UNIVERSITY OF Southampton

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Department of Archaeology

DESIGN AND CONNECTIVITY
THE CASE OF ATLANTIC ROCK ART

Volume 2 of 2

by

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Thesis for the degree of Doctor of Philosophy

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ABSTRACT

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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 the 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 just one more of the transformative processes that characterised the Neolithic.

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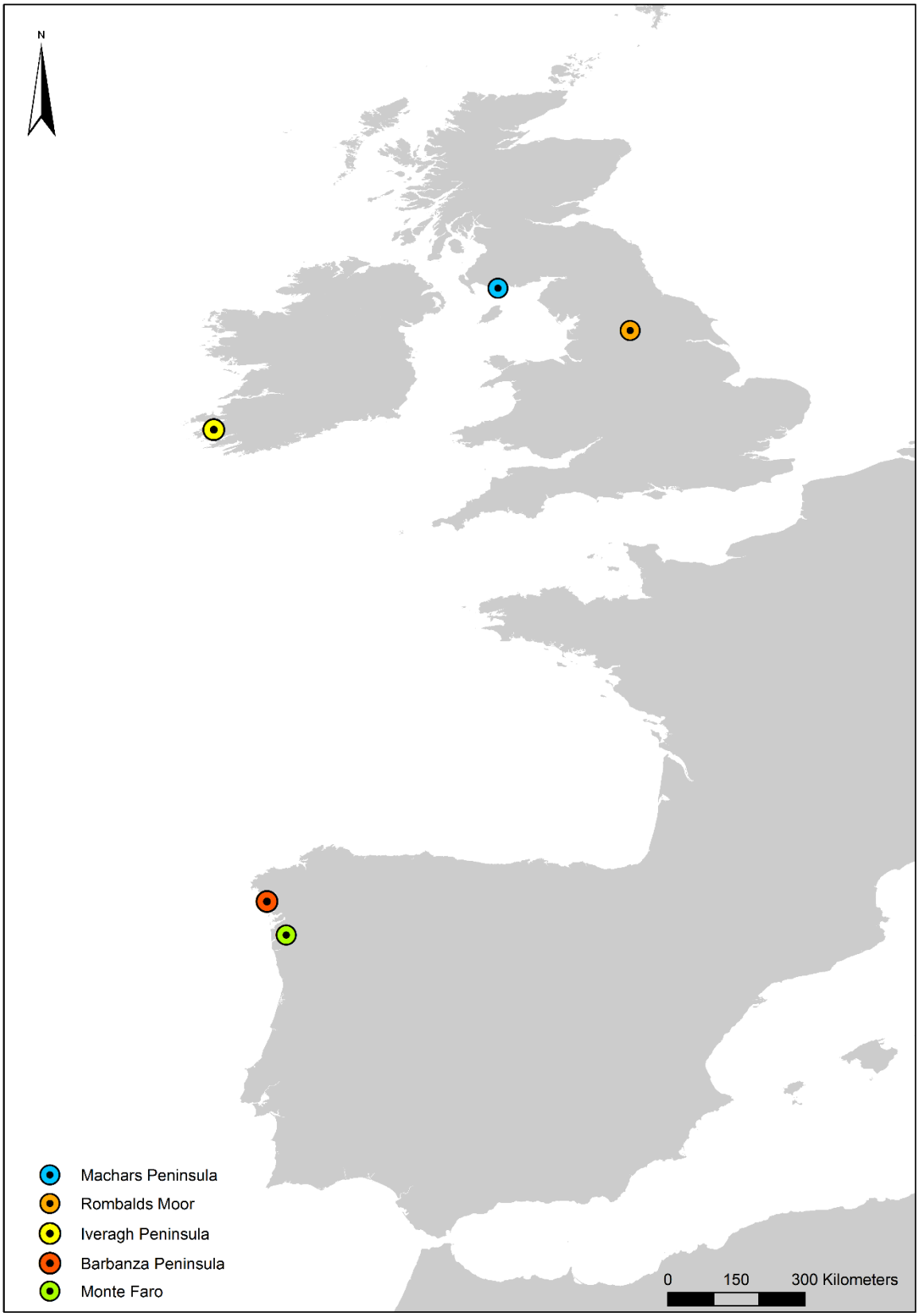


Figure 2 Location of the study areas in an unbounded perspective (Source of map: Diva-GIS Free Spatial Data).

1.1 MACHARS PENINSULA (DUMFRIES AND GALLOWAY, SCOTLAND)

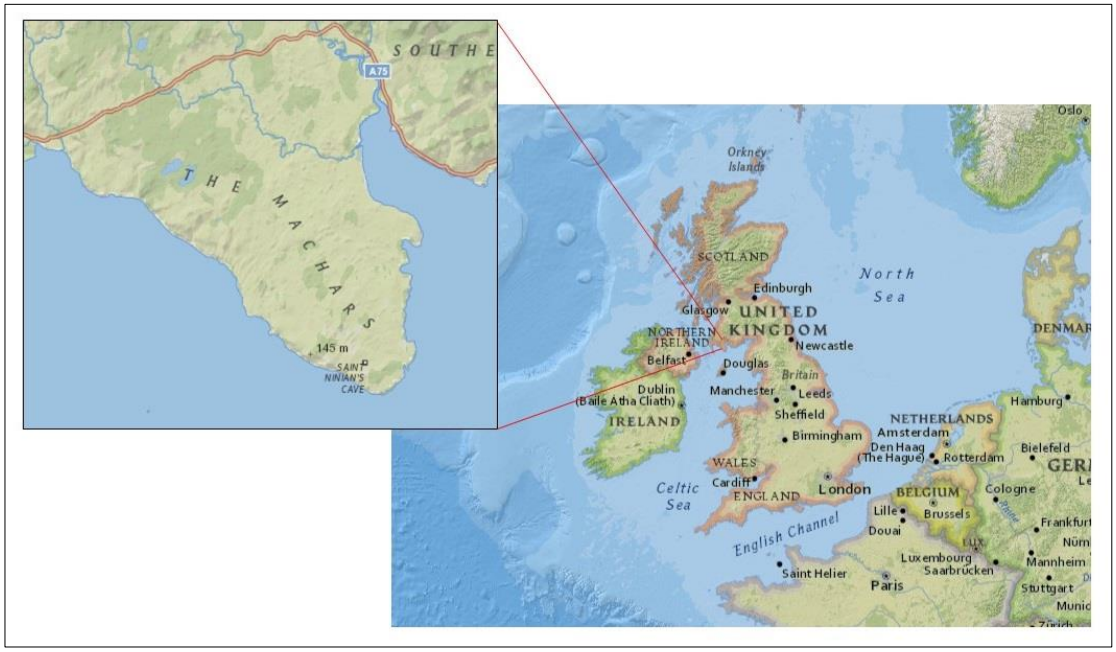


Figure 3 The Machars Peninsula in the context of Western Europe (Source of map: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp).

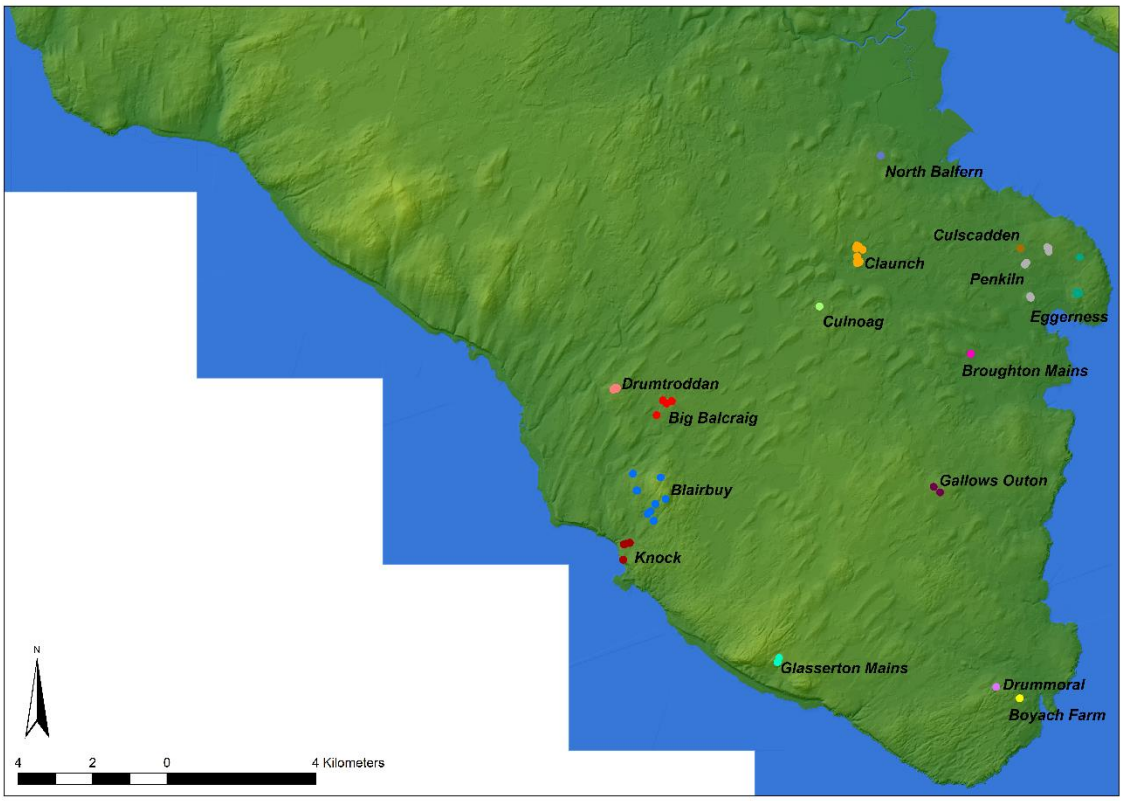


Figure 4 Groups of carved rocks in the Machars.

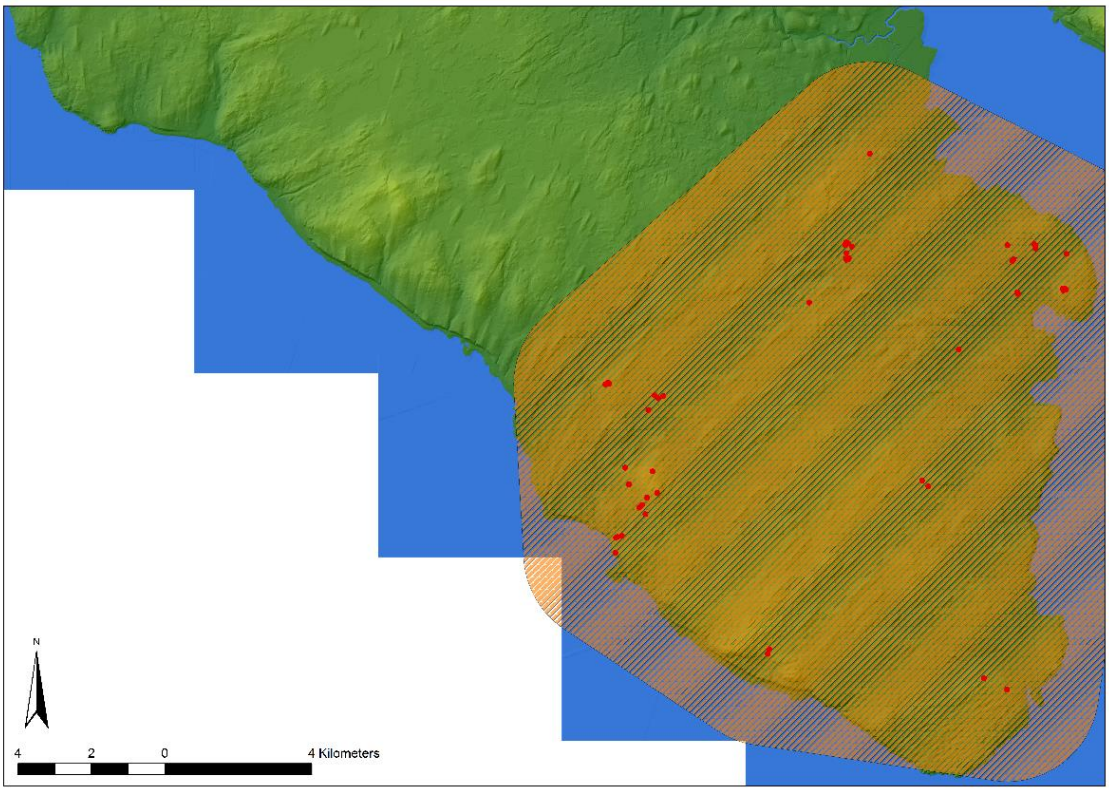


Figure 5 The limits of the study area used in the GIS analysis.

1.2. ROMBALDS MOOR (WEST YORKSHIRE, ENGLAND)

Figure 6 Location of Rombalds Moor in the context of Great Britain (blue circle) (Source of map: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp). Location of the rock art sites in red.

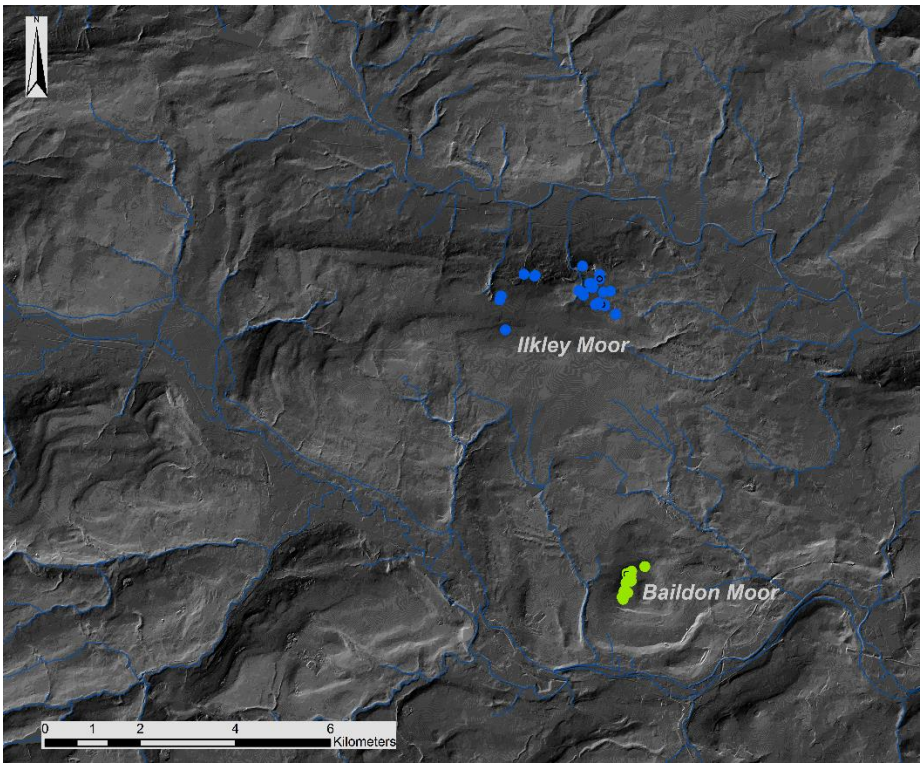


Figure 7 The two groups of carved rocks in Rombalds Moor: Ilkley Moor (blue) to the North and Baildon Moor to the south (green).

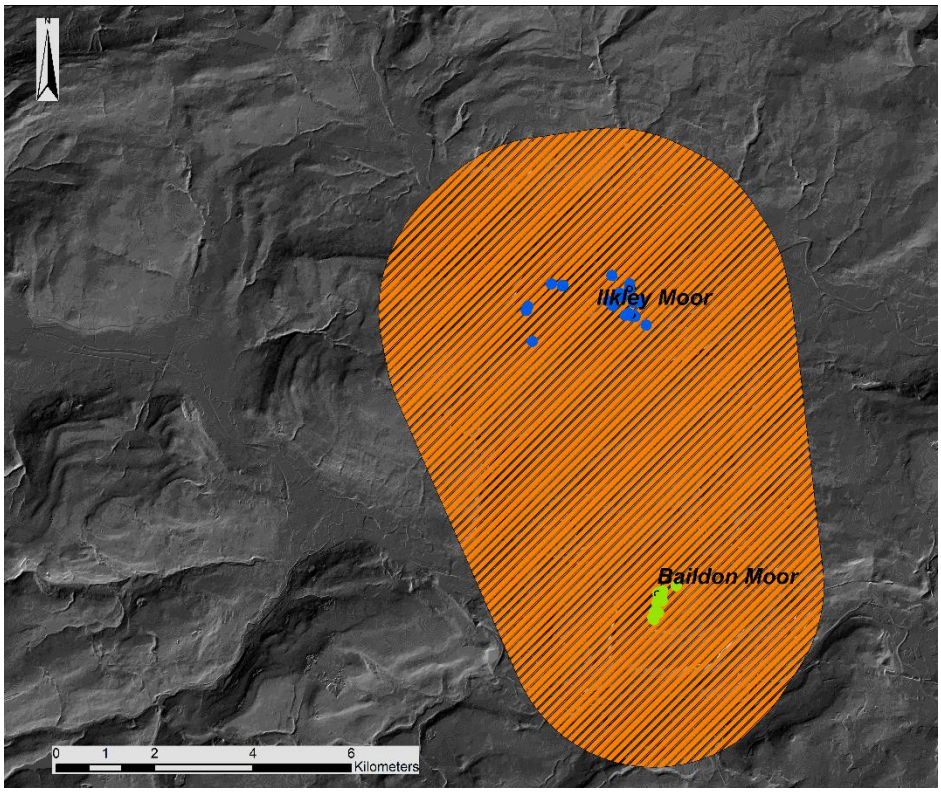


Figure 8 The limits of the study area used to perform the GIS analysis.

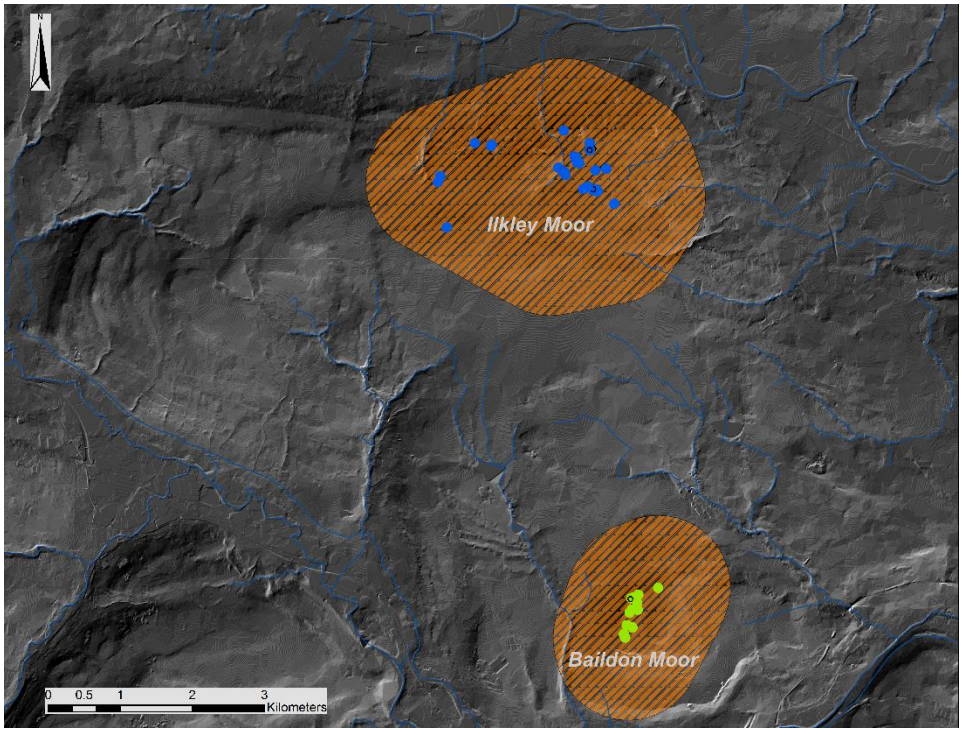


Figure 9 The study area of Rombalds Moor was divided into two small study-areas for certain types of analysis where more detail and a more local approach was required. This map shows the limits of those study areas, used in the GIS analysis.

1.3. IVERAGH PENINSULA (CO. KERRY, IRELAND)

Figure 10 Iveragh Peninsula in the context of the British Isles (Source of map: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.). Rock art sites are represented in red.

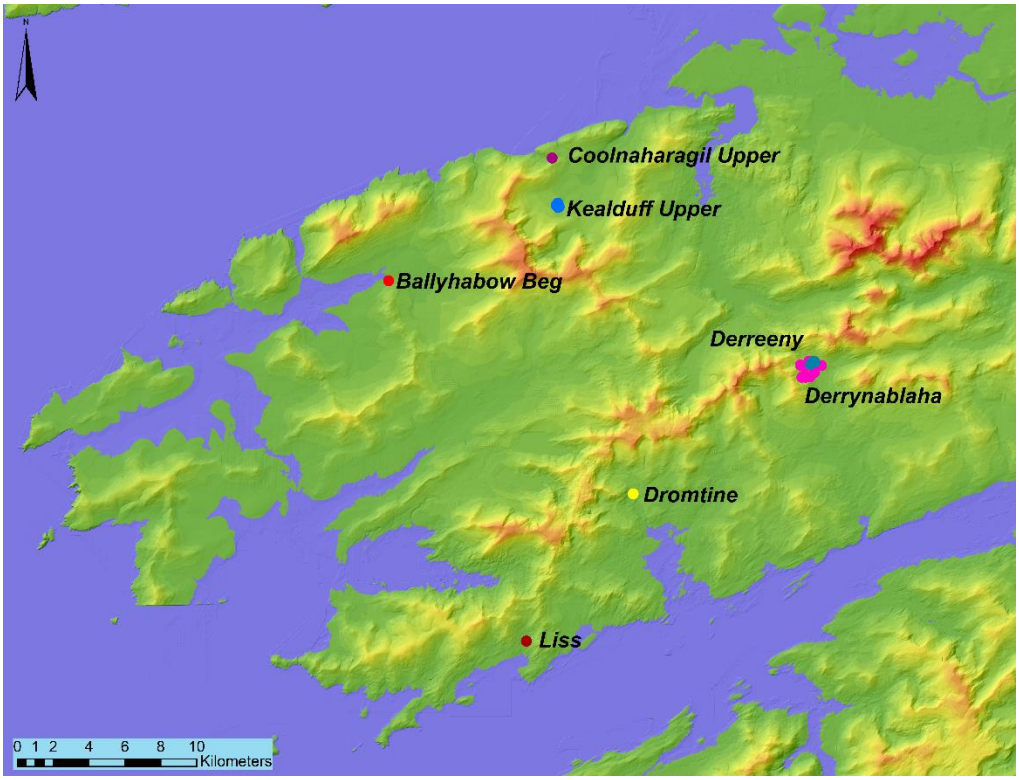


Figure 11 Main rock art sites in Iveragh.

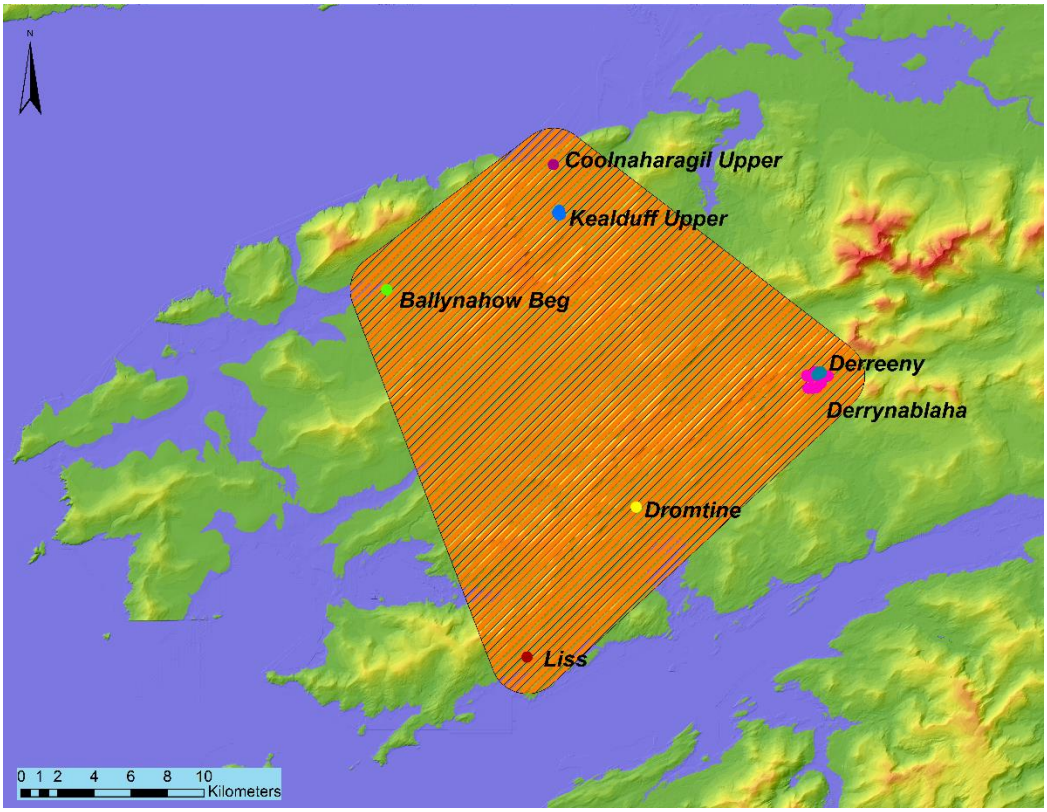


Figure 12 Limits of the study area in Iveragh including all sites of the dataset.

