern of activity and performance that has started to emerge in some examples of carved rocks, but also as a method to refine the period in which the iconography was being used. The re-assessment of previous excavations, namely by antiquarians and the various contexts known to carved rocks which have been re-used in monuments and other structures, could shed light on the moment of closure of Atlantic rock art.

Network science was a late introduction to this project and therefore the results of the analyses discussed in this thesis are embryonic. The potential of these techniques is wide and further explorations will be developed, with detailed enquiries regarding the connections already identified.

The network science was used, in this case, to investigate the differences and similarities between the rock art of the different study areas. These were characterized

through a number of classes and attributes. The sheer amount of data produced became difficult to manage due to the details captured but also their complexity. The SNA appeared to be a good option in order to explore the dataset relationally and in depth. These methods enabled the establishment of relationships between the whole dataset, instead of having to focus on one particular aspect of the rock art at a time, such as the motifs, for example. As such, all the rock art sites included in the study were connected to each other, since most of them share, ate least, one attribute with another panel. The use of the Louvain community detection algorithm allowed to focus on the more meaningful relationships. The analysis resulted in the definition of three groups of rock art sites sharing features with each other. In general, these show quite strong regional characters, although there are a number of sites from one study area which were included in another, indicating the existence of a set of features that crossed regions. It is in this context that the package may be included, as it is composed by a number of characteristics present in all study areas. In this study I began to investigate the reasons that may explain the re-location of these carved rocks into other geographical groups, but these network methods can be used to address particular issues in detail, for example, by looking specifically and identifying the attributes that place certain rocks from one regional group in a different community. It is interesting to note, for instance, that the rock art of England and Ireland have much in common, although in the final approach a number of Irish sites (Kealduff Upper) are grouped in other components. It is worth it exploring these situations as the reasons behind these behaviours may have important archaeological implications. The software allows to scrutinize the sites and the connections individually and in detail. Furthermore, while the groups of Portugal and Spain display a consistent behaviour throughout the analyses defined by the different theoretically motivated approaches, demonstrating their strong unity and coherence, the pair of Scotland and England show strong similarities when assessing the presence of the package, but in further approaches they reveal strong regional traditions instead, which may be worth investigating archaeologically.

Besides an in-depth exploration of the dataset, the network can also be extended in order to relate the carved rocks with, for instance, other characteristics of the panels that may not be contemplated on the classificatory scheme, but also, other archaeological sites.

The network science can be used at a large, inter-regional, scale, such as the one applied in this study, but also at smaller scales. For example, to investigate the relationships between the different groups of rock art in a specific geographic area, which may be a country (e.g. Scotland or Ireland), since at these scales the rock art also reveals regional variations.

This research featured a first application of network science to the study of rock art displaying very interesting results, but also opening new avenues of investigation that may contribute significantly for our understanding of Atlantic Art's social and cultural context, but also the connectivity relationships occurring in the Atlantic during Prehistory.

EPILOGUE

One of the main contributions of this thesis is the study of Atlantic Art through a holistic perspective, ignoring modern administrative borders and ultimately based on empirical datasets. I applied principles of relational ontology and Assemblage Theory which, combined with a multi-scalar methodology, imprinted a dynamic relational character to the study (van der Leeuw 2013:336). Thinking in terms of assemblages, entanglements and meshworks of people (Ingold 2006; Pollard 2013; Thomas 2016) produces 'series of networks of significance, involving places, the personal histories of people, substances, skills and symbolic references' (Thomas 1996), which enable the assessment of material culture's role in the establishment of social identity (Thomas 2016:346) and, in this case, of Atlantic Art and its local and inter-regional engagement with people. While at first glance the cup-and-ring marks and derivatives may seemingly belong to the same tradition, a detailed study of many associated variables enabled the identification of regional identities. Such a conclusion should not come as a surprise given the cultural variation known in the Neolithic and succeeding periods. Despite the morphological resemblances, the variations in particularities recognized for each study area may encompass deeper differences. Atlantic Art and its variations seems to be in tune with the general character of the Neolithic period, which looks like a patchwork of characteristics that can change even over a short distance (Sturt and Garrow 2017:20). Anthropological and ethnological studies show that a specific shape, such as a circle, may have a number of meanings for a society (Morphy 1994). It is only expectable that underneath those apparent similarities, Atlantic Art may have represented different ideologies for different users, in different circumstances. Furthermore, monuments are not static (Pollard 2013) and their meanings change over time (Cummings 2008:154).