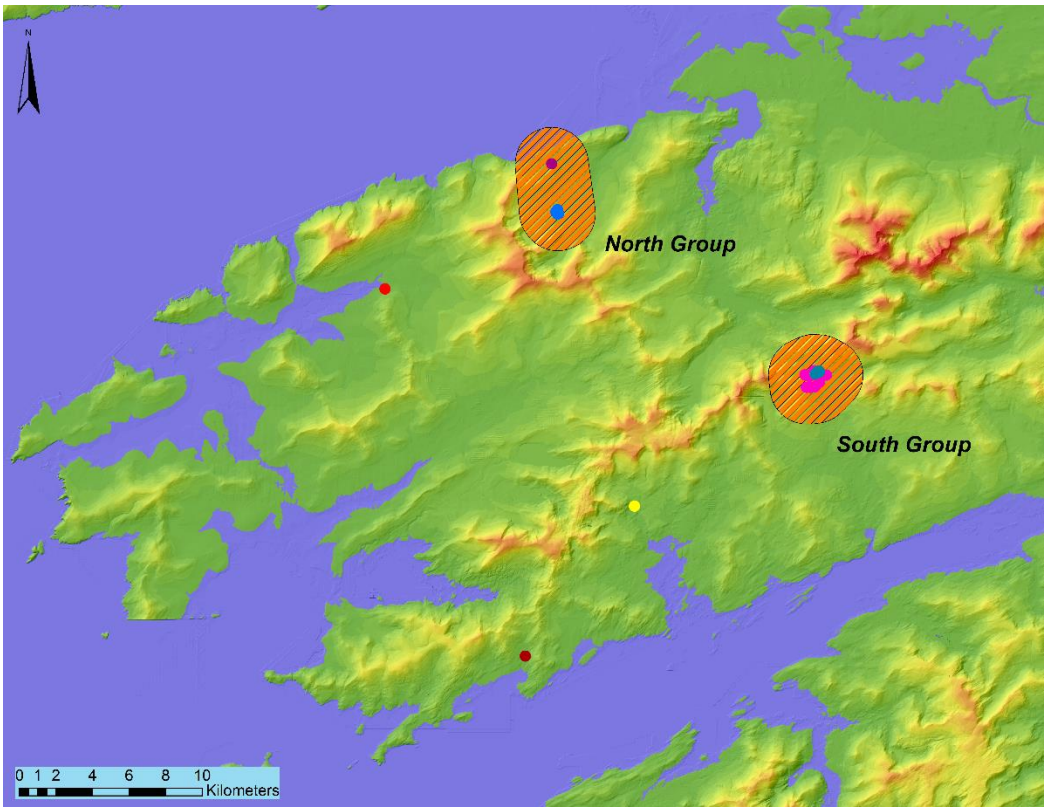


Figure 13 North and South group in Iveragh, used to develop a more local approach.

1.4. Barbanza Peninsula (Galicia, Spain)

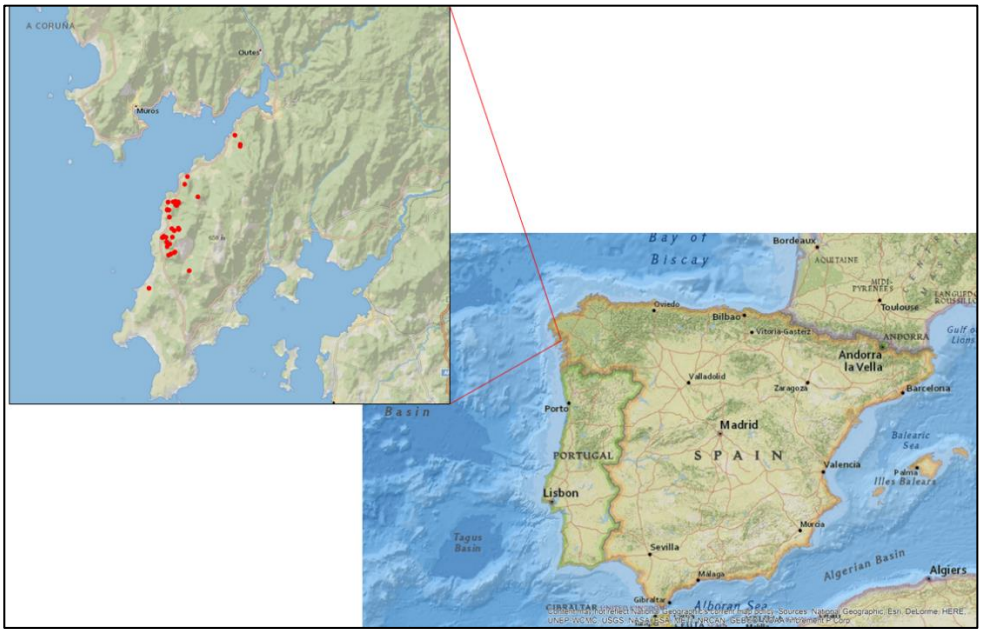


Figure 14 Barbanza Peninsula in the context of the Iberian Peninsula. (Source of map: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.). Rock art sites are represented in red.

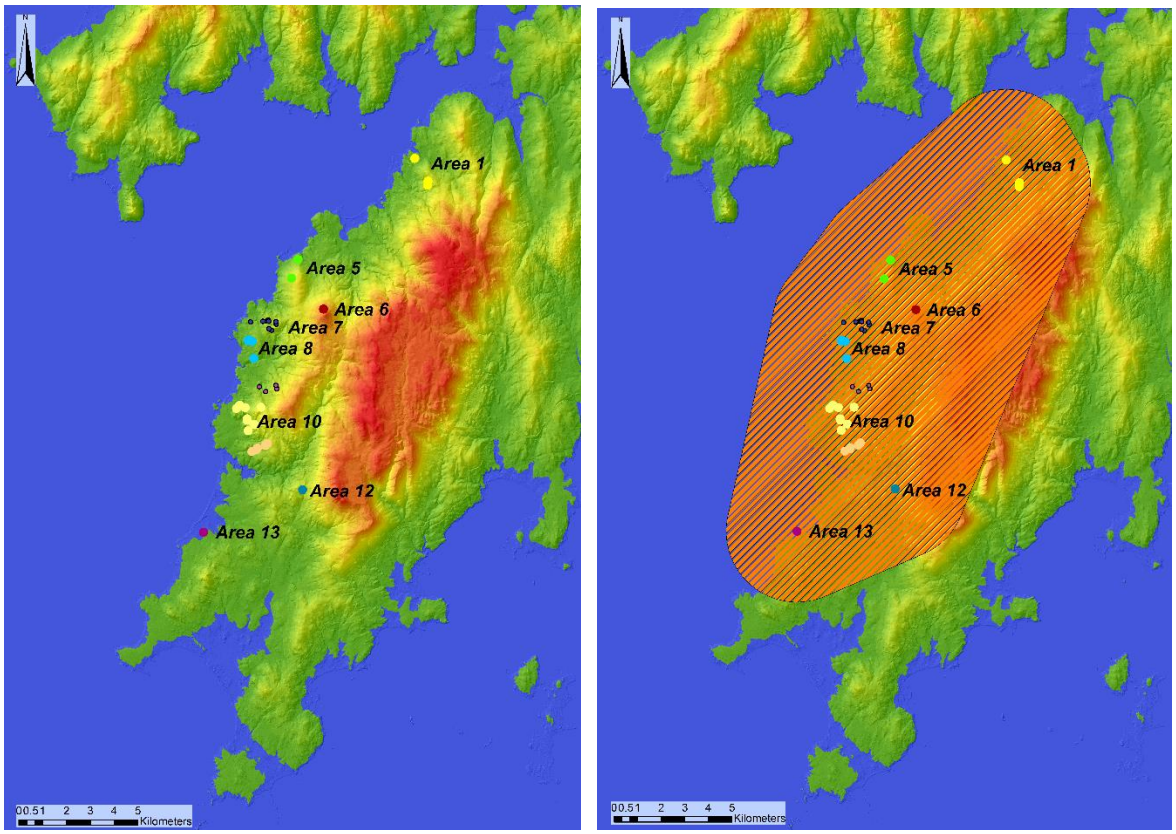


Figure 15 A) Location of the sites and corresponding areas (same as Fábregas-Valcarce and Rodríguez-Rellan 2012a); B) Limits of the study area.

1.5. MONTE FARO (VALENÇA, PORTUGAL)

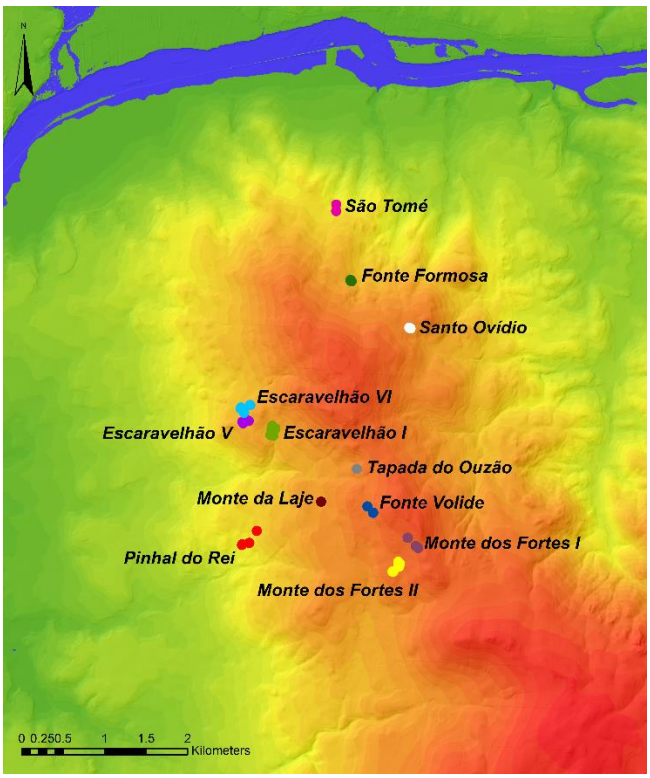


Figure 16 Monte Faro and the location of the different groups of carved rocks. The panels are located to the south of River Minho.

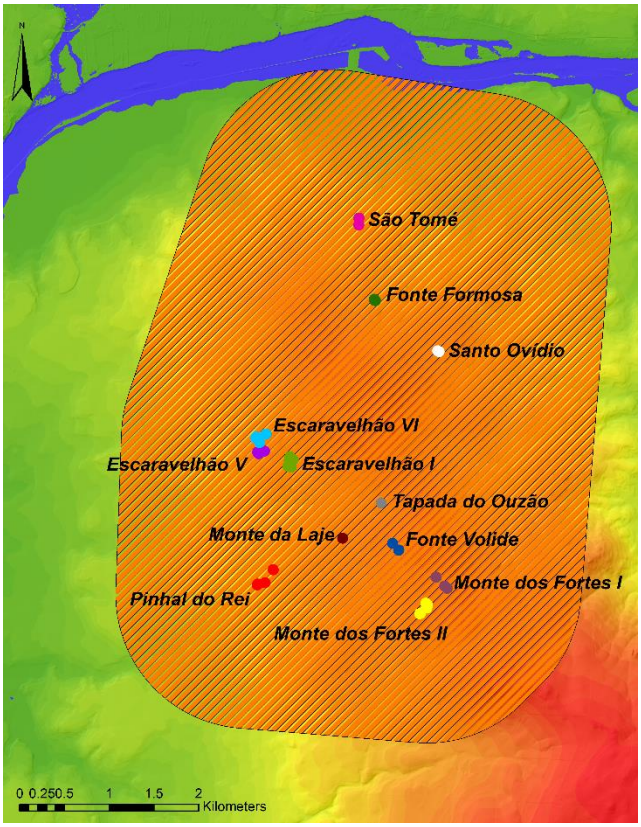


Figure 17 Groups of rock art sites in Monte Faro and the representation of study area's limits (orange).

APPENDIX 2

ROCK ART SITES

2.1. THE MACHARS PENINSULA (DUMFRIES AND GALLOWAY, SCOTLAND)

Table 1 List of sites used in the study of The Machars, with correspondence to references of other main inventories.

PROJECT ROCK REFERENCE	R. MORRIS (1979)	M. VAN HOEK (199)
Blairbuy 1	GAL 15	Blairbuy 1
Blairbuy 2	GAL 16	Blairbuy 2
Blairbuy 3	GAL 17	Blairbuy 3
Blairbuy 4AB	GAL 18	Blairbuy 4AB
Blairbuy 4C	---	Blairbuy 4C
Blairbuy 5	---	---
Blairbuy 6	GAL 20	Blairbuy 6A
Blairbuy 6B1/6B2	---	Blairbuy 6B1/6B2
Blairbuy 7	GAL 20a	Blairbuy 7A
Blairbuy 8	---	Blairbuy 8
Blairbuy 9	---	---
Blairbuy 10	---	---
Big Balcraig 1	GAL 1	Big Balcraig 1A – 1E
Big Balcraig 1B	GAL 1B	Big Balcraig 1F
Big Balcraig 2	GAL 2	Big Balcraig 2
Big Balcraig 3 ABC	---	Big Balcraig 3
Big Balcraig 4	---	---
Big Balcraig 5	---	---
Boyach Farm	---	Boyach Farm
Broughton Mains 1	GAL 23	Broughton Mains 1A
Broughton Mains 2	---	Broughton Mains 1B
Broughton Mains 3	---	Broughton Mains 1C
Broughton Mains 4	GAL 24	Broughton Mains 2A
Broughton Mains 5	---	Broughton Mains 2B
Claunch 1	GAL 41	Claunch 1
Claunch 1A	---	Claunch 1A
Claunch 2	---	---
Claunch 3	GAL 42	Claunch 3A / 3B
Claunch 4	---	---
Claunch 5	---	---
Claunch 6	---	---
Claunch 7	---	---
Claunch 8	---	---
Claunch 10	---	---
Culnoag 1	GAL 45	Culnoag 1A
Culnoag 2	---	Culnoag 1B
Culnoag 3	---	Culnoag 1C
Culscadden 1	Culscadden 1A	Culscadden 1A

Culscadden 2	Culscadden 1B	Culscadden 1B
Drummoral	Drummoral	---
Drumtroddan 1.1	GAL 47	Drumtroddan 1 – Panel E
Drumtroddan 1.2	---	Drumtroddan 1 – Panel C
Drumtroddan 1.3	---	Drumtroddan 1 – Panel C
Drumtroddan 1.4	---	Drumtroddan 1 – Panel C
Drumtroddan 1.5	---	Drumtroddan 1 – Panel A
Drumtroddan 1.6	---	Drumtroddan 1 – Panel B
Drumtroddan 1.6A	---	Drumtroddan 1 – Panel B
Drumtroddan 1.7	---	Drumtroddan 1 – Panel F
Drumtroddan 1.8	---	Drumtroddan 1 – Panel G
Drumtroddan 1.9	---	Drumtroddan 1 – Panel I
Drumtroddan 1.10	---	Drumtroddan 1 – Panel K
Drumtroddan 1.11	---	Drumtroddan 1 – Panel H
Drumtroddan 1.12		Drumtroddan 1 – Panel J
Drumtroddan 2A	GAL 48	---
Drumtroddan 2B	---	---
Drumtroddan 2C	---	---
Drumtroddan 2D	---	---
Drumtroddan 3A	GAL 49	---
Drumtroddan 3B	---	---
Drumtroddan 3C	---	---
Drumtroddan 3D	---	---
Drumtroddan 4	---	---
Drumtroddan 5	---	---
Eggerness 1	---	Eggerness 1
Eggerness 2	---	Eggerness 2A – 2B
Eggerness 4	---	Eggerness 4
Eggerness 5	---	Eggerness 5
Eggerness 6	---	Eggerness 6
Eggerness 7	---	Eggerness 7
Gallows Outon 1	---	Gallows Outon 1
Gallows Outon 2	---	Gallows Outon 2
Glasserton Mains 1A	GAL 58	Glasserton Mains 1
Glasserton Mains 1B	---	---
Glasserton Mains 1C	---	---
Glasserton Mains 1D	---	---
Glasserton Mains 1E	---	---
Glasserton Mains 1F	---	---
Glasserton Mains 2	---	---
Knock 1A	GAL 75	Knock 1
Knock 1B	---	---
Knock 2B	GAL 76	Knock 2B
Knock 3A	GAL 76ab	Knock 3B
Knock 3B	GAL 76aa	Knock 3A
Knock 3C	---	Knock 3D
Knock 3D	---	Knock 3C
Knock 3E	---	Knock 3F

Knock 4	GAL 76b	Knock 4
Knock 5	---	---
North Balfern	GAL 97	North Balfern 1
Penkiln 1A	---	---
Penkiln 1B	---	---
Penkiln 2A	---	Penkiln 2A
Penkiln 2B	---	Penkiln 2B
Penkiln 3	---	Penkiln 3
Penkiln 4A	---	Penkiln 4A
Penkiln 4B	---	Penkiln 4B
Penkiln 4C	---	Penkiln 4C
Penkiln 5	---	Penkiln 5
Penkiln 6	---	Penkiln 6
Penkiln 7	---	Penkiln 7

Table 2 List of sites used to assess the study area of The Machars, with accurate coordinates for each site and source.

PROJECT ROCK REFERENCE	EASTING	NORTHING	COORD. SYSTEM	SOURCE OF COORD.
Blairbuy 1	---	---	---	---
Blairbuy 2	---	---	---	---
Blairbuy 3	237468	542333	BGS	Gazetteer
Blairbuy 4AB	236820	541980	BGS	HER
Blairbuy 4C	236834	541982	BGS	GPS
Blairbuy 5	237597	541750	BGS	Gazetteer
Blairbuy 6A	236722	542436	BGS	GPS
Blairbuy 6B1 / 6B2	236726	542433	BGS	GPS
Blairbuy 7A	237110	541350	BGS	HER
Blairbuy 8	237321	541617	BGS	HER
Blairbuy 9	---	---	---	---
Blairbuy 10	---	---	---	---
Big Balcraig 1	237767	544380	BGS	GPS
Big Balcraig 1B	237761	544382	BGS	HER
Big Balcraig 2	237358	544005	BGS	GPS
Big Balcraig 3 ABC	237629	544321	BGS	GPS
Big Balcraig 4	237527	544403	BGS	GPS
Big Balcraig 5	237526	544400	BGS	GPS
Boyach Farm	247122	536399	BGS	GPS
Broughton Mains 1	245809	545651	BGS	HER / OS Map
Broughton Mains 2	---	---	---	---
Broughton Mains 3	---	---	---	---
Broughton Mains 4	---	---	---	---
Broughton Mains 5	---	---	---	---
Claunch 1	242738	548120	BGS	HER
Claunch 1A	242750	548090	BGS	HER
Claunch 2	242900	548450	BGS	HER
Claunch 3	242740	548563	BGS	HER
Claunch 4	242808	548113	BGS	GPS
Claunch 5	242812	548117	BGS	GPS
Claunch 6	242750	548270	BGS	HER
Claunch 7	242814	548140	BGS	HER
Claunch 8	242726	548488	BGS	GPS
Claunch 10	242795	548537	BGS	GPS
Culnoag 1	241738	546927	BGS	GPS
Culnoag 2	---	---	---	---
Culnoag 3	---	---	---	---
Culscadden 1	247132	548486	BGS	GPS
Culscadden 2	247135	548487	BGS	GPS

Drummoral	246488	536701	BGS	HER
Drumtroddan 1.1	236262	544739	BGS	GPS
Drumtroddan 1.2	236262	544739	BGS	GPS
Drumtroddan 1.3	236262	544739	BGS	GPS
Drumtroddan 1.4	236262	544739	BGS	GPS
Drumtroddan 1.5	236262	544739	BGS	GPS
Drumtroddan 1.6	236262	544739	BGS	GPS
Drumtroddan 1.6A	236262	544739	BGS	GPS
Drumtroddan 1.7	236262	544739	BGS	GPS
Drumtroddan 1.8	236262	544739	BGS	GPS
Drumtroddan 1.9	236262	544739	BGS	GPS
Drumtroddan 1.10	236262	544739	BGS	GPS
Drumtroddan 1.11	236262	544739	BGS	GPS
Drumtroddan 1.12	236262	544739	BGS	GPS
Drumtroddan 2A	236284	544719	BGS	GPS
Drumtroddan 2B	236283	544714	BGS	GPS
Drumtroddan 2C	236281	544714	BGS	GPS
Drumtroddan 2D	---	---	---	---
Drumtroddan 3A	236194	544696	BGS	GPS
Drumtroddan 3B	236194	544693	BGS	GPS
Drumtroddan 3C	236189	544697	BGS	GPS
Drumtroddan 3D	236194	544693	BGS	GPS
Drumtroddan 4	236289	544735	BGS	GPS
Drumtroddan 5	236247	544749	BGS	GPS
Eggerness 1	248657	547252	BGS	GPS
Eggerness 2	248654	547296	BGS	HER
Eggerness 4	248730	547280	BGS	HER
Eggerness 5	248635	547309	BGS	GPS
Eggerness 6	248740	548250	BGS	HER
Eggerness 7	248700	547300	BGS	HER
Gallows Outon 1	244809	542078	BGS	HER
Gallows Outon 2	244980	541930	BGS	HER
Glasserton Mains 1A	240609	537371	BGS	GPS
Glasserton Mains 1B	240609	537371	BGS	GPS
Glasserton Mains 1C	240609	537371	BGS	GPS
Glasserton Mains 1D	240609	537371	BGS	GPS
Glasserton Mains 1E	240609	537371	BGS	GPS
Glasserton Mains 1F	240609	537371	BGS	GPS
Glasserton Mains 2	240651	537487	BGS	GPS
Knock 1A	236455	540122	BGS	GPS
Knock 1B	236462	540119	BGS	GPS
Knock 2B	236523	540551	BGS	GPS

Knock 3A	236635	540571	BGS	GPS
Knock 3B	236634	540577	BGS	GPS
Knock 3C	236638	540578	BGS	GPS
Knock 3D	236637	540575	BGS	GPS
Knock 3E	236632	540573	BGS	GPS
Knock 4	236475	540532	BGS	GPS
Knock 5	---	---	---	---
North Balfern	243385	550979	BGS	GPS
Penkiln 1A	---	---	---	---
Penkiln 1B	---	---	---	---
Penkiln 2A	247860	548520	BGS	HER
Penkiln 2B	---	---	---	---
Penkiln 3	247400	547200	BGS	HER
Penkiln 4A	247260	548050	BGS	HER
Penkiln 4B	247300	548100	BGS	HER
Penkiln 4C	247300	548100	BGS	HER
Penkiln 5	247420	547160	BGS	HER
Penkiln 6	247900	548400	BGS	HER
Penkiln 7	247900	548480	BGS	HER

Table 3 List of sites used to study The Machars and in which types of analysis they feature.

PROJECT ROCK REFERENCE	P/A MATRIX	PHOTOGRAMMETRY	RTI	GIS ANALYSIS	NETWORK ANALYSIS
Blairbuy 1	X	---	---		X
Blairbuy 2	X	---	---		X
Blairbuy 3	X	---	---	X	X
Blairbuy 4AB	X	---	---	X	X
Blairbuy 4C	X	---	---	X	X
Blairbuy 5	X	---	---	X	X
Blairbuy 6A	X	---	---	X	X
Blairbuy 6B1 / 6B2	X	---	X	X	X
Blairbuy 7A	X	---	---	X	X
Blairbuy 7B	X	---	---	---	X
Blairbuy 8	---	---	---	X	---
Blairbuy 9	---	---	---	X	---
Big Balcraig 1	X	---	---	X	X
Big Balcraig 1B	---	---	---	X	
Big Balcraig 2	X	---		X	X
Big Balcraig 3 ABC	X	X	X	X	---
Big Balcraig 4	X	---	---	X	---
Big Balcraig 5	X	---	---	X	---
Boyach Farm	X	---	X	X	X
Broughton Mains 1	X	---	---	X	X
Broughton Mains 2	X	---	---	X	X
Broughton Mains 3	X	---	---	X	X
Broughton Mains 4	X	---	---	X	X
Broughton Mains 5	X	---	---	X	X
Claunch 1	X	---	---	X	X
Claunch 1A	X	---	---	X	X
Claunch 2	X	---	---	X	X
Claunch 3	X	---	---	X	X
Claunch 4	X	X	X	X	X
Claunch 5	X	X	---	X	X
Claunch 6	X	---	---	X	X
Claunch 7	X	---	---	X	X
Claunch 8	X	---	---	X	X
Claunch 10	X	---	---	X	X
Culnoag 1	X	X	X	X	X
Culnoag 2	X	---	---	---	X
Culnoag 3	X	---	---	---	X
Culscadden 1	X	---	X	X	X
Culscadden 2	X	---	X	X	X
Drummoral	X	---	---	X	X
Drumtroddan 1.1	X	X	---	X	X
Drumtroddan 1.2	X	X	---	X	X
Drumtroddan 1.3	X	X	---	X	X
Drumtroddan 1.4	X	X	---	X	X
Drumtroddan 1.5	X	X	---	X	X

Drumtroddan 1.6	**X**	**X**	---	**X**	**X**
Drumtroddan 1.6A	**X**	**X**	---	**X**	**X**
Drumtroddan 1.7	**X**	**X**	---	**X**	**X**
Drumtroddan 1.8	**X**	**X**	---	**X**	**X**
Drumtroddan 1.9	**X**	**X**	---	**X**	**X**
Drumtroddan 1.10	**X**	**X**	---	**X**	**X**
Drumtroddan 1.11	**X**	**X**	---	**X**	**X**
Drumtroddan 1.12	**X**	**X**	---	**X**	**X**
Drumtroddan 2A	**X**	**X**	---	**X**	**X**
Drumtroddan 2B	**X**	**X**	---	**X**	**X**
Drumtroddan 2C	**X**	**X**	---	**X**	**X**
Drumtroddan 2D	**X**	---	---	---	**X**
Drumtroddan 3A	**X**	**X**	---	**X**	**X**
Drumtroddan 3B	**X**	**X**	---	**X**	**X**
Drumtroddan 3C	**X**	**X**	---	**X**	**X**
Drumtroddan 3D	**X**	**X**	---	**X**	**X**
Drumtroddan 4	**X**	**X**	---	**X**	**X**
Drumtroddan 5	**X**	---	---	**X**	**X**
Eggerness 1	---	**X**	---	**X**	---
Eggerness 2	---	---	---	**X**	---
Eggerness 4	---	---	---	**X**	---
Eggerness 5	---	**X**	---	**X**	---
Eggerness 6	---	---	---	**X**	---
Eggerness 7	---	---	---	**X**	---
Gallows Outon 1	**X**	---	---	**X**	**X**
Gallows Outon 2	**X**	---	---	**X**	**X**
Glasserton Mains 1A	**X**	**X**	---	**X**	**X**
Glasserton Mains 1B	**X**	**X**	---	**X**	**X**
Glasserton Mains 1C	**X**	**X**	---	**X**	**X**
Glasserton Mains 1D	**X**	**X**	---	**X**	**X**
Glasserton Mains 1E	**X**	**X**	---	**X**	**X**
Glasserton Mains 1F	**X**	**X**	---	**X**	**X**
Glasserton Mains 2	**X**	---	---	**X**	**X**
Knock 1A	**X**	**X**	---	**X**	**X**
Knock 1B	**X**	---	---	**X**	**X**
Knock 2B	**X**	---	---	**X**	**X**
Knock 3A	**X**	**X**	**X**	**X**	**X**
Knock 3B	**X**	**X**	**X**	**X**	**X**
Knock 3C	**X**	---	---	**X**	**X**
Knock 3D	**X**	---	**X**	**X**	**X**
Knock 3E	**X**	---	---	---	**X**
Knock 4	**X**	**X**	**X**	**X**	**X**
Knock 5	**X**	---	---	---	**X**

North Balfern	**X**	**X**	**X**	**X**	**X**
Penkiln 1A	**X**	---	---	---	**X**
Penkiln 1B	**X**	---	---	---	**X**
Penkiln 2A	**X**	---	---	**X**	**X**
Penkiln 2B	**X**	---	---	---	**X**
Penkiln 3	---	---	---	**X**	---
Penkiln 4A	**X**	---	---	**X**	**X**
Penkiln 4B	**X**	---	---	**X**	**X**
Penkiln 4C	---	---	---	**X**	---
Penkiln 5	---	---	---	**X**	---
Penkiln 6	---	---	---	**X**	---
Penkiln 7	---	---	---	**X**	---

2.2. ROMBALDS MOOR (WEST YORKSHIRE, ENGLAND)

Table 4 List of sites located in Rombalds Moor used in this study and the correspondence with other catalogues, namely the Ilkley Archaeology Group 2003 and the England Rock Art project.

NO.	PROJECT ROCK REFERENCE	IAG	ERA
1	***Baildon Moor 1***	---	---
2	***Low Plain 23***	173	Low Plain 23 (2402)
3	***Low Plain 08***	155	Low Plain 08 (2389)
4	***Baildon Moor 2***	---	---
5	***Low Plain 31***	184	Low Plain 31 (2409)
6	***Low Plain 06***	---	Low Plain 06 (2483)
7	***Low Plain 02***	150	Low Plain 02 (2481)
8	***Baildon moor***	---	---
9	***Dobrudden 10***	154	Dobrudden 10 (2477)
10	***Dobrudden 02***	145	Dobrudden 02 (2469)
11	***Dobrudden 04***	146	Dobrudden 04 (2471)
12	***Low Plain 19***	169	Low Plain 19 (2485)
13	***Low Plain 16***	166	Low Plain 16 (2396)
14	***Haystacks***	302	Pancake Ridge 05 (2567)
15	***Pancake Ridge 03***	298	Pancake Ridge 03 (2569)
16	***Planets Rock***	295	Pancake Ridge 01 (2571)
17	***Pancake Ridge 02***	297	Pancake Ridge 02 (2570)
18	***Cow and Calf 10***	---	Cow and Calf 02 (2419)
19	***Ilkley Moor 1***	318	---
20	***Cow and Calf 05***	312 (?)	Cow and Calf 05 (2414)
21	***Ilkley Moor 2***	313	---
22	***Idol Stone 01***	322	Idol Stone 1
23	***Ilkley Moor 3***	---	---
24	***Idol Stone 02***	---	---
25	***Idol Stone 03***	---	---
26	***Idol Stone 04***	325	---
27	***Ilkley Moor 4***	319	---
28	***Whaleback Stone***	317	Green Crag Slack 02 (2591)
29	***Ilkley Moor 5***	---	---
30	***Pancake Stone***	---	Pancake Stone 01 (2560)
31	***Hangingstones Rock***	284	Hangingstones Rock (2660)
32	***Backstone Beck 1***	285	Beckstone Beck 05 (2546)
33	***Backstone Beck 2***	287	Backstone Beck 06 (2548)
34	***Backstone Beck 3***	288	Backstone Beck 07 (2549)
35	***Pepperpot***	261	White Wells 03 (2346)
36	***White Wells 05***	---	White Wells 05 (2348)
37	***Willy Hall's Wood***	258	Willy Hall's Wood (2343)

38	***Barmishaw***	253	Barmishaw 02 (2333)
39	***Badger Rock 1***	250	Badger Stone (2336)
40	***Badger Rock 2***	---	---
41	***Backstone Beck 04***	---	Backstone Beck 04 (2545)
42	***GreenCrag11***	---	Green Crag Slack11 (2351)
43	***GreenCrag14***	---	Green Crag Slack 14 (2673)
44	***GreenCrag16***	---	Green Crag Slack 16 (2675)
45	***PancakeRidge07***	---	Pancake Ridge 07 (2565)

Table 5 Geogrpahical co-ordinates of the sites featuring the study, in the area of Rombalds Moor.

NO.	PROJECT ROCK REFERENCE	EASTING	NORTHING	COORD. SYSTEM	SOURCE OF COORD.
1	***Baildon Moor 1***	13748	40304	BGS	GPS
2	***Low Plain 23***	13847	40352	BGS	GPS
3	***Low Plain 08***	13770	40309	BGS	GPS
4	***Baildon Moor 2***	13737	40292	BGS	GPS
5	***Low Plain 31***	14123	40448	BGS	GPS
6	***Low Plain 06***	13759	40149	BGS	GPS
7	***Low Plain 02***	13726	40104	BGS	GPS
8	***Baildon moor***	13688	39931	BGS	GPS
9	***Dobrudden 10***	13766	39899	BGS	GPS
10	***Dobrudden 02***	13646	39807	BGS	GPS
11	***Dobrudden 04***	13667	39760	BGS	GPS
12	***Low Plain 19***	13840	40145	BGS	GPS
13	***Low Plain 16***	13832	40240	BGS	GPS
14	***Haystacks***	13028	46313	BGS	GPS
15	***Pancake Ridge 03***	12999	46317	BGS	GPS
16	***Planets Rock***	12965	46402	BGS	GPS
17	***Pancake Ridge 02***	12991	46389	BGS	GPS
18	***Cow and Calf 10***	13175	46586	BGS	GPS
19	***Ilkley Moor 1***	13224	46510	BGS	GPS
20	***Cow and Calf 05***	13173	46490	BGS	GPS
21	***Ilkley Moor 2***	13174	46492	BGS	GPS
22	***Idol Stone 01***	13266	45948	BGS	GPS
23	***Ilkley Moor 3***	13266	45948	BGS	GPS
24	***Idol Stone 02***	13264	45945	BGS	GPS
25	***Idol Stone 03***	13266	45946	BGS	GPS
26	***Idol Stone 04***	13284	45924	BGS	GPS
27	***Ilkley Moor 4***	13230	45962	BGS	GPS
28	***Whaleback Stone***	13220	45939	BGS	GPS
29	***Ilkley Moor 5***	13223	45952	BGS	GPS
30	***Pancake Stone***	13405	46232	BGS	GPS
31	***Hangingstones Rock***	12815	46763	BGS	GPS
32	***Backstone Beck 1***	12821	46193	BGS	GPS
33	***Backstone Beck 2***	12830	46167	BGS	GPS
34	***Backstone Beck 3***	12835	46150	BGS	GPS
35	***Pepperpot***	11810	46549	BGS	GPS
36	***White Wells 05***	11818	46565	BGS	GPS
37	***Willy Hall's Wood***	11583	46590	BGS	GPS
38	***Barmishaw***	11195	45423	BGS	GPS
39	***Badger Rock 1***	11072	46051	BGS	GPS

40	***Badger Rock 2***	11104	46132	BGS	GPS
41	***Backstone Beck 04***	12738	46249	BGS	ERA
42	***GreenCrag11***	13647	45929	BGS	ERA
43	***GreenCrag14***	13668	46015	BGS	ERA
44	***GreenCrag16***	13739	45904	BGS	ERA
45	***PancakeRidge07***	13254	46214	BGS	ERA

Table 6 List of sites and the type of analysis developed in the study, in each the feature.

NO.	PROJECT ROCK REFERENCE	P/A MATRIX	PHOTOGRAMMETRY	RTI	GIS ANALYSIS	NETWORK ANALYSIS
1	*Baildon Moor 1*	X	X	---	X	X
2	*Low Plain 23*	X	X	---	X	X
3	*Low Plain 08*	X	---	---	X	X
4	*Baildon Moor 2*	X	---	---	X	X
5	*Low Plain 31*	X	X	---	X	X
6	*Low Plain 06*	X	X	---	X	X
7	*Low Plain 02*	X	X	---	X	X
8	*Baildon moor*	X	---	---	X	X
9	*Dobrudden 10*	X	X	---	X	X
10	*Dobrudden 02*	X	X	---	X	X
11	*Dobrudden 04*	X	X	---	X	X
12	*Low Plain 19*	X	X	---	X	X
13	*Low Plain 16*	X	X	---	X	X
14	*Haystacks*	X	X	---	X	X
15	*Pancake Ridge 03*	X	X	---	X	X
16	*Planets Rock*	X	X	---	X	X
17	*Pancake Ridge 02*	X	---	---	X	X
18	*Cow and Calf 10*	X	---	---	X	X
19	*Ilkley Moor 1*	X	X	---	X	X
20	*Cow and Calf 05*	X	X	---	X	X
21	*Ilkley Moor 2*	X	X	---	X	X
22	*Idol Stone 01*	X	X	---	X	X
23	*Ilkley Moor 3*	X	---	---	X	X
24	*Idol Stone 02*	X	---	---	X	X
25	*Idol Stone 03*	X	X	---	X	X
26	*Idol Stone 04*	X	X	---	X	X
27	*Ilkley Moor 4*	X	---	---	X	X
28	*Whaleback Stone*	X	X	---	X	X
29	*Ilkley Moor 5*	X	---	---	X	X
30	*Pancake Stone*	X	X	---	X	X
31	*Hangingstones Rock*	X	X	---	X	X
32	*Backstone Beck 1*	X	X	---	X	X
33	*Backstone Beck 2*	X	X	---	X	X
34	*Backstone Beck 3*	X	X	---	X	X
35	*Pepperpot*	X	X	---	X	X
36	*White Wells 05*	X	---	---	X	X
37	*Willy Hall's Wood*	X	X	---	X	X
38	*Barmishaw*	X	X	---	X	X
39	*Badger Rock 1*	X	X	---	X	X
40	*Badger Rock 2*	X	---	---	X	X

41	***Backstone Beck 04***	**X**	---	---	**X**	**X**
42	***GreenCrag11***	**X**	---	---	**X**	**X**
43	***GreenCrag14***	**X**	---	---	**X**	**X**
44	***GreenCrag16***	**X**	---	---	**X**	**X**
45	***PancakeRidge07***	**X**	---	---	**X**	**X**

2.3. IVERAGH PENINSULA (CO. KERRY, IRELAND)

Table 7 List of sites located in Iveragh Peninsula, used in this stud and the correspondence between the different catalogues and National Monuments Service.

PROJECT ROCK REFERENCE	CATALOGUE 1996	CATALOGUE 2009	NATIONAL MONUMENTS SERVICE
Ballynahow Beg	262		KE070-056
Carhoonmeengar East		364	
Coolnaharragill Upper	268	368	KE063-013
Coomasaharn 2	270		
Coomasaharn 6	274		
Coomasaharn 9	277		
Derreeny 1	285	387	
Derrenny 3	285 A		
Derreeny 5		391	
Derreeny 7	288		
Derreeny 8		394	
Derreeny 10			
Derreeny 11		395	
Derrynablaha 1	297	04	KE082-023001
Derrynablaha 3	299	406	KE082-023003
Derrynablaha 4	302		
Derrynablaha 7	303	410	KE082-024001
Derrynablaha 8	304	411	KE082-024002
Derrynablaha 10	306		
Derrynablaha 11	307	414	KE082-026
Derrynablaha 14	310	417	KE082-029
Derrynablaha 15	311	418	KE082-030
Derrynablaha 19	314	423	KE082-034001
Derrynablaha 22	317	426	KE082-036001
Derrynablaha 22A	318	427	KE082-036002
Derrynablaha 23	319	428	KE082-037
Derrynablaha 24	320	429	KE082-038
Derrynablaha 25	321	430	KE082-067
Dromtine	323	434	KE090-040
Gortnagulla	329		
Kealduff Upper 1	330		
Kealduff Upper 2	331	445	KE071-008
Kealduff U pper 4	333	447	KE071-029
Kealduff Upper 5	334	448	KE071-030
Kealduff Upper 8	337	451	KE071-033
Kealduff Upper 9	338	452	KE071-034
Kealduff Upper 10	339	453	KE071-035
Kealduff Upper 11			KE071-071
Kealduff Upper 12	336	450	KE010-032
Kealduff Upper 13	342		

Kealduff Upper 14	346	460	KE071-042
Liss	353	470	KE071-010
Rossacoosane	358	---	---
Tullakeel 1	375	---	---
Tullakeel 2	376	---	---
Tullakeel 2B	376	---	---

Table 8 List of co-ordinates used for each site (when available) and source.

PROJECT ROCK REFERENCE	EASTING	NORTHING	COORD. SYSTEM	SOURCE OF COORD.
Ballynahow Beg	435155	584435	Irish Grid 1965	Ken Williams
Carhoonmeengar East	---	---	---	---
Coolnaharragill Upper	462284	588940	Irish Grid 1965	Megalithomania
Coomasaharn 2	---	---	---	---
Coomasaharn 6	---	---	---	---
Coomasaharn 9	---	---	---	---
Derreeny 1	476913	577588	Irish Grid 1965	GPS
Derrenny 3	476914	577588	Irish Grid 1965	GPS
Derreeny 5	---	---	---	---
Derreeny 7	476848	577560	Irish Grid 1965	GPS
Derreeny 8	476840	577579	Irish Grid 1965	GPS
Derreeny 10	476703	577430	Irish Grid 1965	Ken Williams
Derreeny 11	476933	577548	Irish Grid 1965	GPS
Derrynablaha 1	476144	577393	Irish Grid 1965	Megalithomania
Derrynablaha 3	476139	577388	Irish Grid 1965	Megalithomania
Derrynablaha 4	---	---	---	---
Derrynablaha 7	477315	577368	Irish Grid 1965	Megalithomania
Derrynablaha 8	476189	577189	Irish Grid 1965	Megalithomania
Derrynablaha 10	---	---	---	---
Derrynablaha 11	476383	577297	Irish Grid 1965	GPS
Derrynablaha 14	476683	57741	Irish Grid 1965	Megalithomania
Derrynablaha 15	476618	577606	Irish Grid 1965	GPS
Derrynablaha 19	476930	576974	Irish Grid 1965	Megalithomania
Derrynablaha 22	476219	576703	Irish Grid 1965	GPS
Derrynablaha 22A	476219	576703	Irish Grid 1965	GPS
Derrynablaha 23	476446	576704	Irish Grid 1965	GPS
Derrynablaha 24	476681	576738	Irish Grid 1965	GPS
Derrynablaha 25	476688	576738	Irish Grid 1965	Megalithomania
Dromtine	466805	570198	Irish Grid 1965	GPS
Gortnagulla	---	---	---	---
Kealduff Upper 1	---	---	---	---
Kealduff Upper 2	462539	586291	Irish Grid 1965	GPS
Kealduff Upper 4	462599	586433	Irish Grid 1965	Megalithomania
Kealduff Upper 5	462579	586340	Irish Grid 1965	GPS
Kealduff Upper 8	462622	586323	Irish Grid 1965	Megalithomania
Kealduff Upper 9	462511	586302	Irish Grid 1965	GPS
Kealduff Upper 10	462524	586304	Irish Grid 1965	---
Kealduff Upper 11	462669	586212	Irish Grid 1965	GPS
Kealduff Upper 12	462580	586384	Irish Grid 1965	Megalithomania

Kealduff Upper 13	---	---	---	---
Kealduff Upper 14	462599	586183	Irish Grid 1965	Megalithomania
Liss	460841	561988	Irish Grid 1965	GPS
Rossacoosane	---	---	---	---
Tullakeel 1	---	---	---	---
Tullakeel 2	---	---	---	---
Tullakeel 2B	---	---	---	---

Table 9 List of carved panels and the analysis in which each of them features.

PROJECT ROCK REFERENCE	P/A MATRIX	PHOTOGRAMMETRY	RTI	GIS ANALYSIS	NETWORK ANALYSIS
Ballynahow Beg	X	---	---	X	X
Carhoonmeengar East	X	---	---	---	X
Coolnaharragill Upper	X	---	---	X	X
Coomasaharn 2	X	---	---	---	X
Coomasaharn 6	X	---	---	---	X
Coomasaharn 9	X	---	---	---	X
Derreeny 1	X	X	---	X	X
Derrenny 3	X	X	---	X	X
Derreeny 5	X	---	---	---	X
Derreeny 7	X	X	---	X	X
Derreeny 8	X	X	---	X	X
Derreeny 10	X	---	---	X	X
Derreeny 11	X	---	---	X	X
Derrynablaha 1	X	---	---	X	X
Derrynablaha 3	X	---	---	X	X
Derrynablaha 4	X	---	---	X	X
Derrynablaha 7	X	---	---	X	X
Derrynablaha 8	X	---	---	X	X
Derrynablaha 10	X	---	---	---	X
Derrynablaha 11	X	X	---	X	X
Derrynablaha 14	X	---	---	X	X
Derrynablaha 15	X	---	---	X	X
Derrynablaha 19	X	---	---	X	X
Derrynablaha 22	X	X	---	X	X
Derrynablaha 22A	X	X	---	X	X
Derrynablaha 23	X	X	---	X	X
Derrynablaha 24	X	X	---	X	X
Derrynablaha 25	X	---	---	X	X
Dromtine	X	X	---	X	X
Gortnagulla	X	---	---	---	X
Kealduff Upper 1	X	---	---	---	X
Kealduff Upper 2	X	X	X	X	X
Kealduff Upper 4	X	---	---	X	X
Kealduff Upper 5	X	X	---	X	X
Kealduff Upper 8	X	---	---	X	X
Kealduff Upper 9	X	X	---	X	X
Kealduff Upper 10	X	X	---	X	X
Kealduff Upper 11	X	X	---	X	X
Kealduff Upper 12	X	---	---	X	X
Kealduff Upper 13	X	---	---	---	X
Kealduff Upper 14	X	---	---	X	X
Liss	X	X	X	---	X
Rossacoosane	X	---	---	---	X

Tullakeel 1	**X**	---	---	---	**X**
Tullakeel 2	**X**	---	---	---	**X**
Tullakeel 2B	**X**	---	---	---	---

2.4. BARBANZA PENINSULA (GALICIA, SPAIN)

Table 10 List of sites used in Barbanza Peninsula and the correspondence with the main source of information for the area (Fábregas-Valcarce and Rodríguez-Rellán 2012a).

PROJECT ROCK REFERENCE	FÁBREGAS-VALCARCE AND RODRÍGUEZ-RELLÁN 2012A	AREA
A Picota		1
A Tarela	A Picota	
Agro das Cartas 2	A Tarela	
Basoñas	Basoñas	
Beira da Costa 1	Beira da Costa 1	
Beira da Costa 2	Beira da Costa 4	
Buguiña Gande	Buguiña Gande	
Cacharelas	Cacharelas	
Calderramos 1	Calderramos I	8
Calderramos 2	Calderramos III	8
Calderramos 3	Calderramos IV	8
Cova da Louza 1	Cova da Louza I	
Cova da Louza 3	Cova da Louza III	
Cova da Louza 4A	Cova da Louza IV	
Cova da Louza 4B	---	
Espiñaredo 2	Espiñaredo 2	
Espiñaredo 5	Espiñaredo 5	
Féans	Féans 7	
Fontandurin 1	Fontandurin I	7
Gurita 1	Gurita 1	
Gurita 2	Gurita 2	
Gurita 4	Gurita 4	
Igrexa	Igrexa	
Insuela	Insuela	
Lagoa	Lagoa 2	
Lamatrema	Lamatrema	7
Lamela 1	Lamela I	7
Laxe da Sartaña	Laxe da Sartaña	10
Légoa Seca	Légoa Seca 5	
Monte Dordo	Monte Dordo 1	
O Castro 1	O Castro 1	
O Castro 2	O Castro 2	
O Castro 4	O Castro 4	
Outeiro da Malda 1	Outeiro da Malda 1	
Outeiro da Malda 2	Outeiro da Malda 2	
Pedravila 1	Pedravila 1	
Petroglifo de Baroña	Petroglifo de Baroña	
Rego de Corzo 1	Rego de Corzo 1	
Rego de Corzo 3	Rego de Corzo 3	
Portela de Gourís	Portela de Gourís	

Table 11 List of carved panels used in Barbanza with associated co-ordinates and sources.

PROJECT ROCK REFERENCE	EASTING	NORTHING	COORD. SYSTEM	SOURCE OF COORD.
A Picota	505085	4734462	UTM	GPS
A Tarela	500184	4730216	UTM	FV and RR 2012a[1]
Agro das Cartas 2	498329	4726057	UTM	FV and RR 2012a
Basoñas	496218	4718748	UTM	FV and RR 2012a
Beira da Costa 1	498899	4722484	UTM	FV and RR 2012a
Beira da Costa 2	498814	4722395	UTM	FV and RR 2012a
Buguiña Gande	501256	4728133	UTM	FV and RR 2012a
Cacharelas	500375	4720538	UTM	FV and RR 2012a
Calderramos 1	498266	4726781	UTM	GPS
Calderramos 2	498116	4726842	UTM	GPS
Calderramos 3	498088	4726798	UTM	FV and RR 2012a
Cova da Louza 1	498824	4724665	UTM	FV and RR 2012a
Cova da Louza 3	499256	472924	UTM	GPS
Cova da Louza 4A	499309	4724790	UTM	GPS
Cova da Louza 4B	499309	4724790	UTM	GPS
Espiñaredo 2	497714	4724068	UTM	FV and RR 2012a
Espiñaredo 5	497744	4724085	UTM	FV and RR 2012a
Féans 7	498093	4723020	UTM	FV and RR 2012a
Fontandurin	499255	4727601	UTM	GPS
Gurita 1	498944	4727672	UTM	GPS
Gurita 2	498886	4727646	UTM	FV and RR 2012a
Gurita 4	498963	4727624	UTM	GPS
Igrexa	498709	4727617	UTM	FV and RR 2012a
Insuela	498564	4724870	UTM	FV and RR 2012a
Lagoa	496462	4719143	UTM	GPS
Lamatrema	499271	4727500	UTM	GPS
Lamela 1	498963	4727306	UTM	GPS
Laxa da Sartaña	497601	4723952	UTM	GPS
Légoa Seca	497968	4723988	UTM	FV and RR 2012a
Monte Dordo 1	499910	4729431	UTM	FV and RR 2012a
O Castro 1	498480	4722279	UTM	FV and RR 2012a
O Castro 2	498454	4722239	UTM	FV and RR 2012a
O Castro 4	498250	4722139	UTM	FV and RR 2012a
Outeiro da Malda 1	505624	4733340	UTM	FV and RR 2012a
Outeiro da Malda 2	505641	4733509	UTM	FV and RR 2012a
Pedravila	499074	4727240	UTM	FV and RR 2012a
Petroglifo de Baroña	498195	4727589	UTM	FV and RR 2012a
Rego de Corzo 1	498046	4723455	UTM	FV and RR 2012a
Rego de Corzo 3	498045	4723510	UTM	
Portela de Gourís	498638	4724001	UTM	

[1] Fábregas-Valcarce and Rodríguez-Rellán 2012a

Table 12 Table with the relation of carve rocks and the analysis in which they were used.

PROJECT ROCK REFERENCE	P/A MATRIX	PHOTOGRAMMETRY	RTI	GIS ANALYSIS	NETWORK ANALYSIS
A Picota	X	X	---	X	X
A Tarela	X	---	---	X	X
Agro das Cartas 2	X	---	---	X	X
Basoñas	X	---	---	X	X
Beira da Costa 1	X	---	---	X	X
Beira da Costa 2	X	---	---	X	X
Buguiña Gande	X	---	---	X	X
Cacharelas	X	---	---	X	X
Calderramos 1	X	X	---	X	X
Calderramos 2	X	---	---	X	X
Calderramos 3	X	X	---	X	X
Cova da Louza 1	X	---	---	X	X
Cova da Louza 3	X	---	---	X	X
Cova da Louza 4A	X	X	---	X	X
Cova da Louza 4B	X	X	---	X	X
Espiñaredo 2	X	---	---	X	X
Espiñaredo 5	X	---	---	X	X
Féans 7	X	---	---	X	X
Fontandurin	X	X	---	X	X
Gurita 1	X	X	---	X	X
Gurita 2	X	---	---	X	X
Gurita 4	X	---	---	X	X
Igrexa	X	---	---	X	X
Insuela	X	---	---	X	X
Lagoa	X	X	---	X	X
Lamatrema	X	X	---	X	X
Lamela 1	X	X	---	X	X
Laxa da Sartaña	X	---	---	X	X
Légoa Seca	X	---	---	X	X
Monte Dordo 1	X	---	---	X	X
O Castro 1	X	---	---	X	X
O Castro 2	X	---	---	X	X
O Castro 4	X	---	---	X	X
Outeiro da Malda 1	X	---	---	X	X
Outeiro da Malda 2	X	---	---	X	X
Pedravila	X	---	---	X	X
Petroglifo de Baroña	X	---	---	X	X
Rego de Corzo 1	X	---	---	X	X
Rego de Corzo 3	X	---	---	X	X
Portela de Gourís	X	---	---	X	X

2.5. MONTE FARO (VALENÇA, PORTUGAL)

Table 13 List of sites included in Monte Faro study area and their correspondence to the catalogue of Alves and Reis 2017.