I developed a two-fold approach to rock art. Firstly, I pursued the study of Atlantic rock art's landscape position and affordances. This is an effective perspective to contextualize the carvings through their local environment and other types of archaeological sites, inferring on the significance of place and why the carvings are located where they are. I contrasted field observations with GIS analysis and confirmed some of the general pre-conceived ideas about Atlantic art, whilst demystifying others. Secondly, I returned to the analysis of the motifs. This approach was based on the study of their *chaîne operatoire* (Conneller 2011:17), analysing the sequence of production, from the selection of the outcrop or boulder, to the used techniques, details of the motifs, use, re-use, decommission and abandonment or re-interpretation and re-incorporation in new contexts. This method was supported by the

creation of a PAM and a relational typological categorical scheme, to assess the rock's biographical processes and identification of regional personalities. The entanglement of results was done through a Social Network Analysis system building on the content of this thesis and producing interesting but also important contributions for the perception of Atlantic Rock Art.

It is proposed that a package composed of 'quintessential Atlantic' motifs, and their underlying ideology, including techniques and modes of creation, production and use, was transmitted between the study areas, and further developed locally originating regional variations and local preferences. The use of SNA was pivotal, as it avoids directionalities and does not require the definition of boundaries, borders or any other units of division to limit information (Knappett 2013:6). SNA also allowed for a relational analysis encompassing all the characteristics defined for Atlantic Rock Art and the affordances of the rocks, contributing for the identification and analysis of variability between the study areas and demonstrating a clear potential for connectivity between the regions. In some occasions the relationship pinpointed by SNA for two given study areas confirmed the observations made during other stages of the investigation, namely the Presence/Absence Matrix or the comparison between variants and attributes of the categorical scheme. For example, *Types of Depiction* analysed the character of the motifs in terms of their adaptation to the rock surface and it is interesting to note that neither Iveragh nor the Machars peninsulas have examples of 3D style carvings, and both appear to be connected in the Network analysis. It is true that the SNA results show a strict connection between Iveragh Peninsula and Rombalds Moor, but the former is also the region with which the Machars share more affinities. These two study areas are also joined through the representation of penannular motifs, virtually absent from Barbanza and underrepresented in Monte Faro and Rombalds Moor. Furthermore, there is a striking similarity between the characteristics of the circle category of Rombalds Moor and Iveragh (e.g. *Ring Extended*, *Converging Rings*), and again these regions were grouped together due to their resemblances, in the SNA analysis. Interestingly, the exercise of categorizing Barbanza and Monte Faro's motifs was quite difficult, compared to the other study areas. The designs represented in most of the rocks did not seem to fit lightly the categorical scheme which, as mentioned previously, was adapted from O'Connor's (2006) typological system, based on the iconography of Ireland. The categorical scheme was remodelled and adapted several times to encompass characteristics of the different study areas which, in itself testifies to regional variation. Despite a majority of recognizable motifs, in Iberia the iconography is seemingly particular and a number of motifs were considered 'unknown' due to their ambiguous character. The SNA results showed a close relationship between the regions of Barbanza and Monte Faro and during the exercise categorizing each