GROUP NAME	PROJ. NO.	PROJECT ROCK REFERENCE	ALVES AND REIS 2017
Escaravelhão 1	**26**	***Esc.1.Rock 1***	Rock 4
Escaravelhão 1	**27**	***Esc.1.Rock2***	Rock 3
Escaravelhão 1	**28**	***Esc.1.Rock 3***	Rock 6
Escaravelhão 1	**29**	***Esc.1 – Rock 4***	Rock 7
Escaravelhão 1	**30**	***Esc.1. Rock 5***	
Escaravelhão 1	**31**	***Esc.1.Rock 6***	Rock 3
Escaravelhão 5	**1**	***Esc.5.Rock 1***	
Escaravelhão 5	**2**	***Esc.5.Rock 2***	Rock 3
Escaravelhão 5	**3**	***Esc.5. Rock 3***	
Escaravelhão 5	**4**	***Esc.5. Rock 4***	Rock 5
Escaravelhão 5	**5**	***Esc.5. Rock 5***	
Escaravelhão 5	**6**	***Esc.5.Rock 6***	Rock 8
Escaravelhão 6	**7**	***Esc.6.Rock 1***	Rock 1
Escaravelhão 6	**8**	***Esc.6.Rock 2***	Rock 2
Escaravelhão 6	**9**	***Esc.6.Rock 3***	Rock 3
Escaravelhão 6	**10**	***Esc.6.Rock 4***	Rock 4
Escaravelhão 6	**11**	***Esc.6.Rock 5***	Rock 5
Escaravelhão 6	**12**	***Esc.6.Rock 6***	Rock 6
Escaravelhão 6	**13**	***Esc.6.Rock 7***	Rock 7
Fonte Formosa	**32**	***FF. Rock 1***	Rock 3
Fonte Formosa	**33**	***FF. Rock 2***	Rock 4
Fonte Formosa	**34**	***FF. Rock 3***	Rock 5
Fonte Volide	**46**	***FV. Rock 1***	Rock 1
Fonte Volide	**35**	***FV. Rock 2***	Rock 3
Fonte Volide	**36**	***FV. Rock 3***	Rock 4
Monte da Laje	**43**	***Monte da Laje***	Monte da Laje R1
Monte dos Fortes I	**14**	***MdF1. Rock 1***	Rock 1
Monte dos Fortes I	**15**	***MdF1. Rock 2***	Rock 2
Monte dos Fortes I	**16**	***MdF1. Rock 3***	Rock 3
Monte dos Fortes I	**17**	***MdF1. Rock 4***	Rock 4
Monte dos Fortes II	**18**	***MdF2. Rock 1***	
Monte dos Fortes II	**21**	***MdF2. Rock 2***	
Monte dos Fortes II	**22**	***MdF2. Rock 4***	Rock 13
Monte dos Fortes II	**19**	***MdF2. Rock 5***	Rock 6
Monte dos Fortes II	**23**	***MdF2. Rock 6***	Rock 1
Monte dos Fortes II	**20**	***MdF2. Rock 7***	Rock 14
Monte dos Fortes II	**24**	***MdF2. Rock 8***	Rock 5
Monte dos Fortes II	**25**	***MdF2. Rock 9***	Rock 12
Pinhal do Rei	**37**	***PR. Rock 1***	Rock 2

Pinhal do Rei	**38**	***PR. Rock 2***	Rock 3
Pinhal do Rei	**39**	***PR. Rock 3***	Rock 9
Pinhal do Rei	**40**	***PR. Rock 10***	Rock 10
Santo Ovídio	**44**	***SO. Rock 1***	Rock 2
Santo Ovídio	**45**	***SO. Rock 2***	Rock 3
São Tomé	**41**	***ST. Rock 1***	Rock 1
São Tomé	**42**	***ST. Rock 2***	Rock 3
Tapada do Ouzão	**47**	***Tapada do Ouzão***	Tapada do Ouzão

Table 14 List of sites featuring the study area of Monte Faro, their co-ordinates and sources.

PROJ. NO.	PROJECT ROCK REFERENCE	EASTING	NORTHING	COORD. SYSTEM	SOURCE OF COORD.
26	***Esc.1. Rock 1***	532657	4651412	WGS 84	GPS
27	***Esc.1. Rock2***	532695	4651403	WGS 84	GPS
28	***Esc.1. Rock 3***	532659	4651409	WGS 84	GPS
29	***Esc.1. Rock 4***	532716	4651485	WGS 84	GPS
30	***Esc.1. Rock 5***	532672	4651481	WGS 84	GPS
31	***Esc.1. Rock 6***	532680	4651520	WGS 84	GPS
1	***Esc.5. Rock 1***	532395	4651578	WGS 84	GPS
2	***Esc.5. Rock 2***	532380	4651574	WGS 84	GPS
3	***Esc.5. Rock 3***	532371	4651581	WGS 84	GPS
4	***Esc.5. Rock 4***	532367	4651573	WGS 84	GPS
5	***Esc.5. Rock 5***	532319	4651565	WGS 84	GPS
6	***Esc.5. Rock 6***	-8.609510	42.015310	Datum 73	Alves & Reis 2017a
7	***Esc.6. Rock 1***	532297	4651722	WGS 84	GPS
8	***Esc.6. Rock 2***	532299	4651729	WGS 84	GPS
9	***Esc.6. Rock 3***	532299	4651730	WGS 84	GPS
10	***Esc.6. Rock 4***	532300	4651737	WGS 84	GPS
11	***Esc.6. Rock 5***	532407	4651767	WGS 84	GPS
12	***Esc.6. Rock 6***	532411	4651769	WGS 84	GPS
13	***Esc.6. Rock 7***	-8.608510	42.017290	Datum 73	Alves & Reis 2017a
32	***FF. Rock 1***	-8.593840	42.030740	Datum 73	Alves & Reis 2017a
33	***FF. Rock 2***	-8.594000	42.030860	Datum 73	Alves & Reis 2017a
34	***FF. Rock 3***	-8.593970	42.030780	Datum 73	Alves & Reis 2017a
46	***FV. Rock 1***	-8.591390	42.006370	Datum 73	Alves & Reis 2017a
35	***FV. Rock 2***	-8.590520	42.005680	Datum 73	Alves & Reis 2017a
36	***FV. Rock 3***	-8.590540	42.005680	Datum 73	Alves & Reis 2017a
43	***Monte da Laje***	-8.598110	42.006860	Datum 73	Alves & Reis 2017a
14	***MdF1. Rock 1***	534327	4650191	WGS 84	GPS

15	***MdF1. Rock 2***	534323	4650190	WGS 84	GPS
16	***MdF1. Rock 3***	534422	4650093	WGS 84	GPS
17	***MdF1. Rock 4***	534451	4650068	WGS 84	GPS
18	***MdF2. Rock 1***	534220	4649850	WGS 84	GPS
21	***MdF2. Rock 2***	534226	4649844	WGS 84	GPS
22	***MdF2. Rock 4***	534228	4649880	WGS 84	GPS
19	***MdF2. Rock 5***	534226	4649881	WGS 84	GPS
23	***MdF2. Rock 6***	534215	4649901	WGS 84	GPS
20	***MdF2. Rock 7***	534235	4649877	WGS 84	GPS
24	***MdF2. Rock 8***	-8.586770	42.000170	Datum 73	Alves & Reis 2017a
25	***MdF2. Rock 9***	-8.586660	42.000180	Datum 73	Alves & Reis 2017a
37	***PR. Rock 1***	-8.609580	42.002110	Datum 73	Alves & Reis 2017a
38	***PR. Rock 2***	-8.609560	42.002190	Datum 73	Alves & Reis 2017a
39	***PR. Rock 3***	-8.608520	42.002340	Datum 73	Alves & Reis 2017a
40	***PR. Rock 10***	-8.607430	42.003660	Datum 73	Alves & Reis 2017a
44	***SO. Rock 1***	-8.585430	42.025740	Datum 73	Alves & Reis 2017a
45	***SO. Rock 2***	-8.585220	42.025660	Datum 73	Alves & Reis 2017a
41	***ST. Rock 1***	-8.596150	42.038340	Datum 73	Alves & Reis 2017a
42	***ST. Rock 2***	-8.596130	42.039030	Datum 73	Alves & Reis 2017a
47	***Tapada do Ouzão***	-8.592950	42.010420	Datum 73	Alves & Reis 2017a

Table 15 List of sites used in Monte Faro study areas and the analysis each of the rocks were used in.

PROJ NO.	PROJECT ROCK REFERENCE	P/A MATRIX	PHOTOGRAMMETRY	RTI	GIS ANALYSIS	NETWORK ANALYSIS
26	*Esc.1.Rock 1*	X	X	X	X	X
27	*Esc.1.Rock2*	X	X	---	X	X
28	*Esc.1.Rock 3*	X	X	---	X	X
29	*Esc.1 – Rock 4*	X	X	X	X	X
30	*Esc.1. Rock 5*	X	X	---	X	X
31	*Esc.1.Rock 6*	X	X	---	X	X
1	*Esc.5.Rock 1*	X	X	---	X	X
2	*Esc.5.Rock 2*	X	X	---	X	X
3	*Esc.5. Rock 3*	X	X	---	X	X
4	*Esc.5. Rock 4*	X	---	---	X	X
5	*Esc.5. Rock 5*	X	X	---	X	X
6	*Esc.5.Rock 6*	X	X	---	X	X
7	*Esc.6 . Rock 1*	X	X	---	X	X
8	*Esc.6.Rock 2*	X	X	---	X	X
9	*Esc.6.Rock 3*	X	---	---	X	X
10	*Esc.6.Rock 4*	X	X	---	X	X
11	*Esc.6.Rock 5*	X	X	---	X	X
12	*Esc.6.Rock 6*	X	X	---	X	X
13	*Esc.6.Rock 7*	X	X	---	X	X
32	*FF. Rock 1*	X	X	---	X	X
33	*FF. Rock 2*	X	X	---	X	X
34	*FF. Rock 3*	X	X	---	X	X
46	*FV. Rock 1*	X	X	---	X	X
35	*FV. Rock 2*	X	X	---	X	X
36	*FV. Rock 3*	X	X	---	X	X
43	*Monte da Laje*	X	---	---	X	X
14	*MdF1. Rock 1*	X	X	---	X	X
15	*MdF1. Rock 2*	X	X	---	X	X
16	*MdF1. Rock 3*	X	X	---	X	X
17	*MdF1. Rock 4*	X	X	---	X	X
18	*MdF2. Rock 1*	X	X	---	X	X
21	*MdF2. Rock 2*	X	X	---	X	X
22	*MdF2. Rock 4*	X	X	---	X	X
19	*MdF2. Rock 5*	X	X	---	X	X
23	*MdF2. Rock 6*	X	---	---	X	X
20	*MdF2. Rock 7*	X	X	---	X	X
24	*MdF2. Rock 8*	X	---	---	X	X
25	*MdF2. Rock 9*	X	---	---	X	X
37	*PR. Rock 1*	X	X	---	X	X
38	*PR. Rock 2*	X	X	---	X	X
39	*PR. Rock 3*	X	X	---	X	X
40	*PR. Rock 10*	X	X	---	X	X
44	*SO. Rock 1*	X	X	---	X	X
45	*SO. Rock 2*	X	X	---	X	X

41	***ST. Rock 1***	**X**	**X**	**---**	**X**	**X**
42	***ST. Rock 2***	**X**	**X**	**---**	**X**	**X**
47	***Tapada do Ouzão***	**X**	**---**	**---**	**X**	**X**

NOTE: The 3D models of the rocks of Fonte Formosa, Fonte Volide, Pinhal do Rei, Santo Ovídio and São Tomé were created through images provided by L. B. Alves and M. Reis.

APPENDIX 3

3.1. CHRONOLOGICAL SYNCHRONIZATION

Table 16 Synchronization of the chronological systems of each of the countries included in the study. Correspondence between archaeological terminology and millennia.

	NORTHWEST IBERIA [2]	NORTHERN ENGLAND[3]	SOUTHERN SCOTLAND	IRELAND[4]
Mesolithic	10 000 – 5500 BC	9500 – 3800 cal BC	8500 BC - 3800 cal BC	8000 – 3850 BC
Early Neolithic	5500 – 4500 BC[5]	3800 cal BC[6] – 3400/3300 BC	3800[7]cal BC - 3500 BC[8]	3850/3740 cal BC[12] - 3600
Middle Neolithic	4500 – 4000 BC[9]	3400/3300 – 3000/2900 BC	3500 – 3000 BC[13]	3600 – 3100 BC[10]
Late Neolithic	4000 – 3200/2500 BC	3000/2900 – 2500/2200 BC	3000 – 2500 BC[13]	3100 - 2500 BC
Chalcolithic	3200/2500[11] – 2200 BC	2500/2200 – 2200/2150 BC	2500 – 2200 BC[13]	2500 – 2200 BC[12]
Early Bronze Age	2200 – 1950 BC	2200/2150 – 1600 BC	2200 – 1500 BC[13]	2200 – 1700 BC[14]
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[15] BC	700 BC – 100 AD	700 BC – 100 AD	500 BC – 400 AD

[2] 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.
[3] Dates were taken from Whittle (2001:58-76) for the Neolithic, Needham (2012:1-26) for the Chalcolithic and Parker Pearson (2001:76-94).
[4] Some dates were taken from irisharchaeology.ie.
[5] Taken from Rodrigues 2011:341-350; Martins *et al.* 2015.
[6] This date was taken from Bayliss *et al.* 2011:839.
[7] After Bayliss *et al.* 2011:839.
[8] After Sheridan 2012:166, 171, 174, 179.
[9] Martins *et al.* 2015
[10] Cooney 2000
[11] 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).
[12] Dates taken from Brindley 2007.
[13] 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.
[14] Cooney and Grogan 1994

3.2. List of the main chronological proposals to Atlantic Art.

AUTHOR	YEAR	COUNTRY	TERMINOLOGY	CRITERIA	CHRONOLOGY (PERIOD)	CHRONOLOGY (MILLENNIUM)	OBSERVATIONS
G Tate	1865; 1868	Britain			Neolithic; Bronze Age		Linked Northumberland's rock art to EBA on the basis of comparisons with burial structures In Argyll. Due to similarities between the carvings associated with funerary contexts and those found open-air, the latter was also dated to the BA.
M Murguia	1908						An ancient system of Celtic origins (Alves 2003:91)
I Calvo	1920	Galicia			Bronze Age		Conclusions based on the finds of carved rocks overlain by Iron Age structures.
H Obermaier	1923	Iberia (Galicia)	***Simpler Linear Designs***	Crosses and circles associated with schematic representations of humans and animals	From Epi-Palaeolithic onwards Bronze Age		Interpreted rock art as a language of profound and mysterious meaning, inscribed in sacred places.

			Circular Designs ***Complex Designs***	Concentric circles, square-shaped and oval motifs, including stylized animals Circles with radial lines and cupmarks.			
H Obermaier	1925	Iberia (Galicia)	***Ältere Grüppe*** ***Jüngere Grüppe***	Simple linear figures, crosses, square-shaped and oval images Animal figures, labyrinths and circles	Post-Neolithic/ Neolithic Bronze Age		
López-Cuevillas & Bouza-Brey	1929	Galicia		Bronze Age			Follow Obermaier's typology and focus on the analysis of individual motifs.
Serpa Pinto	1929	Portugal					Follows Obermaier's chronological proposal.
R Sobrino-Buhigas	1935	Galicia	***Period 1*** ***Period 2***	Human figures, crosses enclosed by circles *Phase 1*: roughly elaborated cup-and-rings, circles enclosing crosses and dots, stylised deer, riding scenes, with old appearance (e.g. Outeiro do Galiñeiro) *Phase 2:* Naturalistic deer, 'astronomical imagery'	From the Bronze Age to the Iron Age , mostly focusing on a Bronze Age chronology From the final moment of	2500 BC To 900 BC	e.g. Pombal, Cogoludo e.g. Lombo da Costa, As Texiñas

			Period 3	Phase 3: Labyrinths Cnossos-type labyrinths and letters *In general, follows Obermaier's proposal;* *Stresses the find of 2 copper axes found in the vicinities of carved rocks;* *Suggests imagery may have originated in the Neolithic*	Megalithism and the Bronze Age		e.g. Laxe das Lebres, Pedra Redonda, Laxe das Minas Admits existence of modern carvings such as crosses Compares iconography of Galicia with Bryn-Celli and Clynnog-Fawr (Wales), Loughcrew (Ireland) and Clava (Scotland)
E MacWhite	1946	Ireland	***Passage Tomb Art***	Coincidental distribution of rock art, copper sources, food vessel pottery and bronze axes, and the presence of panels in EBA funerary monuments provided proof for an EBA date	Early Bronze Age		(1946: 62, 68-69) Accepts previous suggestions for a BA date, namely Tate's (1865).
E MacWhite	1951	Ireland / Galicia	***Galician Group of Rock Art***	Systematic comparison between individual motifs in Irish megalithic tombs and open-air rock art	Bronze Age		Established strong links between the rock art across the Atlantic façade of Western Europe.
J Ferro Couselo	1952	Galicia	***Galician Petroglyphs***	Used historical documents referring to rock art as boundary markers.	Roman/Medieval and Modern Periods		Generalizes his observations to crosses, horseshoes,

							cupmarks and prehistoric motifs
L Monteagudo	1952	Galicia	Labyrinths		Consider some of these motifs to be Neolithic, lasting until modern days,		
S Lorenzo-Ruza	1953a	Galicia			Copper Age/ Bronze Age		Revises Obermaier's suggestion. Emphasizes Mediterranean origins. Defends a historical chronology for crosses.
S Lorenzo-Ruza	1955	Galicia/ Portugal	***Galician-Atlantic Group***	- Circular images - Animal Figures - Crosses	Neolithic origin Copper/Bronze Age Copper/Bronze Age Modern		Animal figures would have been introduced through contacts with neighbouring groups. The author accepted synchrony between Atlantic-Galician carvings, Schematic paintings and Megalithic Art.

D Simpson and J Thawley	1972	Britain	***Grave Art***		Neolithic – Early Bronze Age		
López-Cuevillas	1973 [1951]	Iberia (Galicia)		Circular Motifs →	→Middle Bronze Age		
				Zoomorphos →	→Late Bronze Age		
C G Borgna	1973	Galicia		Circular Motifs earlier than animal figures.			Chronological proposals based on the principle of precedence and relative preference. Central carvings older than peripheral ones. Horizontal stratigraphy.
M Herity	1974	Ireland	***Passage Tomb Art***		Middle Neolithic if not earlier)		Modern scientific dating. (1974: 151-3)
E Hadingham	1974	Scotland	***Cup-marks***	Passage Graves →	→Neolithic		Suggets rock art traditions were still in use in some reasons, after ceasing in others (1974:63); Suggests practice of rock art finished by the beginning of the BA in western
				Cists →	→Bronze Age		

							Scotland but persisted in eastern parts.
A Peña-Santos	1975	Galicia		Defends a synchrony between circular designs and animal figures.	Bronze Age		
M Herity and G Eogan	1977	Ireland			Bronze Age		Follow MacWhite's proposal (1977:137)
R Morris	1977 1981				Bronze Age		Rejects a Neolithic date and argues for EBA, adding that some rock art might be earlier or later. Influenced by MacWhite (1977:15; 1981: 76-7)
C B Burgess	1980	Britain	***Cup-and-ring marks***	Based his arguments on blocks with carvings in cists, etc., which had been broken from outcrops or standing stones. Therefore their use had to be earlier.	Neolithic date, at least to some carved rocks. Neolithic, ending before EBA		Argues strongly for an Early Neolithic beginning of British rock art.
E Shee Twohig	1981	Atlantic Europe	***Passage Tomb Art***		Middle Neolithic		
J Barnatt and P Reader	1982				Bronze Age		

A M Baptista	1983-84	Portugal	***Arte do Noroeste (Art of the Northwest)***	*Group I*: Motifs of spherical nature such as circular compositions, wavy lines, 'proto-labyrinths' and labyrinths, spirals, occasional weapons, semi-schematic and schematic figures, anthropomorphs and occasional idols. *Group II:* Schematic human figures, geometric-abstract images such as squares and rectangles, often with round corners or segmented in the interior with a cross.	→ Middle Bronze Age/Late Bronze Age → Late Bronze Age / Iron Age	2nd half of the 2nd mil. BC	Breaks with Anati's proposal of 1968. Group I would be geographical distributed on the coast, whereas Group II had a continental distribution.
G Eogan	1986	Ireland			Bronze Age		p. 221
S O Jorge	1986	Portugal		*About AM Baptista Group I (1983-1984):*		1st half of 2nd mil. BC, although considered that it could have originated in the 3rd mil. And lasted until the Late Bronze Age	Takes on board Cunha e Silva (1981) paper about Monte da Laje, valuing the presence of daggers, short swords, halberds, idols (EBA) and their associations to circular combinations. Re-assesses A M Baptista Group I.

							Naturally accepts Peña-Santos and Rey-García's proposal (1993).
C Burgess	1990	Iberia	***Cup-and-Rings***		Neolithic		Argued depictions of EBA weapons adjacent to cup-and-ring motifs indicate an earlier Neolithic date for the latter.
I Hewitt	1991	Ireland		Proposes the outcrops with cup-and-rings in Ireland pre-date the Boyne valley monuments			Talks of an "identity crisis" to the chronology of rock art (1991:9).
A Peña-Santos and J M Rey-García	1993	Galicia	***Galician Petroglyphs***	*Classic Iconography*	Late Copper Age to the Early Bronze Age	2nd half of the 3rd mil/ beginning of the 2nd mil BC	Short chronology based on the results of a territorial study which aimed to demonstrate the relationship between rock art and settlement sites. Supported by the chronology of depicted weapons.
A M Baptista	1995	Iberia (Portugal)		*Group 1*	Chalcolithic – Bronze Age		
A Beltrán	1995	Galicia		Riding Scenes (appear with metallurgy) →		$3^{rd}/2^{nd}$ mil. BC	The practice of carving to have lost importance in the

				Weapons (comparison between weapons from Conxo and Wessex) Halberds (comparisons in southern Iberia).		Transition between 3rd / 2nd mil. BC Beginning od 2nd mil. BC)	Iron Age, during the 9th and 7th centuries BC, judging by overlain carved rocks and others used in constructions.
A O'Sullivan and J Sheehan	1996	Ireland			Late Neolithic		Follows Simpson and Thawley 1972.
Peña-Santos and Rey-Garcia	1997	Galicia		Megalithic art to precede 'Galician group of rock art'			Re-evaluation of the relationship between open-air carvings and depictions in stone-built monuments.
R Bradley	1997	British Isles; Ireland; Iberia	***Atlantic Rock Art*** ***Atlantic Rock Art*** ***Atlantic Rock Art***	Accepts the chronology proposed by Peña-Santos and Rey-Garcia	Neolithic to the Bronze Age	3300 BC 3300 BC, remaining important into the early 2nd millennium BC End of the 3rd/beginning of the 2nd millennium BC (1997:208)	1997: 65 Places the appearance of Atlantic Rock Art in the 4th millennium BC, in parallel with the megalithic monuments of Ireland. Still in use in the Early Bronze Age. It does not survive the 1st millennium BC (1997:66).

A M S Bettencourt and M J Sanches	1998	Portugal			Bronze Age		Follow A de la Peña-Santos
C Waddington	1998/1999	Britain		Explored the relationship between rock art and range of other Neolithic and BA sites.	Early Neolithic origin		Used cupmarks to date rock art (1998)
S Beckensall	1999/2002	Britain	***British Rock Art***		Neolithic origin used until Bronze Age, which is the main period.	4th to the end of the 2nd millennium BC	Argues for a long tradition.
A Peña-Santos and J M Rey-García	2001	Galicia	***Galician Petroglyphs***	The largest cicle of rock art would have taken place in late stages of prehistory.	Bronze Age / Iron Age		Authors widened slightly their previous proposal dated to 1993. This suggestion was controversial amongst Galician researchers.
A Purcell	2002	Ireland			Late Neolithic		Does not discuss chronology, simply accepting other proposals (e.g. Simpson and Thawley 1973; Johnston 1989; O'Sullivan and Sheehan 1996)

L B Alves	2003	Iberia	***Atlantic Art Tradition***	Contrasted prehistoric traditions in NW Iberia: Atlantic, Schematic and Megalithic. Does not discard the use of iconography in later periods, after EBA.	Neolithic – developing through the Copper Age/ Early Bronze Age	4th millennium BC for the origin of the cup-and-ring motifs.	In association with the expansion of an 'Atlantic Cosmology' (Scarre 2002).
A M Jones	2006	Britain			Late Neolithic / Early Bronze Age	3000 – 1500 BC	Establishes connections between images of similar character found on certain forms of Late Neolithic pottery and on a series of specialized portable artefacts (2006: 214).
B O'Connor	2006	Ireland	***Atlantic Art***	Neolithic date to the origin of 'quintessential' Atlantic Art.	Middle to Late Neolithic – Early Bronze Age		Rock art to have fallen out of favour during Bronze Age, when it is positioned n hidden places of passage tombs (2006:50). Combination of results from a multi-scalar perspective. Study includes geophysical surveys and excavations revealing Neolithic pits.

							Study of 'interrelated traditions'.
L B Alves	2008	Iberia	***Atlantic Art Tradition***	Considered the existence of two traditions, one geometric and present in Megalithic and open-air art; the other of figurative nature and depicted in Megaliths and Schematic Art		4^{th} millennium BC	
M Santos-Estévez	2008	Galicia	***Atlantic Rock Art Style***	Mostly composed by abstract motifs such as cupmarks, concentric circles with or without radials, simple circular compositions, spirals and labyrinths.			
			Schematic Atlantic Rock Art Style	Comprised mainly animal figures and weapons			
M Santos-Estévez	2010	Galicia	***Atlantic Style***	First Group with two kinds of panels: - One with cup-and-ring (as in Ireland and UK) and weapons; - Second group with cup-and-rings, hunting scenes,	Late Neolithic / EBA	Between the 8^{th} and the $5^{th}/4^{th}$ centuries BC	Based on the excavations of Laxe de Os Carballos A number of motifs are ascribed to the Iron Age period. Comparisons with Valcamonica.

				riding scenes and labyrinths			Scandinavian, Valcamonica and Galician rock art to be contemporary of each other in the 1st half of the 1st millennium. Suggests British rock art disappears in the EBA.
L B Alves	2012b	Iberia	***Iberian Atlantic Art***				Argues for a long longevity of abstract motifs in Iberia, known to Neolithic tombs and lasting until the Iron Age (2012b:210).
Fábregas-Valcarce and Rodríguez-Rellán	2012b	Iberia	*Circles* *Boxed U's* *Single circles within oval enclosure* *Riding Scenes* *Weapons (halberds and daggers)*	→	4th/early 3rd millennium, persisting until the 3rd/2nd millennium BC 3rd millennium BC 2200 – 2050 BC		Admits the possibility that Atlantic Art may have originated in the mid-4th millennium BC, being used until the mid 2nc millennium BC (2012: 91).

				• *Halberds (based on British evidence)* • *Argar Culture* • *Daggers*	2000 – 1800 BC 3rd millennium BC		
M Santos-Estévez	2013	Galicia	***Atlantic Art Style***	*Phase 1 - Circles* Two moments for circular combinations, one complex and the second with simpler combinations associated with deer. Oldest motifs were cupmarks, concentric circles, cup-and-rings, ovals and wavy grooves. *Phase 2 – Weapons*	Neolithic/Late Neolithic to Bronze Age	3rd mil BC, some maybe earlier, with origin in the 4th mil BC. 2500 – 1800 BC	Takes into account connections between megalithic monuments and open-air rock art. Analysis of surfaces and motif distribution based on Borgna's principles. Follows Fredell's suggestions that based on observations of horizontal stratigraphy, concluding that more complex and bigger circles are earlier than deer, contemporary of smaller and more simple circles. Bronze Age demonstrated through weapons.

				Incorporation of weapons during the Bronze Age (daggers, swords and halberds) ↓ *Phase 3 – Animals (Os Carballos – LBA)* Excavations of Campo Lameiro showed one moment of use. Excavations + chronology ascribed to horse riding. Labyrinths, riding scenes. ↓ Two phases of disappearance, depending on the area.	LBA / 1st Iron Age and part of 2nd Iron Age.	8th / 6th centuries BC	Possibility of idols belonging to the same period since they are often associated with weapons. Quadrupeds in general should not be older than the 9th century. Animal to belong to only one chronological moment. Sub-styles or formal variants of quadrupeds have a local distribution and those sub-styles rarely share the same locality (p.224). Riding scenes, labyrinths belonging to the last stage of this phase. N.B. The sequence should not be interpreted as a succession of phases

							that suppress earlier ones (p.226).
R Fábregas-Valcarce And C Rodríguez-Rellán	2015	Iberia	*Idols*	Existence of motifs with known parallels in the archaeological record.		3300 BC	
			Metal Weapons	Comparisons with similar examples from other areas; Archaeological information recorded at the foot of the carved panels or immediate surroundings.		2nd half of the 3rd millennium BC	Weapons often associated (c. 50%) with hard core of Galician carvings, reinforcing its chronology in the 3rd millennium BC
			Riding Scenes			Transition between 3rd to 2nd millennium BC	Discusses this matter in detail in Fábregas-Valcarce *et al.* 2011
			Circular Combinations	Suggests the root of circles may be regional megalithic art			
			Cup-marks	Associated with megaliths but also associated to historic periods.			

Table 17 Sobrino-Buhígas chronological proposal for Galician rock art ([1935] 2000)

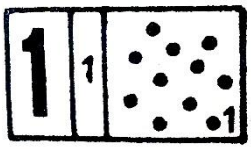
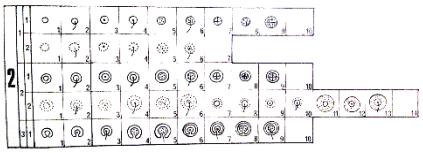
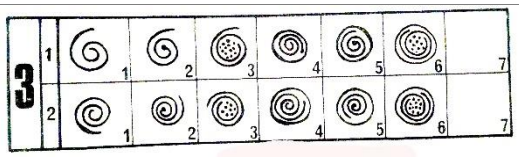
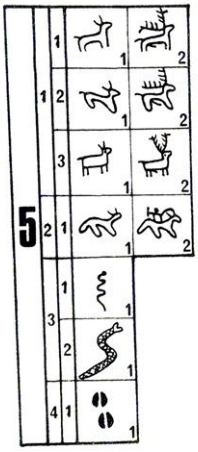
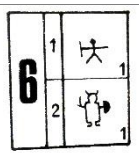
PRIODIZATION		TYPE OF MOTIFS	CHRONOLOGY (PERIOD)	CHRONOLOGY (MILLENIUM)
Period 1		Human figures, crosses enclosed by circles	Admits origin of rock art in the Neolithic (Megalithism) but ascribes motifs, in general, to the Bronze Age.	2500 BC To 900 BC
Period 2	Phase 1	Cup-and-ring motifs, circles enclosing circles, circles enclosing dots, stylised deer, riding scenes (i.e. Pombal, Cogoludo).		
	Phase 2	Naturalistic deer, 'astronomical imagery' (i.e. Lombo da Costa, As Texiñas)		
	Phase 3	Labyrinths (Laxe das Lebres, Pedra Redonda, Laxe das Minas)		
Period 3		Cnossos-type labyrinths and letters.		

Table 18 Detailed description of Anati's chronological phases for Iberia, based on an evolutionary framework similar to the one the author developed for Valcamonica (Italy).

ANATI'S EVOLUTIONARY CHRONOLOGICAL FRAMEWORK FOR IBERIA				
I	Archaic Phase	Epipaleolithic	6000 – 3500 BC	Sub-naturalistic animal figures.
II	Stylised-dynamic Phase	Neolithic	3500 – 2000 BC	Schematic human and animal figures; hunting scenes.
III	Idols and Daggers Phase	Chalcolithic / Early Bronze Age	2000 – 1500 BC	Cylindrical idols; weapons.
IV	Circles and lines Phase	Middle to Late Bronze Age	1500 – 900 BC	Circle iconography and linear grooves.

V	Geometric-Symbolic Phase	Iron Age	900 – 100 BC	Crosses, *phi* figures, horseshoe shapes, simple circles, cup-marks.

Table 19 Detail of chronological proposal by Peña-Santos and Vázquez-Varela (1979), according to their typologies.

TYPE OF MOTIFS		CHRONOLOGY	TYPOLOGICAL TABLE
Cup-marks		The authors do not ascribe a specific chronology for cup-marks, acknowledging the wide use of the motifs in a variety of contexts.	
Circular Combinations		From the End of Megalithism to the Early Iron Age.	
Spirals		Chalcolithic / Bronze Age	
Labyrinths		Late Bronze Age	
Animals	*1. Deer*	Chalcolithic / Bronze Age	
	2.Horses/ Riding Scenes	Late Bronze Age / Iron Age	
	3.Serpents	Iron Age	
	4.Hoof Prints	Bronze Age	
Human Figures		Bronze Age, although Iron Age for riding scenes.	
Idols		Eneolithic/Bronze Age	

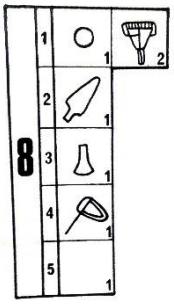
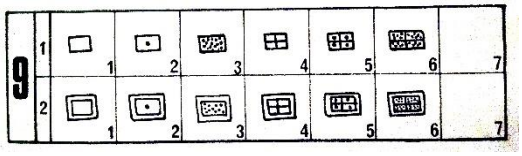
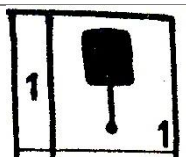
Weapons	*1.Shields*		
	2. Daggers / Short swords	Aeneolithic until Bronze age	
	3. Axes	Bronze Age	
	4.Halberds	1700 – 1750 BC / Bronze Age	
Squares		Suggests a prehistoric chronology for some examples (i.e. Portela da Laxe), but acknowledges that a large percentage is modern.	
Palettes		Late Bronze Age / Early Iron Age	
Swastikas		Late Bronze Age	
Footprints		The authors consider that some footprints are prehistoric due to their relationship with other motifs on the rocks, but agree that in other cases these can be modern.	

Table 20 Detail of chronological proposal by Santos-Estévez for Galicia (2013)

PHASES	GROUP OF MOTIFS	CHRONOLOGY	CRITERIA
Phase 1	*Circles*	3rd millenium, but the author admits a possible origin on the 4th millenium.	Considers connections between Megalithic Architecture and Atlantic Art; Surface and motif distribution analysis according to Borgna's principles; Follows Fredell's (2013) suggestion based on horizontal stratigraphy, in which more complex and larger circle belong to an earlier period than deer, the latter being contemporary of smaller and more simple circles.
Phase 2	*Weapons*	2500 – 1800 BC	
Phase 3	*Quadrupeds*	8th/6th centuries BC	Based on the excavations of *Laxe de Os Carballos.*
	Riding Scenes	After the 1st millennium BC.	Follows the argument that cavalry is not documented in Europe until 1000 BC (Anthony and Brown 2007 cit. Santos-Estévez 2013).

APPENDIX 4

FIELDWORK: RECORDING SITE SHEET

The same site sheet was used throughout the several fieldwork campaigns in the various study areas. The main objective was to collect a similar amount of information between these that would then be comparable to each other. As such, a comparable type of detail was necessary. In some cases the site sheets were previously filled out with available information in order to ease the organization of data and the fieldwork itself. Small details would be changed for each study area, relating to specific bibliography or existing catalogue numbers.

The site sheets were designed in order to record information at various scales, from the motifs to the medium and the wider landscape. They were structured taking into consideration the characteristics of each of the study areas, the information required to carry out the different types of analysis. Other elements were included, following the model of ERA site sheet, available at their website.

1.IDENTIFICATION

Name	Field Number	Database Number	Area	Page (Other Ref)

2. GEOGRAPHICAL LOCATION

Co-Ordinates	X / Eastings	Y / Northings	Altitude	Coord. System

3. GEOMORPHOLOGY

Topography	Highlands	Lowlands	In Between

Geology Type	Granite	Schist	Quartz	Sandstone	Limestone	Other

Geology Details	Type Grain	Colour	Inclusions	Observations

Landscape Situation/ Relief	Bottom (Valley)	Flat (Plain)	Slope	Spur	Top (Summit/ Hill)	Middle (Hillside)	Other

Water Resources	Spring	Dist. (m)	Watercourse	Dist. (m)	Lake	Dist. (m)	Sea	Dist. (m)

Vegetation Cover	
Reference points in the landscape?	
Orientation of panel slope	

LAND USE	Heathland/ Moorland	Bog/ Marsh	Wood/ Forrest	Unmanaged Grassland	Improved Pasture	Arable	Other

DESCRIPTION/OBSERVATIONS

4. INDIVIDUAL SITE DESCRIPTION

4.1. ROCK MEDIUM

Geology of rock	
Colour	
Orientation of Panel	
Shape of rock	

DISTANCE TO THE GROUND	Close to the Ground	At a distance from the ground	Distance from the ground (m)

OTHER CHARACTERISTICS				
Fissures/Cracks	**Yes**		**No**	
Natural Hollows	**Yes**		**No**	
Visible Bedding Plains	**Yes**		**No**	
Grain	**Fine**	**Medium**	**Large**	
Visible Components	**Yes**		**No**	

SURFACE TOPOGRAPHY	Horizontal	Vertical	Flat	W/ Inclination	Other

DIMENSIONS	Length (m)	Breadth (m)	Depth (m)

MEDIUM SCALE ANALYSIS

	Yes	No	More Details
Does the rock stand out?			
Relationship of carvings with natural features?			
Similarity with other carved rocks?			

4.2. DECORATED SURFACE

ART IN THE LANDSCAPE	Boulder	Outcrop	Shelter/Cliff	Other
ART IN A STRUCTURE	Burial Cairn	Standing Stone	Stone Circle	Other
ART ON PORTABLE STONE	Burial Cairn	Surface Find	Unknown	Other Context

CARVED ROCK SURFACE

Horizontal		Rough		Concave	
Vertical		Plain		Other	
Smooth		Convex			

ARTIFICIAL PREPARATION

	Pecking	Incision	Smoothing/ Abrasion	Combination of:
CARVING TECHNIQUES				

TOOL MARKS VISIBLE?	Yes	No	Description

MOTIFS

Type of Motifs (see annex)			
Number of Motifs			
Distribution of Motifs			
Internal Orientation of the composition?	**Yes**	**No**	
Dimension of Main Motifs			
BRIEF DESCRIPTION (surface morphology + Carvings)			

NATURAL FISSURES PRESENT

	Fissures/Cracks	Natural Hollows	Bedding planes	Weathering Channels	Solution holes	Others
Dominant Orientation						

SURFACE COMPACTNESS

Unconsolidated	Very Friable	Friable	Hard

VISIBLE COMPONENTS

Quartz	Feldspar	Mica	Other

MICRO SCALE ANALYSIS

	YES	NO	MORE DETAILS
Superimpositions?			
Preference on the orientation of tails?			
Preference on the orientation of other motifs?			
Differences in Patina?			
Do Motifs have a 3D character?			
Use of natural features to create motifs?			

3. CURRENT CONDITION

PHYSICAL/CHEMICAL WEATHERING	EXTENT OF IMPACT ACROSS EXPOSED AREA				EXTENT OF IMPACT ACROSS CARVED AREA			
	None	< 1/3	1/3 – 2/3	>2/3	None	< 1/3	1/3 – 2/3	>2/3
Differential (hollows and channels)								
Planar (scaling/flaking)								
Cratering/Pitting								
Burnt Areas								

BIOLOGICAL COVERAGE	EXTENT OF IMPACT ACROSS EXPOSED AREA				EXTENT OF IMPACT ACROSS CARVED AREA			
	None	< 1/3	1/3 – 2/3	>2/3	None	< 1/3	1/3 – 2/3	>2/3
Lichen								
Moss								
Algae								
Grass/Turf patches								

ANIMAL/HUMAN IMPACT	EXTENT OF IMPACT ACROSS EXPOSED AREA				EXTENT OF IMPACT ACROSS CARVED AREA			
	None	< 1/3	1/3 – 2/3	>2/3	None	< 1/3	1/3 – 2/3	>2/3
Wear (rubbing/tramping)								
Chips or scratches								
Graffiti (carved)								
Graffiti (painted)								
Quarrying								
Plough marks								

5. SPATIAL ANALYSIS

VISIBILITY AND INTERVISIBILITY

NORTH	
SOUTH	
EAST	
WEST	

	IS THE ROCK (MEDIUM) VISIBLE AT THE DISTANCE OF:		**ARE THE MOTIFS VISIBLE AT THE DISTANCE OF:**	
	Yes	**No**	**Yes**	**No**
10 m				
30 m				
50 m				
100 m				
Observations				

OBSERVATIONS OF FIELDWALK IN THE SURROUNDINGS

INCLINATION/SLOPE

	Plain/Flat	Smooth	Accentuated	Very Accentuated
Carved Panel				
Rock Medium				
Slope/Terrain				
Observations				

LARGE SCALE ANALYSIS

	Yes	No	More Details	
Does the rock stand out in the landscape?				
Relationship with other archaeological sites?			**Distance (m)**	
Relationship with natural features?			**Distance (m)**	
Proximity to other carved rocks?			**Distance (m)**	
Intervisibility with other carved rocks?			**Orientations**	
Intervisibility with other archaeological sites?			**Orientations**	
Preferential orientation of viewsheds?			**Orientations**	
Is the rock accessible?				
Rock situated in routeway of pathway?				
Discrete location in landscape?				
Evident location in landscape?				
Large audiences at site?				
Large audiences looking at motifs?				

6. SENSORIAL AND EMOTIONAL EXPERIENCE

DOES THE ROCK REVERBERATE?

Yes		**Type of Sound**
Instrument used to hit rock		
Projection of sound (d)		
No		

WHAT KIND OF BODY ENGAGEMENT IS NEEDED TO EXPERIENCE THIS ROCK?

HOW DO YOU FEEL WHEN EXPERIENCING THIS ROCK? (TICK ALL THE APPROPRIATE)

POSITIVE FEELINGS									
Happiness		**Able**		**Pleasure**		**Fascinated**		**Determined**	
Delight		**Expectant**		**Pleasant**		**Awe**		**Contented**	
Thrill		**Relieved**		**Excited**		**Inspired**		**Grateful**	
Exhilarated		**Confident**		**Surprised**		**Positive**		**Love**	
Hopeful		**Strong**		**Enthusiastic**		**Beautiful**		**Humorous**	
Satisfaction		**Relaxed**		**Interested**		**Energetic**		**Sympathy**	
Empathy		**Playfulness**		**Pride**		**Eager**		**Lively**	

NEGATIVE FEELINGS									
Concerned		**Tired**		**Exhausted**		**Uncomfortable**		**Annoyed**	
Worry		**Pressured**		**Shocked**		**Dissatisfied**		**In rage**	
Anxious		**Confused**		**Panicked**		**Disappointed**		**Drained**	
Stressed		**Upset**		**Hesitant**		**Doubtful**		**Jumpy**	
Overwhelmed		**Sad**		**Suspicious**		**Destructive**		**Despair**	
Exasperated		**Nervous**		**Depressed**		**Angry**		**Frustrated**	
Indifferent		**Scared**		**Apprehensive**		**Intimidated**		**Discouraged**	

COMMENTS ON YOUR FEELINGS

7. ADDITIONAL NOTES

8. FIELD TRIP INFORMATION

DATES	
TEAM	
INFORMERS	

9. Sketch

N

PHOTOGRAPHIC RECORD NIKON D90

No.	Orientation	Description	Date

No.	Orientation	Description	Date

APPENDIX 5

FIELDWORK: RECORDING METHODOLOGY

5.1. IMPLEMENTING PHOTOGRAMMETRY

Photogrammetry was the preferred recording method used throughout this project. Initially, the main objective was to use published drawings made by other auhors to assess the the carvings, which would be complemented with digital RTI recordings for details. However, soon became apparent that the published drawings were not always accurate and important details were, sometimes, not possible to extract from them. Furthermore, certain levels of interrogation could not be conducted to the traditional 2D drawings made by somebody else's hand. It is a fact that rock art recording can vary according to the practitioner. Motifs are viewed differently depending on the time of the day and year, lighting conditions, percentage of rock surface covered by lichens, moss, etc., sensitivity and awareness of the observer. As a result, after a first field campaign to Scotland, where only a few 3D models were produced, photogrammetry was used to record most of, if not all, the rock surfaces that were inventoried in the remaining study areas.

Photogrammetry is an easy recording method and can be carried out during fieldwork without any special preparations. It is useful to document whole rock surfaces, which may have large sizes, but also as a prospectin tool, when searching for new carved rocks. When in doubt, whether a rock has been carved or not, this technique facilitates the documentation of the surface, which can be validated (or not) after processing. During the several fieldwork campaigns of this project, photogrammetry provided several surprises by revealing densely carved rocks when grooves were most weathered.

The equipment used for capturing photographs for the production of photogrammetric models was:

- Camera: Nikon D300 with sensor resolution 2848 x 4288 (12.3 megapixels);
- Camera: Nikon D90 with sensor resolution 2848 x 4288 (12.3 megapixels);
- Lens: Nikon 18 – 70 mm f/3.5.-4.5. lens;
- Lens: Nikon 18 – 105 mm f/3.5.- 5.6.G lens;
- Scale bars.

Most of the surfaces to photograph were horizontal or approximately horizontal and therefore the adopted position was mostly vertical, with the camera placed on top of the panels. The zoom and camera's aperture were maintained constant during the capture

sequence. Apertures and ISO settings depended much on the conditions available to capture each of the photograph's sequence. The 'base to subject ratio' was kept constant.

To ensure an adequate overlap (between 60% and 80%), the camera would move at an approximate distance of 34% of the camera's field of view between photographs, following a linear direction, normally from left to right. This sequence was repeated in rows from one end to the other of each rock. The number of photographs captured depended on the size of the subject. As a result, in some cases little as 50 photographs were taken but in other cases (e.g. Liss in Ireland), over 1000 pictures were taken. The high number of images was also due to an attempt to retain detailed information and produce high resolution 3D models. When the micro-topographies of the carved rocks allowed, as well as vegetation and the morphology of the surfaces, the photographic coverage was more thorough, encompassing the whole of the outcrop, to capture the context of the carved panels (e.g. Drumtroddan 1, The Machars, Scotland). In other cases, when very large outcrops would feature a single motif, for instance, only the latter was recorded, in order to document the design and technique details (e.g. Rock 3, Escaravelhão 1, Valença, Portugal).

Although it does not provide as much micro-details as RTI, photogrammetry allows for the recording of larger surfaces and therefore it is a very useful tool in rock art recording, enabling a better visualization of the motifs engraved on the rocks. In many cases, previous drawings had registered a majority of motifs displayed on the panels, but the photogrammetric models were capable to identify details that were left unnoticed. When captured at smaller scales, details of the techniques used to produce the carvings can also be observed (e.g. Drumtroddan 1A, The Machars). More interestingly, the use of these 3D models allowed for the identification of motifs that were completely invisible to the naked eye and to touch as well. The sense of touch is essential for the study of rock art, since often the grooves are hardly seen, but the remains of the depressions on the rock can still be sensed. Even the most weathered motifs can be enhanced with different renderings used on the 3D models, making photogrammetry a useful tool for fieldwork at various stances (e.g. Rock 3, Escaravelhão 1, Valença, Portugal). This situation was particularly striking in the Portuguese study area, where a number of motifs were identified randomly, after the modelling of the outcrops. In some cases a certain rock would be documented because of a single motif, and others on the same surface would appear in the photogrammetry model (e.g. Rock 3, Escaravelhão 1, Valença, Portugal).

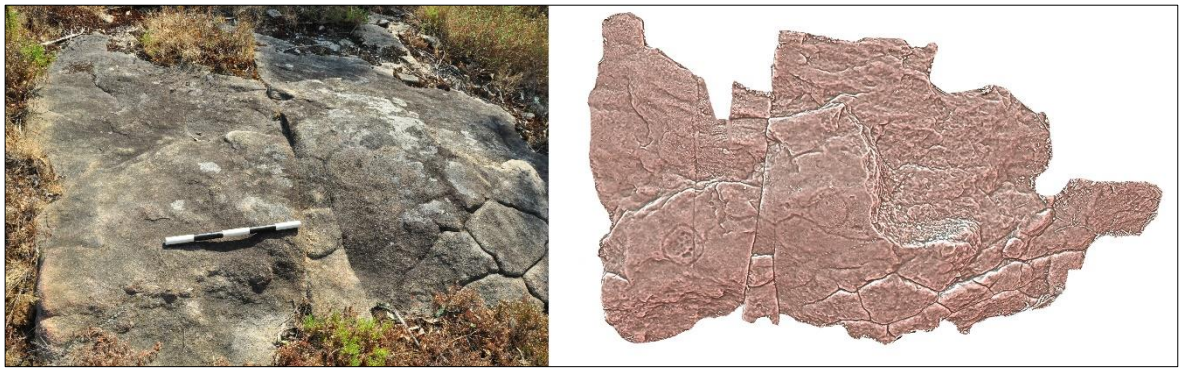


Figure 18 Photograph and 3D model of Rock 3 of Escaravelhão I (Valença, Portugal). This rock was recorded once the circle carved above the scale bar was identified. There were suspicions of another motif to the right but these could not be confirmed in the field. The confirmation came with the 3D model, where another simple circled, connected to the first one is visible.

Unlike the geology of British study areas, the granite rocks upon which the carvings found in Portugal and Spain have suffered from the character of the medium, in general heavily affected by erosion. Since granite tends to crumble, being composed of large particles, the preservation of the grooves is not great and these can be difficult to delineate. Granite is, by far, the most difficult type of bedrock to work with, when analysing rock art.

But photogrammetry was not only useful for the reproduction of the carved rocks included in this study. The examination of the models in appropriate software, such as MeshLab turned out to be extremely useful. While manipulating the models, it was possible to identify a number of details that could have, otherwise, escape a more traditional analysis. By applying the numerous rendering options of this dedicated software, it was possible to highlight motifs, describe the relationship of the engraved figures with the micro-topography of the rocks, analyse the carving techniques in detail. The preferred software to process the sequences of photographs was Agisoft Photoscan.

Figure 19 Photograph and 3D model of Rock 5, Escaravelhão 6 (Valença, Portugal). Through the sense of touch it is possible, when in the field, to perceive some of the carvings on this rock. However, it is impossible to outline them since they are so eroded and mostly imperceptible. The 3D model of this outcrop was a surprise for the number of engravings that it revealed, but also for the complexity of the designs.

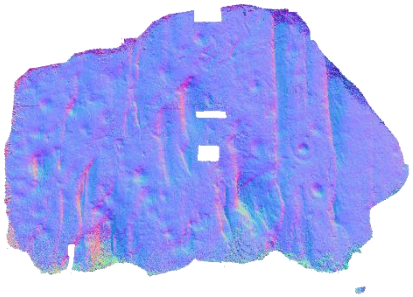
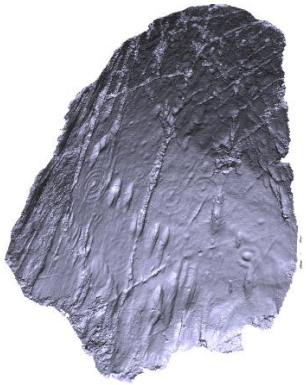
Once the models were completed, the files were introduced in MeshLab. This programme allowed for the manipulation of the meshed models regarding their colour, texture, highlight of relief, lightning conditions, etc. The application of filters and other rendering options facilitates a better outline of the motifs and in some occasions, the discovery of new figures, as mentioned previously. Radiance Scaling was the preferred technique to analyse the model's surfaces, as it depicts it through shading. There are a number of advantages to this method and results, when applied to rock art, are quite satisfactory. By adjusting reflected light intensities, dependent on surface curvature and object characteristics, it diffuses shading and highlight variations, therefore becoming correlated to the surface feature variations, enhancing concavities and convexities (Vergne *et al.* 2010).