of the rocks, this resemblance became apparent. Most significantly, the SNA revealed that all study areas are directly connected to Ireland and Spain, who are said to have established connections since the Neolithic, evident for example in Brueil's (1934:322) expression 'Ibero-Irish Art' referring to Atlantic Art (see Lionain 2014:62). Despite the flimsy evidence, the earliest dates for a British Neolithic come from Ferriter's Cove (Co. Kerry), where six 'eroded mid-shafts of a cattle radius and tibia and a charred fragment of cattle metatarsus' (Anderson-Whymark and Garrow 2015:66) were recovered from a Mesolithic midden. Considering the lack of ungulates in Ireland at the time, and because the domestication of animals was not yet happening in Britain, authors have suggested that these remains belonged to animals that may have come from Western France, although there are no other associated artefacts that indicate the presence of continental migrants (Anderson-Whymark and Garrow 2015; Sheridan 2010, 2010a; Woodman and McCarthy 2003). Dated to 4498-4238 cal BC (95% confidence) (Cooney *et al.* 2011:635; Woodman *et al*. 1999:219), this event has been seen by some as the beginning of the Neolithic in Ireland, brought by Morbihan colonisers (Woodman and McCarthy, 2003), but also a 'false start' due to the lack of supporting evidence and possible misinterpretations of the dated material (Sheridan 2010:91-92). Although Ferriter's Cove cattle bone cannot be seen as an indicative as the earliest moment of the Neolithic period, it certainly suggests that some kind of contact between the population of Ireland and the continent was taking place.

It is also in Ireland that we find the best and most credible examples of the re-use of Atlantic Art in funerary monuments, such as some cairns at Loughcrew and the well-known passage tomb of Newgrange (Co. Meath), built during the 4th and 3rd millennia BC (Scarre 2002). If, as suggested, these pristine motifs were effectively quarried from decorated open-air sites (Shee Twohig 2010), then perhaps it is acceptable to push back the chronology of Atlantic Art further back in time.

Through the introduction of a multi-scalar methodology based on a multi-disciplinary approach, I was able to confirm a broad-scale pattern of similarity encapsulated in the package, which was also revealed in the qualitative sphere of the data. Furthermore, the formal method of the SNA enabled the identification of regional patterns, with the third approach to the data, which otherwise would not be revealed through a simple qualitative analysis. The number of variables involved, which enabled the identification of fine details of production and making, but also levels of difference and similarity between the rocks, would not be manageable without a formal method of analysis and therefore the quantitative scrutiny was important too.

Although a chronological definition for Atlantic Rock Art is a complicated task, recent evidence points at its inception during the Neolithic, with a prolonged use possibly until the end of the BA. It is difficult to demonstrate that the carving practice began in the early stages of the Neolithic, but there is strong evidence that it was around at least in the Late Neolithic. Besides the archaeographical (i.e. excavations, sealed contexts) evidence that determines this conclusion, such as results from archaeological excavations in the surroundings of carved rocks, or the *ante quem* dating of stones with clear connections to this worldview, but also the spatial relationship with other Neolithic monuments, Atlantic Rock Art also sits well with broader tendencies of the Neolithic period. In a moment of great transformation that led to a more intrusive relationship between people and the land, the modification and transformation of rocks through carving seems to fit this idea of changing the natural that is also evident in the construction of large stone monuments, the movement of large amounts of earth to build ditches and cursuses, the quarrying of great stones and the effort put into moving them around to build monuments in different parts of the territory. There is a clear demonstration of empowering skills which are used to transform the landscape.

Despite being mostly located in open-air contexts, Atlantic Rock Art also revealed itself do be mostly a hidden kind of art, mirroring other Neolithic practices. This character does not necessarily contradict its public nature nor the social act of carving, reflected in the fact that the rocks are placed outside and available to passers-by (Lamdin-Whymark 2011). But Atlantic Rock Art did not need to serve only one purpose, and its use in specific places could have been related to the community's daily activities, functional needs or even more symbolic acts. Each of these spheres could have required specific uses of the rock art, perhaps involving its deployment in particular contexts by specific people. Furthermore, it could be argued that the public character of Atlantic Art ends with its integration into funerary monuments during the Bronze Age, as motifs are broken and placed in dark confined spaces, accessible only to the dead. A similar process of context transformation is known with other types of iconography such as that in Scandinavia, where imagery is no longer depicted on the rocks for the wider public, but applied to personal artefacts such as razors, implying a change of perception, ideology and behaviour towards the images (Sköglund 2016).

Finally, for the mimicry of the landscape through the enhancement of the natural form of the rock surface (Alves 2012b); for the use of execution techniques that resemble one thing but are effectively another; for the use of strategies to create the motifs in order to look like regular cup-and-rings but encompassing a great number of "hidden" variations; for the prominent landscape location that is effectively concealed; for the public character of the rock art that is not, I like to think that Atlantic Art is an art of illusion.

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