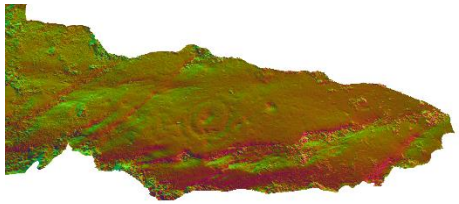
The implementation of photogrammetric surveys presented some limitations. When working in the field, the weather can cause constraints, being no different with the application of this technique. Although it can be carried out using only a camera and a scale-bar, even when raining sometimes it can be completed. However, very wet surfaces can

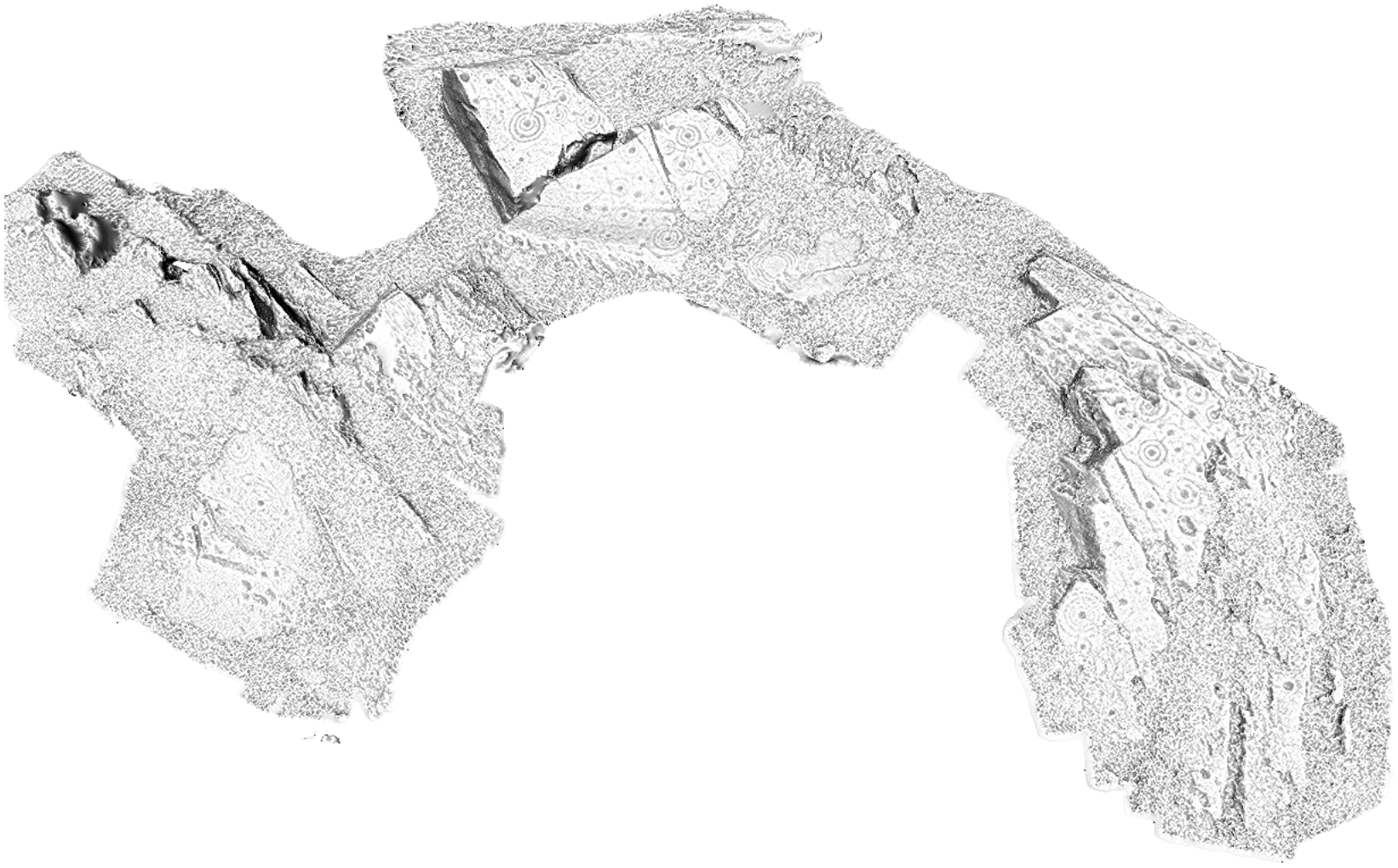
compromise the final results of the surveys. Also, one should avoid to capture photographs when there are shadows (and especially moving shadows) on the surface. In both situations, the software may get confused and not be able to match the points effectively. Nevertheless, the biggest drawback of this technique is, without a doubt, the fact that its processing can be very time-consuming, requiring high performance computers.

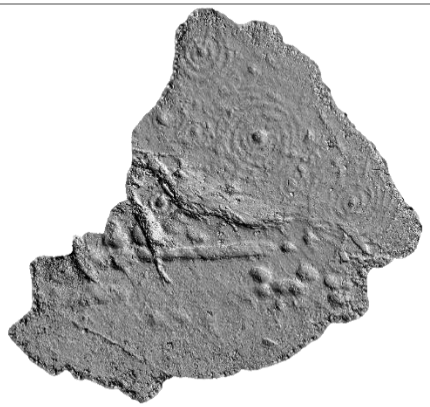
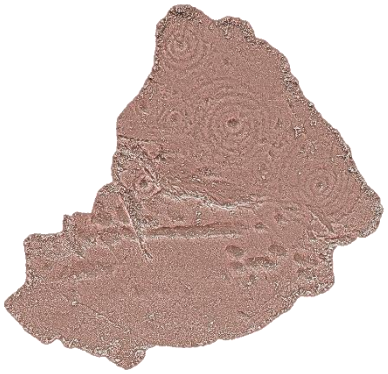
5.2. PHOTOGRAMMETRY MODELS

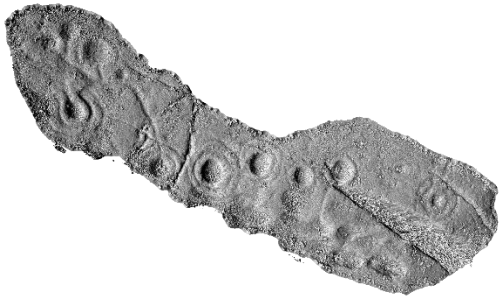
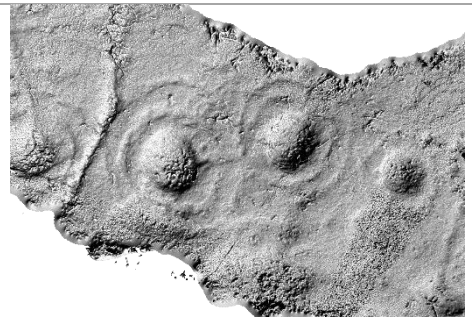
A) MACHARS PENINSULA

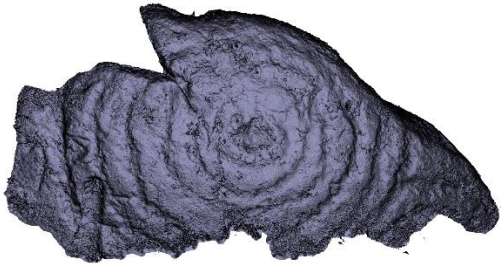
Big Balcraig 3			
Claunch 1			

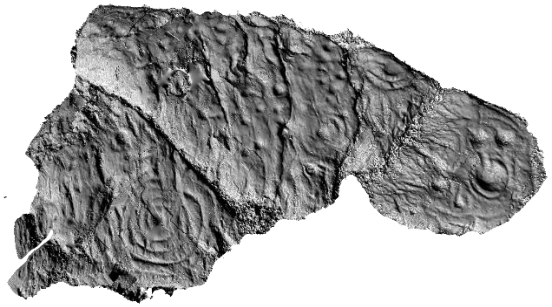
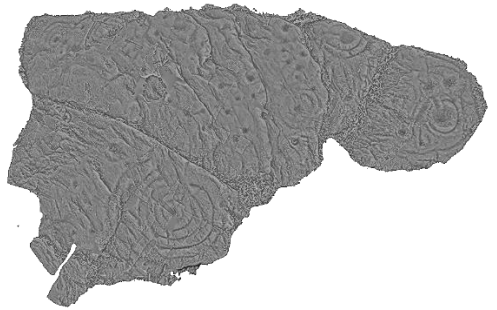
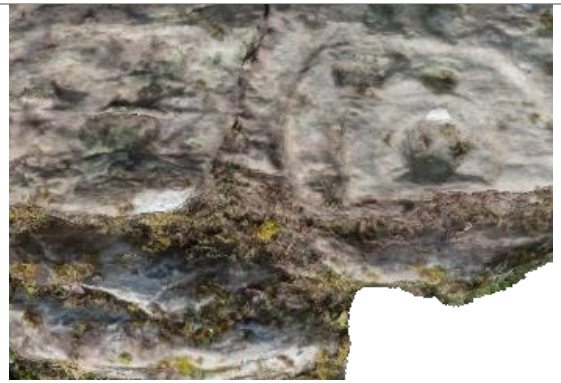
Claunch 1A			
Drumtroddan 1 (General View)			

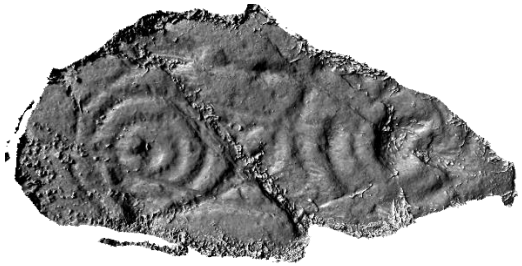
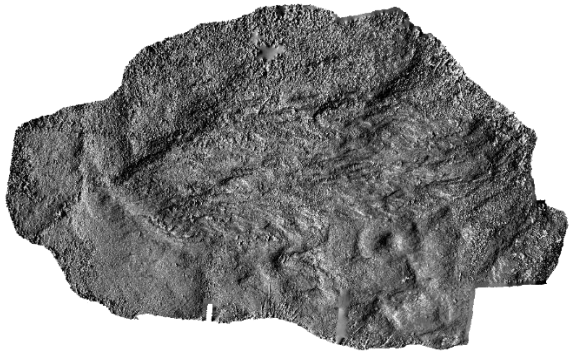
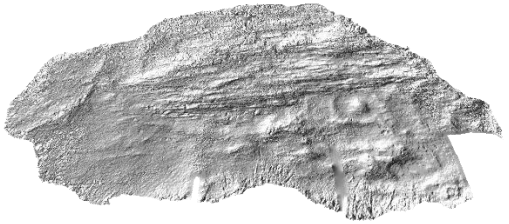


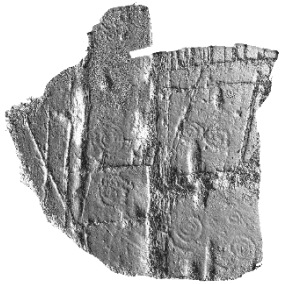
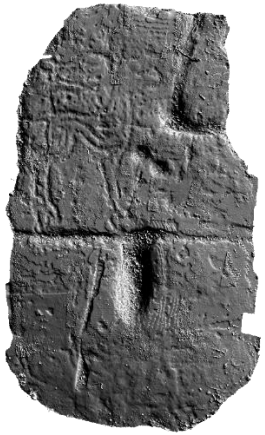
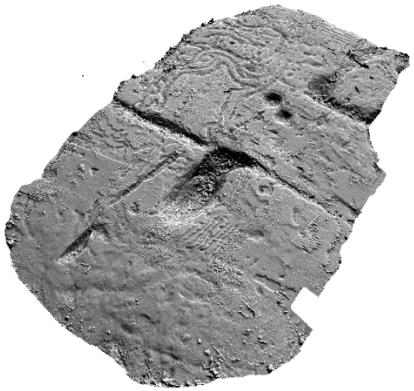
Drumtroddan 1.1			
Drumtroddan 1.5			

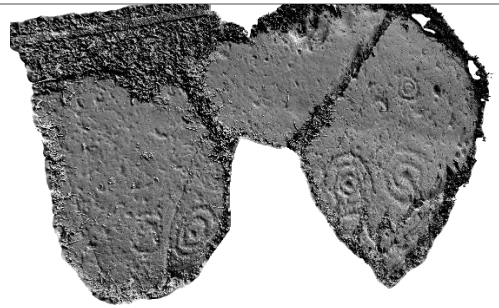
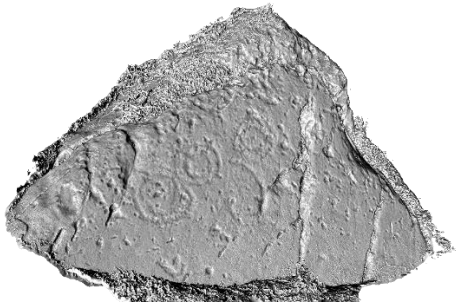
Drumtroddan 1.7.			
Drumtoddan 1.10			
Drumtroddan 2A			

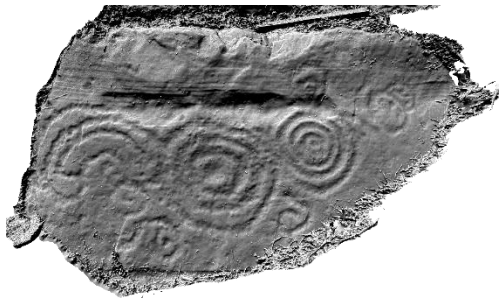
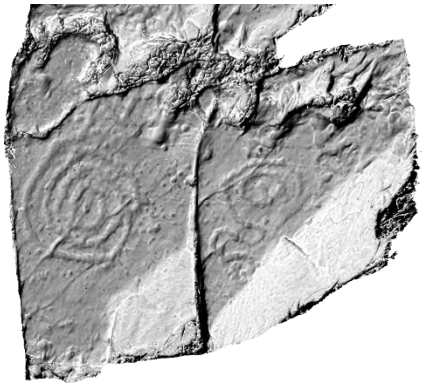
Drumtroddan 2B			
Drumtroddan 2C			

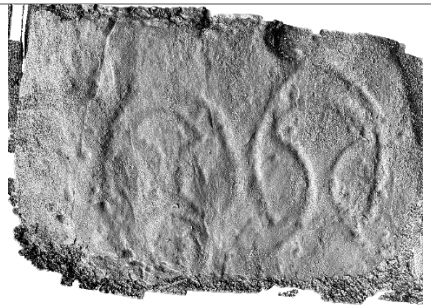
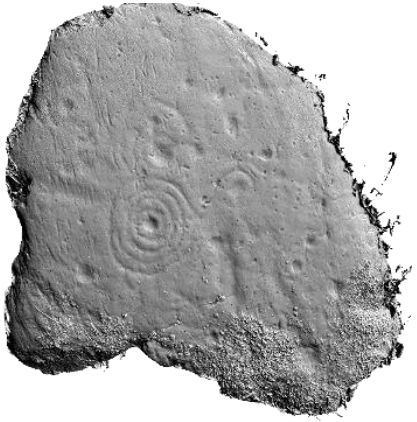
Drumtroddan 3A			
Drumtroddan 3B			

Drumtroddan 3C			
Drumtroddan 3D			

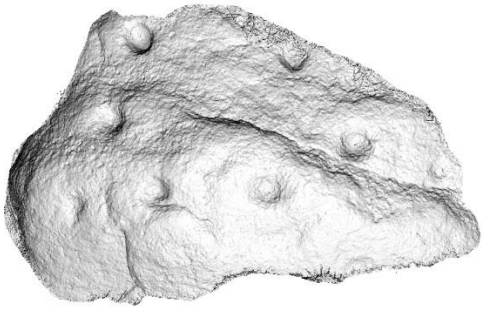
Eggerness 1			
Eggerness 5			

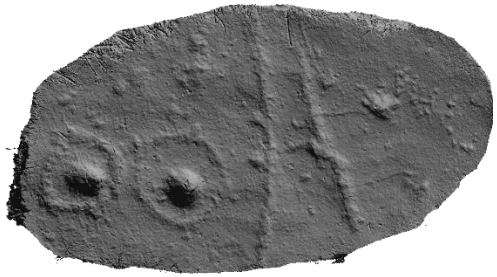
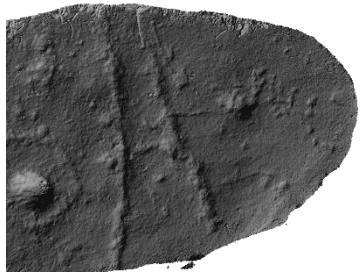
Knock 1			
Knock 3A			
Knock 3B			

Knock 3C			
Knock 3D			

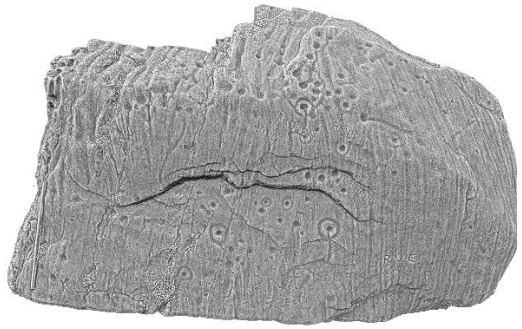
Knock 3E			
Knock 4			

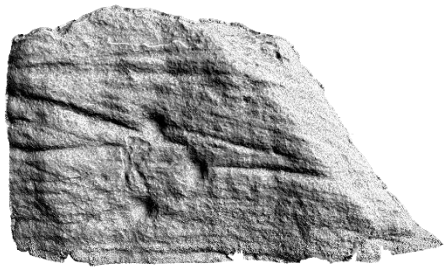
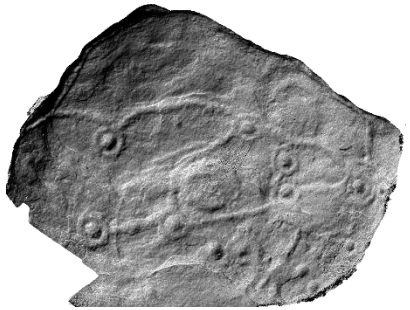
B) ROMBALDS MOOR

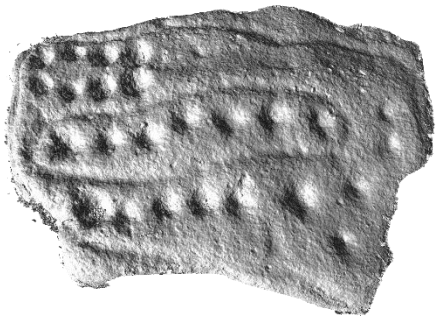
2.Low Plain 23			
5.Low Plain 31			

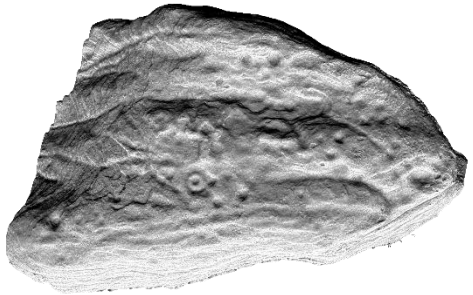
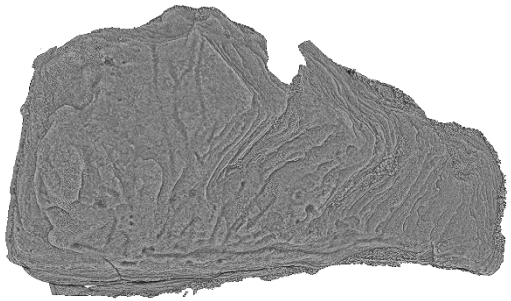
6.Low Plain 06			
7.Low Plain 02			
9.Dobrudden 10			

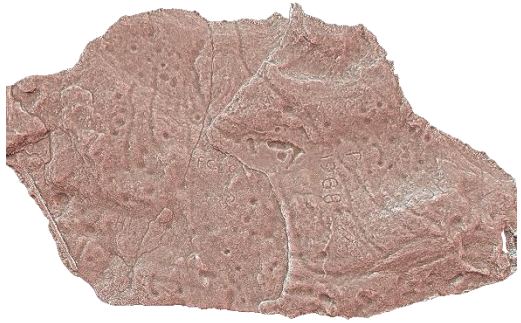
10.Dobrudden 02			
11.Dobrudden 04			
12.Low Plain 19			

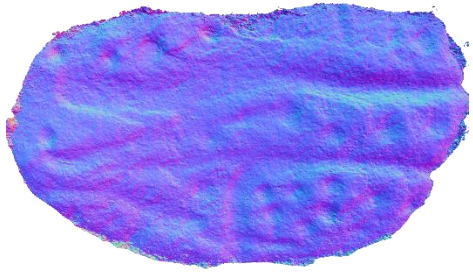
13.Low Plain 16			
14.Haystacks			

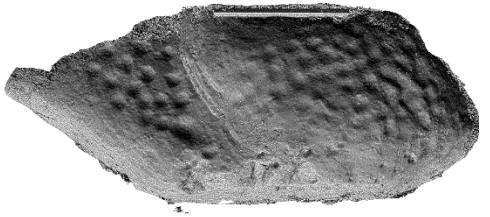
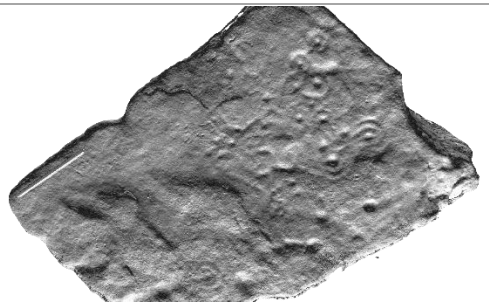
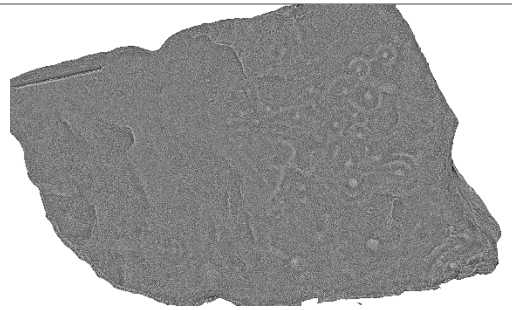
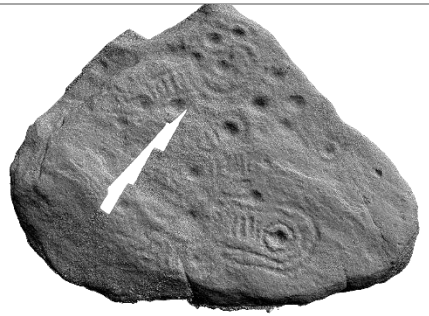
15.Pancake Ridge 03			
16.Planets Rock			
19.Ilkley Moor 1			

20.Cow and Calf 05			
Ilkley Moor 2			
22.Idol Stone 01			

26.Idol Stone 04			
28.Whaleback Stone			

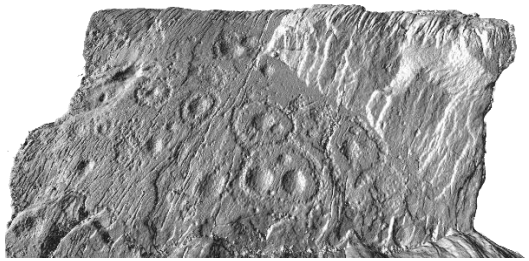
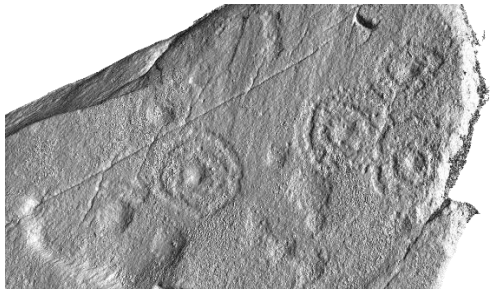
30.Pancake Stone			
31.Hangingstones Rock (detail)			

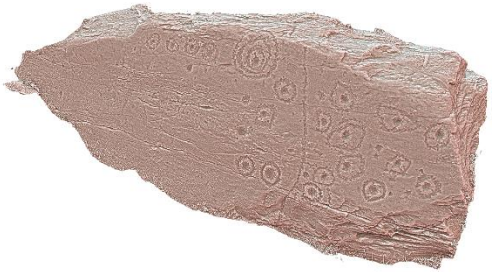
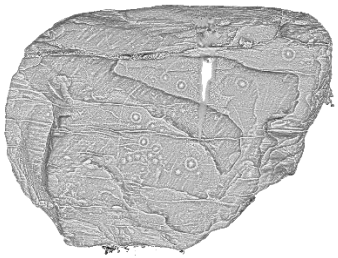
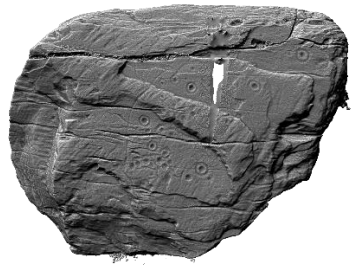
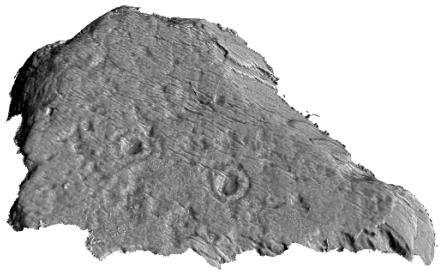
32.Backstone Beck 1			
33. Backstone Beck 2			
34.Backstone Beck 3			

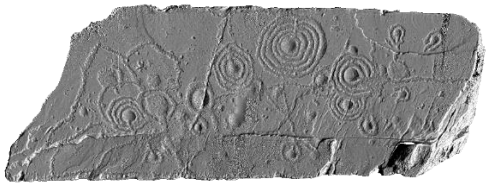
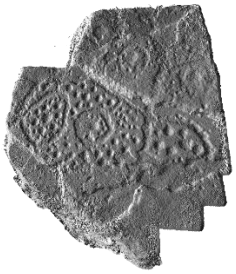
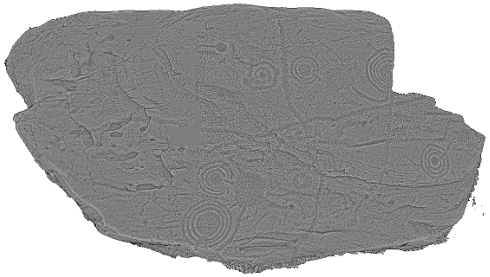
35.Pepperpot			
37.Willy Hall's Wood			
38.Barmishaw			

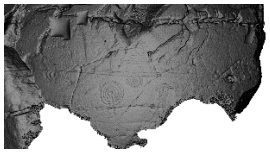
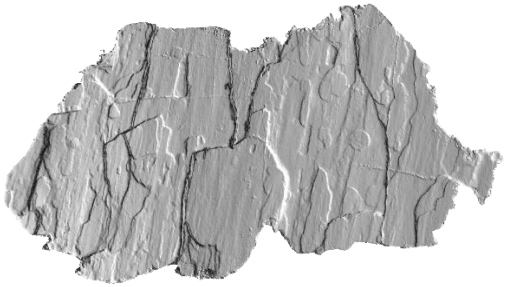
39.Badger Rock 1			

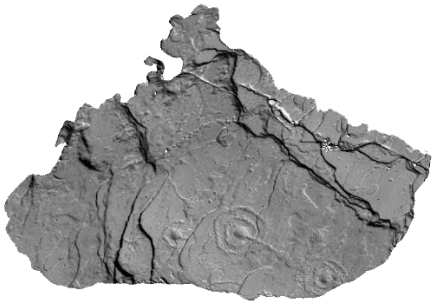
C) IVERAGH PENINSULA

Derreeny 1			
Derreeny 7			

Derreeny 8			
Derrynablaha 11			
Derrynablaha 15			

Derrynablaha 22			
Derrnablaha 23			
Dromtine			

Kealduff Upper 2			 
Kealduff Upper 9			

Kealduff Upper 10			
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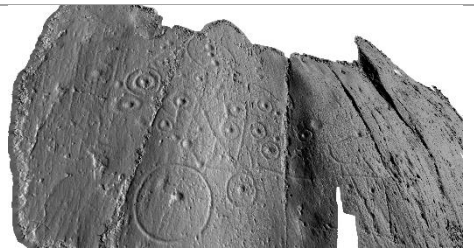
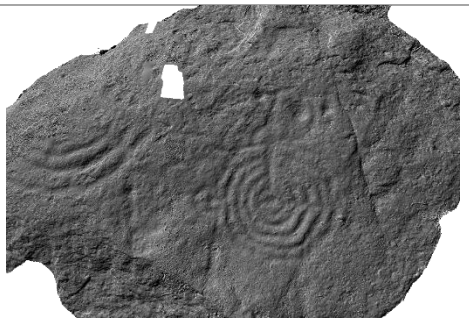
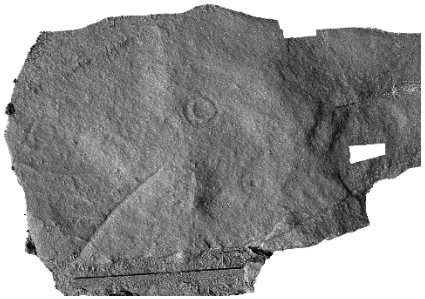
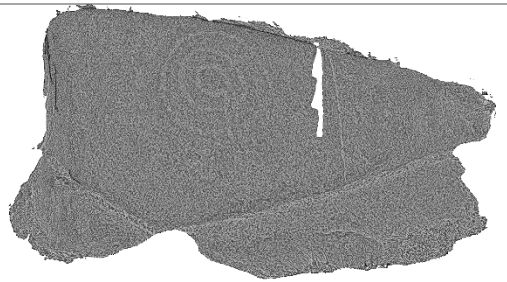
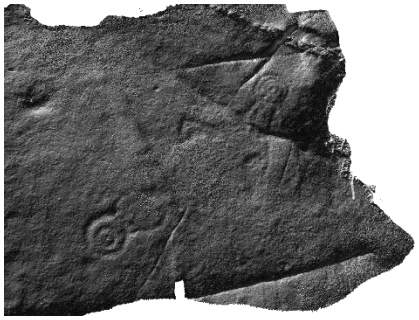
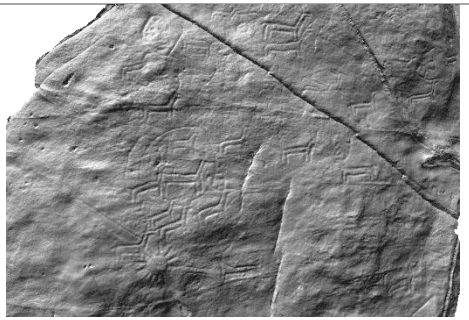
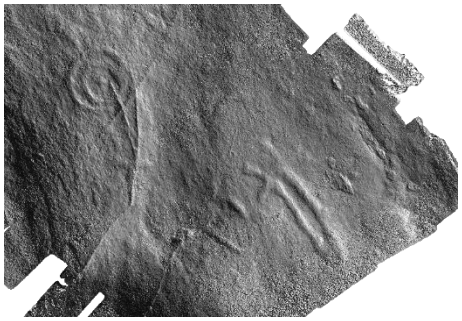
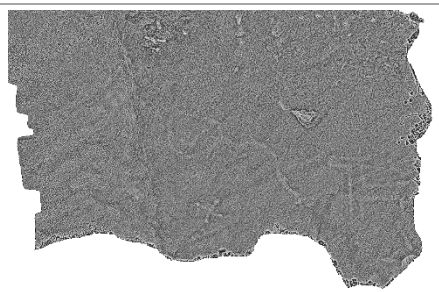
Liss			

D) BARBANZA PENINSULA

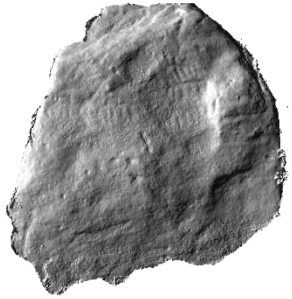
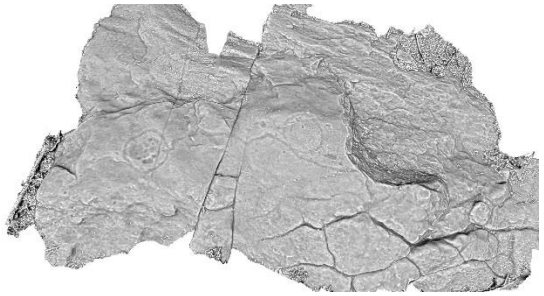
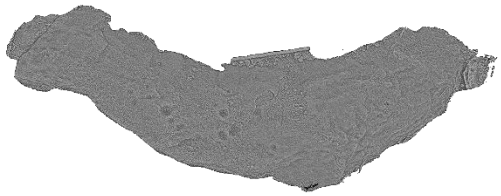
A Picota			
Calderramos 1			

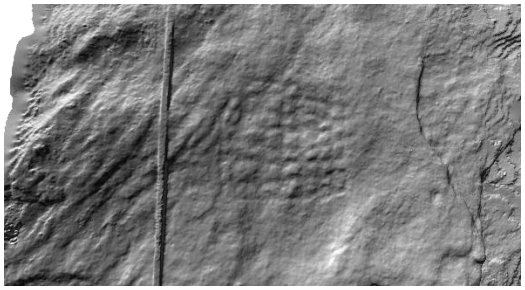
Calderramos 3			
Cova da Louza 4A			
Cova da Louza 4B			

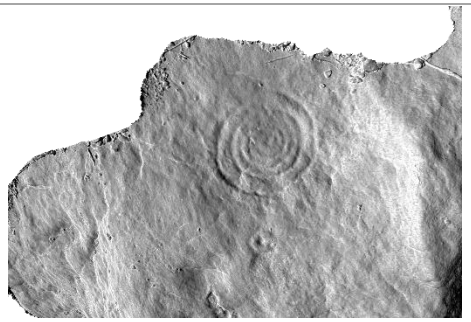
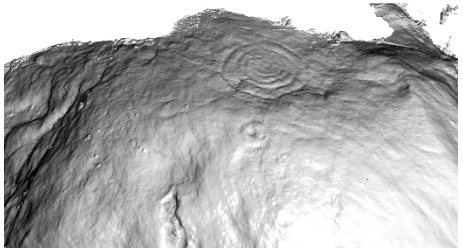
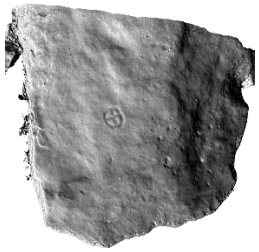
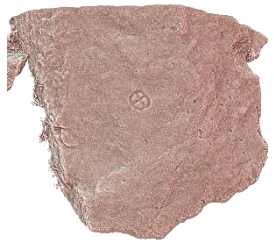
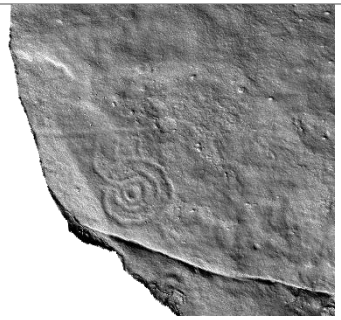
Fontandurin			
Gurita 1			
Gurita 4			

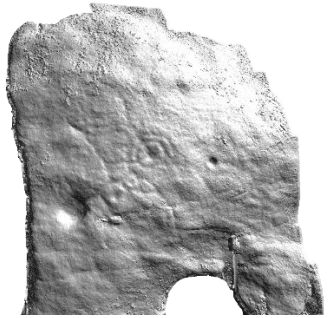
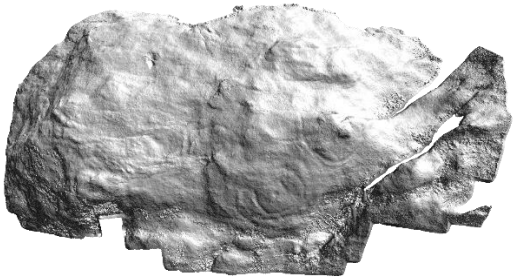
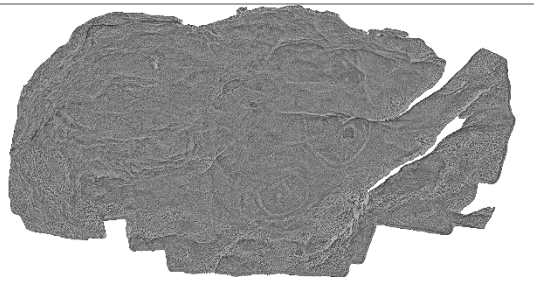
Lagoa			
Lamatrema			
Lamela 1			

E) MONTE FARO

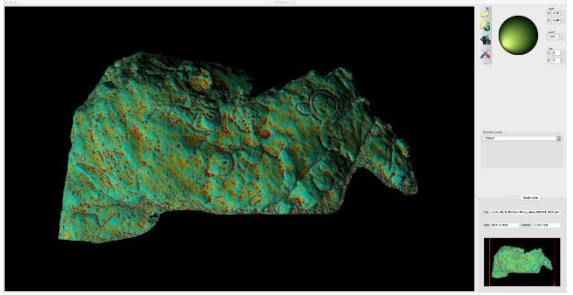
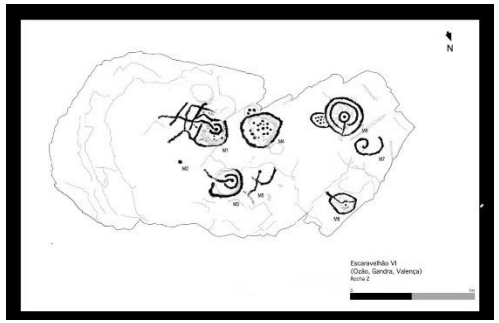
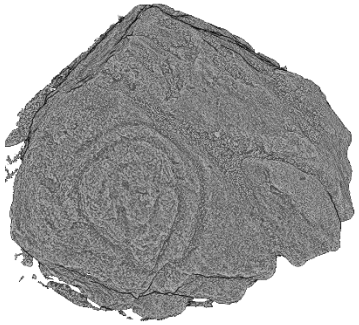
Esc.1.Rock 1			
Esc.1.Rock 2			
Esc.1.Rock 3			

Esc.1.Rock 4			
Esc.1.Rock 5			
Esc.1.Rock 6			

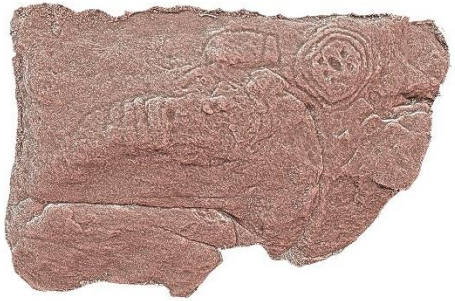
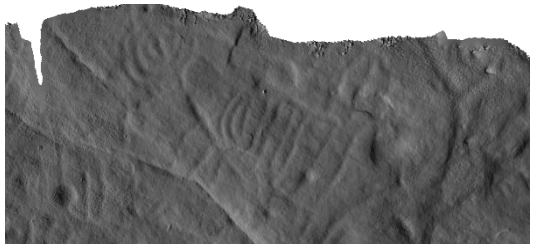
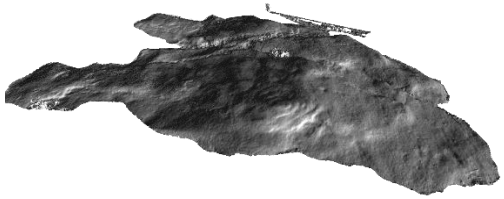
Esc.5.Rock 1			
Esc.5.Rock 3			
Esc.5.Rock 5			

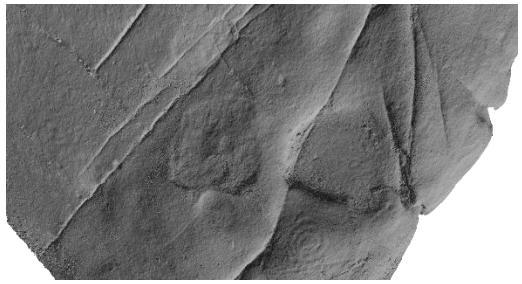
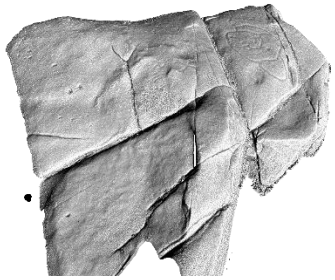
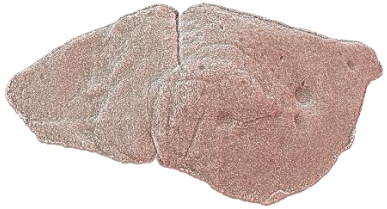
Esc.5.Rock 6			
Esc.6.Rock 1[16]			

[16] Photograph by Lara Alves.

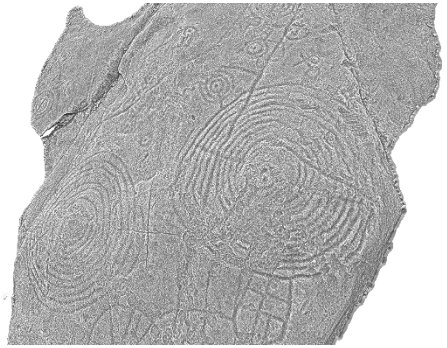
Esc.6.Rock 2[17]			
Esc.6.Rock 3			

[17] 3D Model and drawing by Lara Alves.

Esc.6.Rock 4			
Esc.6.Rock 5			
Esc.6.Rock 7			

FF.Rock 1[18]			
FF.Rock 2			
FF.Rock 3			

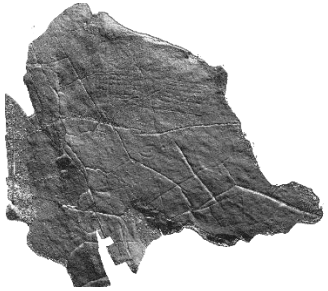
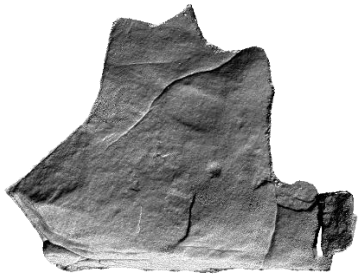
[18] Photograph by Lara Alves

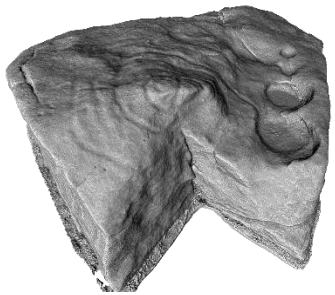
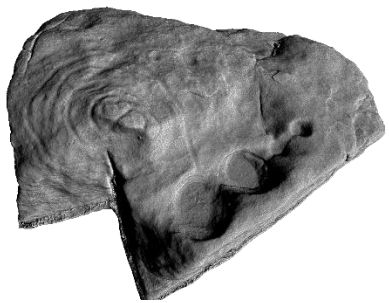
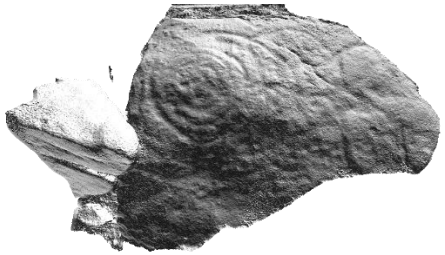
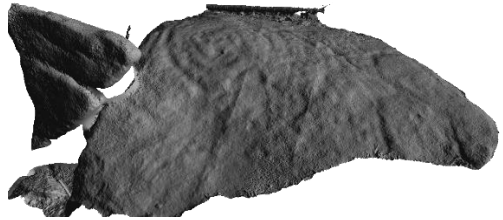
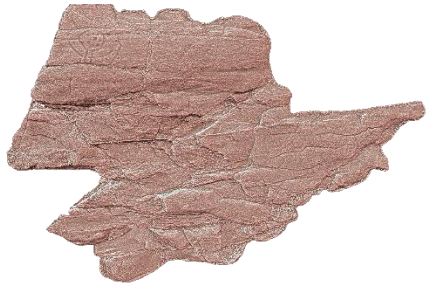
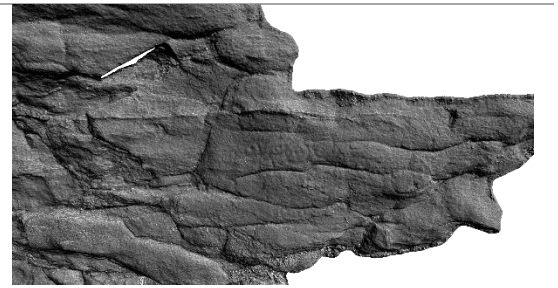
FV.Rock 1[19]			
MdF1.Rock 1			

[19] Photographs and 3D Model by Lara Alves.

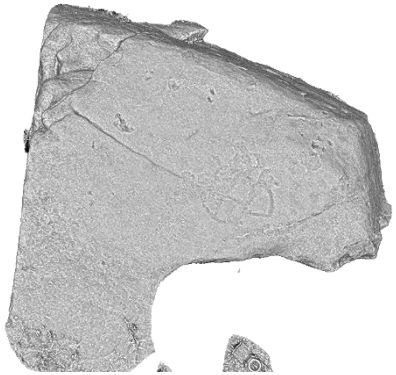
MdF1.Rock 2			
MdF1.Rock 3[20]			

[20] 3D Model after Alves and Reis 2017

MdF1.Rock 4			
MdF2.Rock 2			
MdF2.Rock 4			

MdF2.Rock 5			
MdF2.Rock 7			
PR.Rock 1[21]			

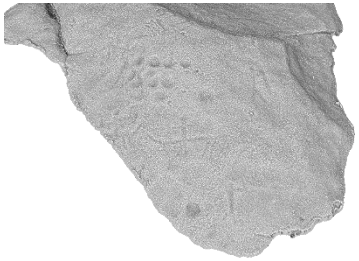
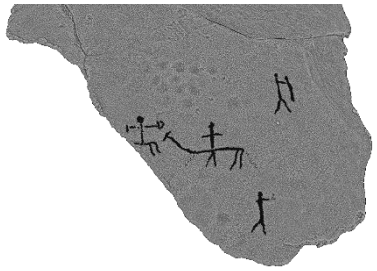
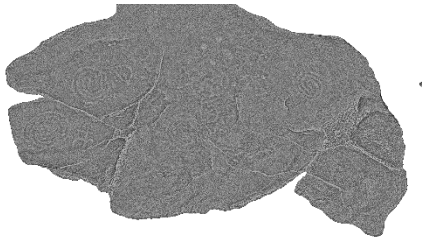
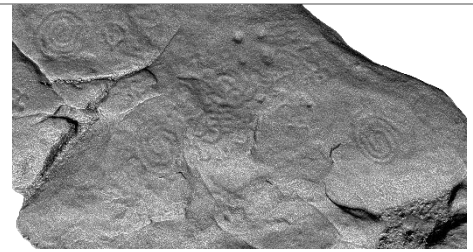
[21] Photograph by Lara Alves

PR.Rock 2[22]			
PR.Rock 3[23]			

[22] Photograph by Lara Alves
[23] Photograph by Lara Alves

PR.Rock 10[24]			
SO.Rock 2			

[24] Photograph by Lara Alves.

ST.Rock 1[25]			
ST.Rock 2[26]			

[25] Photograph by Lara Alves
[26] Photograph by Lara Alves

5.3. IMPLEMENTING RTI

Due to logistical limitations RTI was used only in specific cases throughout the several campaigns of fieldwork in this project. The difficulty of its application relates to a number of physical problems arising from the character of the objects to record, their location and very specifically, weather conditions.

In Scotland this was the preferred methodology to record the carved panels and it was used in a larger sample of rocks. Nevertheless, the attempt to record the entirety of the carved surfaces with this method failed (see Big Balcraig 3, Figure 20) and the technique was then used only for details, whilst photogrammetry became the preferential method for broader recordings.

Figure 20 Failed attempt to record the entire surface of a carved rock at Big Balcraig 3 (The Machars).

However, soon the limitations of the technique in open-air environments was made evident, when in a first attempt it seemed impossible to keep the camera stationary due to the intense wind. This problem was recurrent in other study areas as well. As with wind, rain was another major obstacle, present in all field campaigns. Apart from complicating the logistics of the fieldwork itself, in many cases the survey of the surfaces was impossible. Besides ensuring for the preservation of the equipment, the wet conditions affect the rock surfaces by creating a shiny layer of water that affects the outcome of the PTMs. Alternating weather conditions between radiant sun, storms with heavy rain and dark cloudy skies (Figure 21) were also challenging for the capturing of RTI, since the light conditions should

be constant and controlled in order to obtain acceptable results. H-RTI recordings have darkness as their optimal background conditions, indoor or night-time being the best options for the capture of PTMs. Since the carved rocks recorded for this projects were all located outdoors, neutral density filters were fixed to the lens on occasions and other strategies were used in order to control ambient lightning. Overall, overcast days were preferred to carry out the RTI documentation.

Limitations in the application of RTI in open-air contexts were not restricted to the weather conditions. As mentioned above a great number or carved rocks with Atlantic motifs are horizontal and close to the ground. This means that the distance from the stationary camera to the object, which should be 3 to 4 times the maximum length of the latter's surface, is restricted to the height of the tripod, and therefore may not guarantee that the reflection qualities of the entire surface are recorded under similar light conditions.

Figure 21 Drumtroddan (The Machars). Instability of weather conditions with alternating blue skies and sudden storms bringing rain, sleet, hail, snow and wind.

The morphology of the rocks were not always easily adaptable to the capturing of PTMs. Problems from positioning the camera with the tripod that was sometimes difficult to balance, to the lack of an adequate place to locate the sphere were only some of the issues faced during fieldwork. The irregularity of the rocks' surfaces would not always allow for a proper positioning of the tripod and camera, which should be mounted over or on top of the

object (Historic England 2013) and completely stationary during the photo sequence. As a result, occasionally it was not possible to incorporate the object and the reflective target(s) in the frame at the same time. Convexities and concavities of the surfaces would constrain the location of the sphere in adequate places, and the mineralogical constitution of the outcrops was also problematic at times. This was particularly true while documenting granites, where the high presence of shiny biotite and muscovite interferes with the reflectance of the surface, even more with rain.

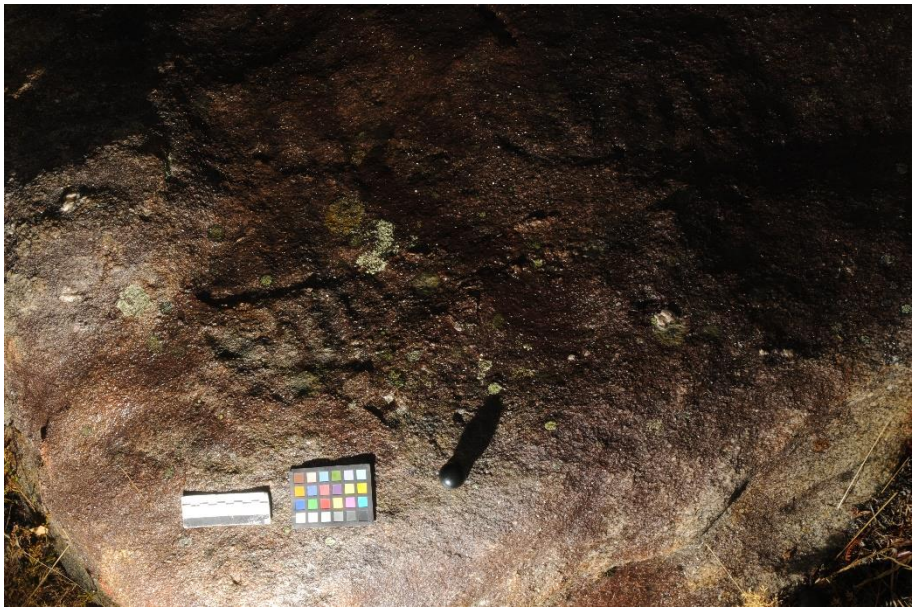


Figure 22 Rock 1, Escavarelhão I. The irregularities of the rock surface's morphology was a limitation to the placement of the black sphere, as well as the scale and colour chart. The small sized sphere was more appropriate, avoiding shadows over the motifs during the projection of the flashlight. Weather conditions were also challenging, namely when it rained, compromising the rock's reflectance conditions (Process photograph taken during RTI recording).

In general, the capture of RTIs took around 30 – 45 minutes depending on the complexity required to set up the equipment. The number of photographs taken varied between 50 and 90, in which light was projected from a variety of directions. The photographs were taken at relatively even distances in order to record the light source directions, making a type of 'light dome' over the object. The light source is registered on the glossy sphere placed within the frame (see detail of black sphere in Figure 24, p.150).

The following equipment was used to capture the RTIs:

- Camera: Nikon D300 with sensor resolution 2848 x 4288 (12.3 megapixels);
- Lens: Nikon 18 – 70 mm f/3.5.-4.5. lens;
- Tripod;
- Light source: Flash connected to the camera through radio remote triggers;

- Black spheres (large and small);
- Measuring tape and/or string;
- Scale;
- Colour chart.

Figure 23 Recording with RTI at Rock 6 of Escaravelhão I (Valença, Portugal).

The PTMs were processed with the freeware RTIBuilder[27] software, following the steps that are described in a very useful handbook facilitated by CHI (2011). Lastly, the RTI final files were introduced in the, also freely available, RTIViewer[28] software which allows for the visualization of the recorded surface with an enhanced perspective, through the application of 'rendering modes' (Figure 24).

[27] Available for download at:
http://culturalheritageimaging.org/What_We_Offer/Downloads/Process/

[28] Available for download at: http://culturalheritageimaging.org/What_We_Offer/Downloads/View/

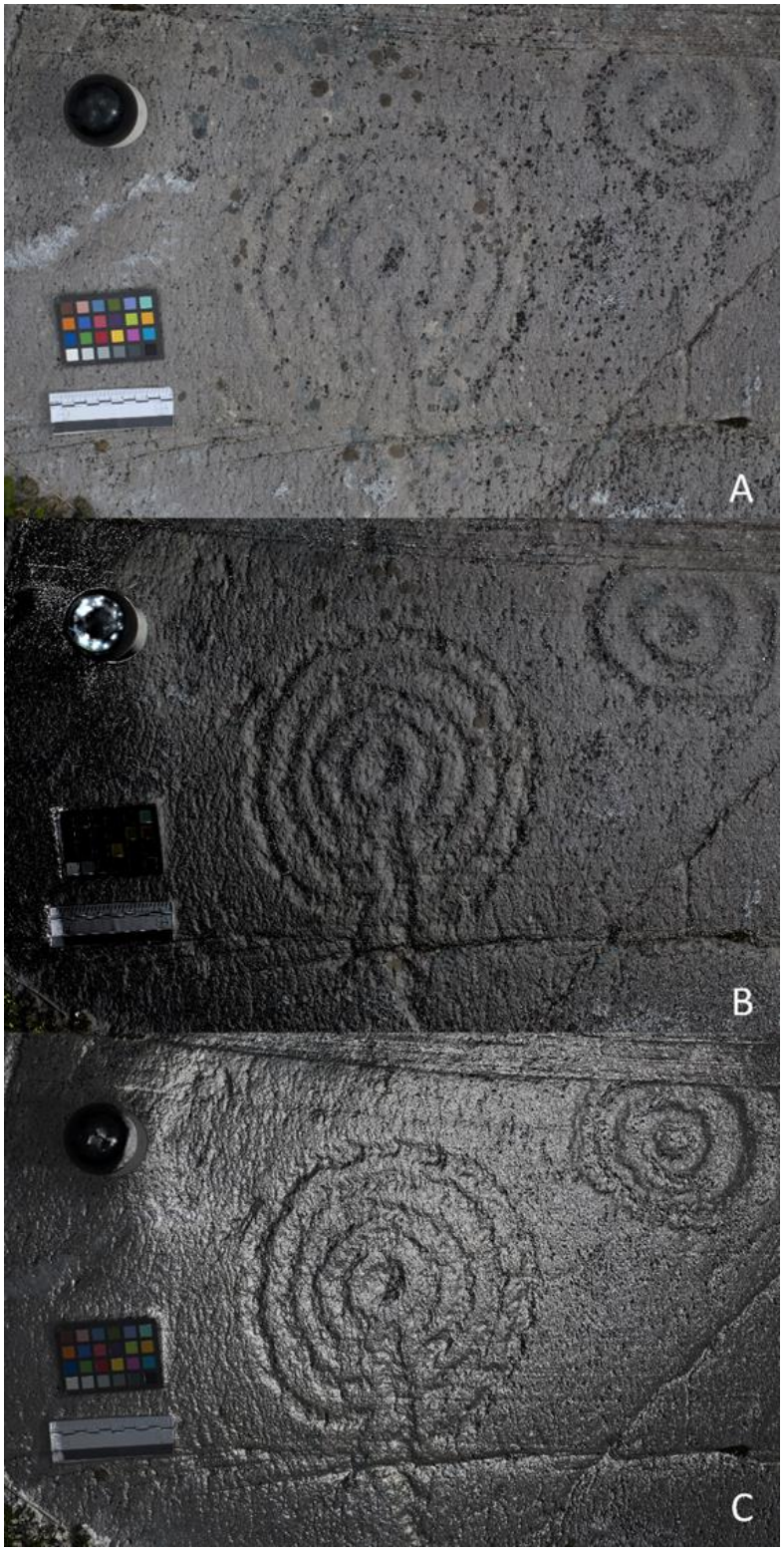
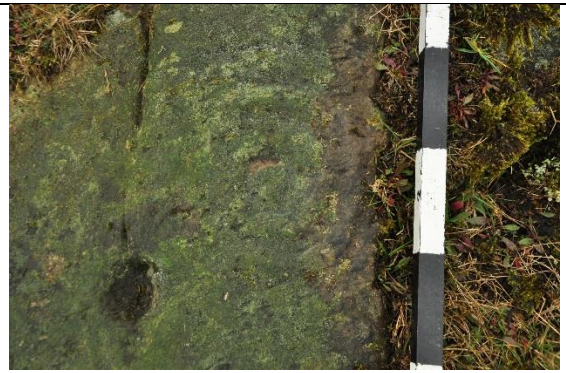


Figure 24 Rock 331 of Kealduff Upper (Iveragh Peninsula). RTI was used to understand the relationship between motifs and a large strip of different geology that crosses the medium, but also to compare motifs that were side by side and presented differential weathering conditions. 23A. Original capture; 23B. Diffuse Gain; 23C. Specular Enhancement.

5.4. RTI MODELS

F) MACHARS PENINSULA

Blairbuy 6		
Boyach Farm		

Culscadden 1A

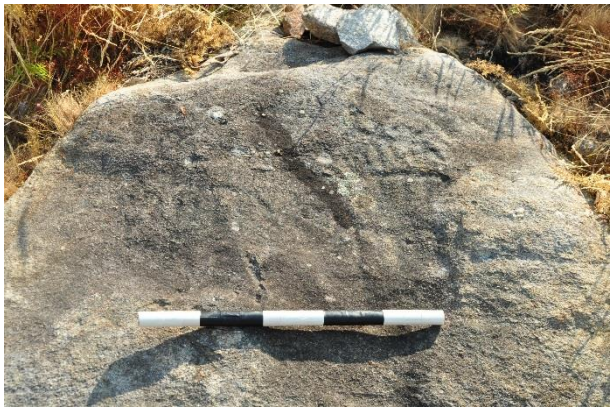
Culscadden 1B

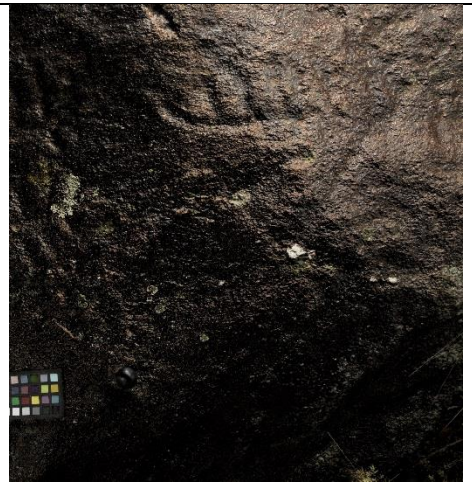
G) IVERAGH PENINSULA

Kealduff Upper 2 – Motif 1

H) MONTE FARO

Escaravelhão 1 – Rock 1





Escaravelhão 1 – Rock 2

Escaravelhão 1 – Rock 4

APPENDIX 6

CATEGORISATION SYSTEM

6.1. GRAPHIC SCALE: THE MOTIFS

Table 21 Planar, Depictive and Plastic characteristics of depictions.

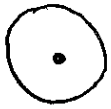
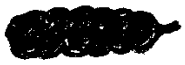
TYPES OF DEPICTION	
Planar Style	Entirely unresponsive motifs to natural features and the topography of the rock. Two-dimensional character of depictions, often with shallow profiles.
Plastic Style	Motifs are often responsive to natural features and topography of rock. In many cases, solution holes, fissures and slope are incorporated into compositions.
3D Style	Motifs totally embrace the rock topography and natural characteristics of the medium. Three-dimensional character of depictions, often with deep grooves. Complex result.

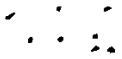
Table 22 List of Categories, Sub-categories, variants and attributes used in Motif Classification approach.

MOTIF VARIATION			
CUP VARIANTS	Isolated	An artificial depression/hollow, usually of round shape. Depth and diameter may very.	
	Row of cup-marks (more than 3 in line)	When three or more cup-marks were carved in a line.	
	Row of cup-marks in circular fashion (more than 3)	When three or more cup-marks were carved in a curvilinear line.	

Cluster	A group of 3 or more cup-marks displayed in close proximity with random organisation.	
Enclosed cup-mark	When cup-mark(s) is(are) enclosed in the centre of a circular motif.	
Cluster of central cup-marks (in cup-and-ring)	A group of one or more cup-marks enclosed within a cup-and-ring motif.	
Satellite cup-mark (in ring)	The occurrence of a natural or artificial cup-mark on a ring.	
Cup at ring terminus	Natural or artificial cup-mark forming the terminus of a gapped or partial ring.	
Terminal cup-mark in Groove	The occurrence of a cup-mark at the end of a groove (including radial grooves).	
Cup-mark along Groove	The occurrence of a cup-mark along the length of a groove (including radial grooves).	
Cup-mark adjoining ring	Natural or artificial cup-mark physically adjoining one side of a ring.	

Cup-mark adjoining groove	Natural or artificial cup-mark physically adjoining one side of a line.	
Cup-mark between rings	When a cup-mark occurs between two circles (does not include dimples).	
Cup-mark in ring gap	Natural or artificial cup-mark located in the break of a gapped ring.	
Off centre cup-mark	When an enclosed cup-mark is obviously not centred within the circle.	
Multiple cup-marks enclosed	When two or more cup-makes are enclosed within a single ring.	
Conjoined cup-marks	When two or more cup-marks were carved contiguously.	
Disc cup-mark	Flat-based cup-mark. Usually shallow and with large diameters.	
Cup-mark with internal features	When a cup-mark has been worked (i.e. pecked) inside.	
Dumbbell	When two cup-marks are located in close proximity and linked through a short linear groove.	
Oval cup-mark	Oval-shaped artificial depression. In can vary in size.	

	Isolated Mini cup-mark	A very small cup-mark in size.	
	Linear row of mini cup-marks	When three or more very small cup-marks were carved in a straight line.	
	Cluster of mini cup-marks	A group of 3 or more very small cups-marks displayed in close proximity.	
	Enclosed mini cup-marks	Very small depressions enclosed within another motif.	
	Enclosed central mini cup-mark	Where a very small depression is positioned centrally within a circle.	
	Solution holes used or transformed into cup-marks	Solution holes or other natural depressions that have been used as or transformed into cup-marks.	
	Intestinals	Cup-marks carved conjoined to each other, usually smooth to make a line (curved edges visible).	
PECKING VARIANTS	Condenced pecking	Small areas with large concentration of peck-marks, but without forming a recognisable shape.	

	Random pecking	Where random peck-marks occur on the rock face, in a spaced manner.	
	Enclosed Dense Pecking	Areas of large concentrations of pecking enclosed within a defined motif.	
RING VARIANTS	Single ring (without cup-mark)	Simple circular motif, without central cup-mark.	
	Double single ring (without cup-mark)	Two single rings disposed in a concentric way, without central cup-mark.	
	Multiple single ring (+3 without cup-mark)	Three or more circles disposed in a concentric way, without central cup-mark.	
	Gapped single ring (no cup-mark)	A single ring without central cup-mark, whose groove is interrupted.	
	Double gapped ring (no cup-mark)	Two single rings disposed in a concentric manner, whose grooves are interrupted, without central cup-mark.	
	Gapped Single Ring (with cup-mark)	A single ring whose groove is interrupted, with central cup-mark.	
	Gapped Double Ring (with cup-mark)	Two concentric interrupted rings with central cup-mark.	

Gapped Multiple Ring (with cup-mark. +3 rings)	Three or more concentric and interrupted rings, with central cup-mark.	
Cup-and-ring (1 ring)	Classic cup-and ring motif, when a circle encloses a central cup-mark.	
Cup-and-ring (2 ring)	Same as the above, with two concentric circles.	
Cup-and-ring (3 ring)	Same as the above with three concentric circles.	
Cup-and-ring (4 ring)	Same as the above, with four concentric circles.	
Cup-and-ring (5 ring)	Same as the above, with five concentric circles.	
Cup-and-ring (6 ring)	Same as the above, with six concentric circles.	
Cup-and-ring (7 ring)	Same as the above, with seven concentric circles.	
Cup-and-ring (8 ring)	Same as the above, with eight concentric circles.	
Cup-and-ring (9 ring)	Same as the above, with nine concentric circles.	
Cup-and-ring (+10 ring)	Same as the above, with nine or more concentric circles.	
Partial ring	A circular or oval shape that was intentionally carved extending c. 270 degrees or less.	

Double partial ring	The same as above, but with two parallel grooves.	
Multiple partial ring (3 rings)	The same as above with three parallel grooves.	
Multiple partial ring (4 rings)	The same as above, with four parallel grooves.	
Multiple partial ring (+5 rings)	The same as above with five parallel grooves.	
Gapped and complete combination ring (2 rings)	When a motif features simultaneously a complete and a gapped ring, surrounding a central cup-mark.	
Gapped and complete combination ring (3 rings)	Same as the above, but with a combination of three complete and gapped rings.	
Gapped and complete combination ring (+4 rings)	Same as the above, but with a combination of four or more complete and gapped rings.	
Gapped ring on one side, with radial	When the end of a ring physically connects to the groove of a radial, while the other side remains detached.	
Gapped ring on one side, with radial (2 rings)	Same as above, but with two concentric rings.	

Gapped ring on one side, with radial (+3 rings)	Same as the above, but with three concentric rings.	
Ring Extended	When the ends of a gapped ring are extended with linear grooves, away from the centre of the motif.	
Converging Circles	When two or more circular motifs are depicted affixed to each other.	
Ring with cup and converging ends (1 rings)	When the ends of a gapped ring converge inwards the circle.	
Ring with cup and converging ends (2 rings)	Same as the above, but with two concentric circles.	
Ring with cup and converging ends (+3 rings)	Same as the above, but with three concentric circles.	
Ring with one conjoined end	When two concentric, gapped rings have joined ends on one side and not on the other.	
Ring with conjoined ends (2 ring)	When both ends of two concentric and gapped circles, are joined.	
Ring with conjoined ends (3+ rings)	The same as the above with a larger number of rings.	

Ring terminus convergence	When the end of an outer ring is directly adjoining the inner ring, making a single motif.	
Ring surrounding large cup-mark/central depression (1 ring)	When a circle is surrounding a very large cup-mark/central depression.	
Ring surrounding large cup-mark/central depression (2 rings)	Same as the above, but the large cup-mark is surrounded by two concentric circles.	
Ring surrounding large cup-mark/central depression (+3 rings)	Same as the above, but the large cup-mark is surrounded by three concentric circles.	
Wide spaced ring with central cup-mark	Central cup-mark surrounded by an unusually large ring.	
Single oval ring	Oval-shaped ring with no central cup-mark.	
Double Oval (without cup-mark)	Two concentric oval shapes with no central cup-mark.	
Multiple Oval (+3 without cup-mark)	Three or more concentric oval shapes with no central cup-mark.	
Single Oval Ring (with central cup-mark)	Oval-shaped ring with central cup-mark.	

Double Oval Ring (with central cup-mark)	Two concentric oval-shaped rings with central cup-mark.	
Multiple Oval Ring (3+, with cup-mark)	Three or more concentric oval-shaped rings with central cup-mark.	
Single Squared-ring with central cup-mark	Square-shape with central cup-mark.	
Double Squared-ring with central cup-mark (2 rings)	Two concentric squares with central cup-mark.	
Multiple Squared-ring with central cup-mark (+ 3 rings)	Three or more concentric squares with central cup-mark.	
Single 'U' shape without cup-mark	'U' shaped figure without central cup-mark.	
Double 'U' shape without cup-mark	Double 'U' shape figure without central cup-mark.	
Single 'U' shape with cup-mark	'U' shape image with central cup-mark.	
Double 'U' shape with cup-mark (2 rings)	Same as the above, with two concentric 'U' shaped grooves.	
Multiple 'U'shape with cup-marks (+ 3 rings)	Same as the above, with three concentric 'U' shaped grooves.	
Compartmentalized Circle	Circles which are internally segmented.	

PENANNULAR RING VARIANTS	Single Penannular	Gapped single circle, with central cup-mark.	
	Double Penannular (2 arcs)	Same as the above but with two concentric gapped circles.	
	Multiple Penannular (+ 3 arcs)	Same as the above but with three or more concentric gapped circles.	
	Single Oval Penannular	Single gapped oval arc, with central cup-mark.	
	Double Oval Penannular (2 arcs)	Same as the above but with two concentric arcs.	
	Multiple Oval Penannular (+3 arcs)	Same as the above but with three or more concentric arcs.	
	Combined Penannular (2 rings)	When a motif is composed by a combination of a complete circle and a gapped oval, with central cup-mark.	
	Combined Penannular (3 rings)	Same as the above, but with 3 rounds of motifs around cup-mark.	
	Combined Penannular (+ 4 rings)	Same as the above but with 4 rounds of motifs around the cup-mark.	
ROSETTE VARIANTS	Simple (arrangement of cup-marks)	When a series of cup-marks are arranged in a circular manner.	

	Enclosed cup-marks without central cup-mark	When a series of cup-marks are arranged in a circular manner and enclosed by a circle.	
	Enclosed cup-marks with central cup-mark	When a series of cup-marks are arranged in a circular manner, around a central cup and enclosed by a circle.	
	Rosette with cup-marks and groove	When a series of cup-marks are arranged in a circular manner, around a central cup from where a linear radial departs, enclosed by a circle.	
SPIRAL VARIANTS	Incipient right-handed spiral ring (no cup-mark)	A right-handed spiral-like motif, or a circle whose ends are notably offset from one another. No central cup-mark.	
	Incipient right-handed spiral ring (with cup-mark)	A right-handed spiral-like motif, or a circle whose ends are notably offset from one another. With central cup-mark.	
	Right-handed spiral	Continuous line that starts from a middle position curving outwards in a clockwise direction around itself.	
	Right-handed spiral with central cup	Continuous line that starts from a middle position curving outwards in a clockwise direction	

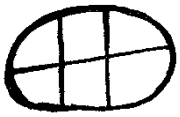
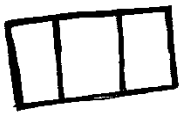
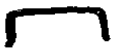
		around itself. With central cup-mark.	
	Incipient left-handed spiral ring (no cup-mark)	A left-handed spiral-like motif, or a circle whose ends are notably offset from one another. No central cup-mark	
	Incipient left-handed spiral ring (with cup-mark)	A left-handed spiral-like motif, or a circle whose ends are notably offset from one another. With central cup-mark.	
	Left-handed spiral	Continuous line that starts from a middle position curving outwards in an anti-clockwise direction around itself.	
	Left-handed spiral with central cup	Continuous line that starts from a middle position curving outwards in an anti-clockwise direction around itself. With central cup-mark.	
	Running spiral	When a number of spirals are depicted joined together.	
	Right-handed horn spiral	Spiral developing towards the right and ending with an inwards twist.	
	Left-handed horn spiral	Spiral developing towards the left and ending with an inwards twist.	

	Double linked 'S' spiral	Continuous groove used to create two opposing spirals linked together.	
	Serpentiform spiral (right hand)	Continuous line that starts from a middle position curving outwards in a clockwise direction around itself, ending in a long wavy groove.	
	Serpentiform spiral (left hand)	Continuous line that starts from a middle position curving outwards in an anti-clockwise direction around itself, ending in a wavy groove, ending in a long wavy groove.	
	Triple Spiral	When three spirals are disposed in very close proximity and a triangular manner.	
RADIAL GROOVE VARIANTS	Radial from cup-mark	Artificial radial groove originating from a cup-mark (including mini-cups, discs, natural cups, etc.)	
	Radial – truncating	A linear groove extending from the central cup-mark, cutting across all associated rings.	
	Radial – non-truncating	A linear groove extending from the central cup-mark and running	

	between the gapped associated circles.	
Radial – combination (truncating and non-truncating)	When a linear groove extending from a central cup-mark both truncates and runs between the gaps of the associated rings.	
Radial – link	Where a linear groove departing from a central cup-mark end in another element (usually a cup-mark).	
Radial – multiple	When a circular motif has two or more radial grooves.	
Radial from inner ring	When the linear radial groove departs from an inner ring, part of the composition.	
Radial from outer ring	When the linear radial groove of a composition departs from the outer ring of a composition.	
Radial – partial	A radial groove, part of a multi-ringed motif, extending from the central cup-mark but ending on an inner circle.	
Radial – enclosed	A radial groove enclosed within a ring, not extending beyond the outer ring.	

	Radial – dumbbell	Linear straight groove departing from a circular motif's cup-and-ring, and finishing on another element, located at a short distance.	
Keyhole Variants	Simple keyhole	Gapped ring with extended dog-legged ends.	
	Keyhole around cup-mark	Gapped ring with extended dog-legged ends and central cup-mark.	
	Keyhole around ring	Gapped ring with extended dog-legged ends, surrounding a simple circle.	
	Keyhole around cup-mark and radial groove	Gapped ring with extended dog-legged ends surrounding a cup-mark with linear radial.	
	Multiple keyholes around cup-mark	Two or more concentric gapped rings with extended dog-legged ends surrounding a central cup-mark.	
	Multiple keyholes around cup-mark and groove	Two or more concentric gapped rings with extended dog-legged ends surrounding a central cup-mark with a radial groove.	

	Penannular around keyhole	Gapped ring with extended dog-legged ends surrounded by a gapped ring/arc.	
	Penannular around Keyhole with cup-mark	Gapped ring with dog-legged ends surrounded by a gapped ring/arc. With central cup-mark.	
	Paired Radial Groove (keyhole variant)	Two closely spaced parallel grooves departing from an outter circle, resembling a keyhole motif.	
Enclosure Variants	Simple Curvilinear	A closed groove making a curvilinear shape.	
	Multiple Curvilinear/Circle/Oval	Two or more curvilinear enclosures developing concentrically.	
	Curvilinear with cup-marks	A number of cup-marks surrounded by curvilinear enclosure.	
	Semi-circular enclosure	Curvilinear line making a half circle/oval shape.	
	Simple Rectilinear/Square/Rectangle (no cup-marks)	A closed groove that is rectilinear in shape.	
	Multiple Rectilinear/Square/Rectangle (no cup-marks)	Concentric rectangles/squares.	

	Multiple Rectilinear/Square/Rectangle with cup-marks	Concentric rectangles/squares enclosing a number of cup-marks.	
	Segmented Curvilinear Enclosure	A circular or curvilinear enclosure segmented on the inside.	
	Segmented Rectilinear Enclosure	A rectangle or square with internal segmentations.	
	Cartouche	A closed groove that is rectilinear with rounded corners.	
	Diamond-shaped Enclosure	A closed groove with angular edges, making the shape of a diamond.	
	Triangle	An enclosure with three angles, making a triangular shape.	
	Other Enclosures with internal segmentation	Enclosures with various shapes, which are segmented on their inside.	
Groove Variants	Rectilinear	When a groove takes three or four sides, forming sharp corners.	
	Curvilinear	A groove that curves.	
	Wavy line	A groove, of varying lengths, with a number of curves.	

	Linear straight	A linear, straight groove.	
	Linear smooth	Linear groove with smooth undulations.	
	Linear angular	Linear groove with sharp changes in direction.	
	Partly enclosing	When an open groove encloses another artificial or natural element.	
	Single arc	An artificial, curvilinear, open groove.	
	Single Chevron	A line with an angle in the middle of almost 90 degrees.	
	Double Chevron	Two grooves with marked angles (c. 90 degrees), developing in parallel.	
	Serpentiform	A continuous and very wavy line.	
	'V' shaped	A continuous groove with a central angle, making a 'V' shape.	
Parallel Groove Variants	Straight	A set of straight grooves carved in proximity and parallel to each other.	
	Wavy	A set of wavy grooves carved in proximity and parallel to each other.	
	Diagonal	A set of diagonal grooves carved in a parallel.	

	Originating from linear stem	When the ends of a number of parallel straight lines adjoins a perpendicular linear groove.	
	Ladder	A series of parallel short grooves confined on the top and bottom by another pair of parallel grooves, this time perpendicular to the first set.	
	Parallel Arc	Two or more arcs parallel to each other.	
	Enclosed	A set of parallel straight lines enclosed by a groove, often cartouche-like.	
	Unenclosed	A set of parallel straight lines lacking any type of enclosing groove.	
	Central division	A set of parallel straight lines divided by a central groove.	
	In ring	A set of parallel straight lines enclosed by a ring.	
Animal Variants	Stylized deer	Representation of a deer which is neither completely linear nor realistic.	

Naturalistic deer	Representation of a deer (male or female) with naturalistic references.	
Linear deer	Simple representation of a deer (male or female), in a linear fashion.	
Stylized horse	Representation of a horse which is neither completely linear nor realistic.	
Naturalistic horse	Representation of a horse (male or female) with naturalistic references.	
Linear horse	Representation of a deer (male or female) with naturalistic references.	
Stylized unidentified species	Unidentified species depicted in a stylized way.	
Naturalistic unidentified species	Unidentified species of animal with a more naturalistic design.	
Linear unidentified species	Unidentified species of animal depicted in a linear shape, with no details.	
Animal footprints (hooves)	Replicas of impressions left by animals hooves on the ground.	
Serpent	With the shape of a snake.	

Human Variants	Stylized Human Figure	Human figure designed in a stylized way. These are very rare.	
	Detailed Human Figure	Human figured designed in a detailed, naturalistic way. These are very rare.	
	Riding Scene	Composition of human and horse.	
Weapon Variants	Axe	Axes can have more or less detail.	
	Dagger	Daggers can be more or less stylized, with or without details of the material counterpart.	
	Short-sword	A short blade that may be hafted.	
	Halberd	Representation of the material object, halberd.	
	Shield	Although there is no certainty about what this depiction represents it has been suggested that it is a shield, due to its rectangular shape.	
	Spear	Hafted object in the shape of a spear.	

	Unknown	Any other weapon that is not evidently recognizable.	
Idols	Simple Idols	Simple cylindrical motif. May display lines delimiting the “head”.	
	Segmented Idols	Cylindrical or near rectangular motif, internally segmented.	
Misc.	Wishbone	A “V” shaped form in which two short linear grooves converge on one end.	
	Soliform	Sun-shaped motifs.	
	Podomorphs	Foot-shaped images. These can be in pairs or isolated and level of details vary from the outline of the feet to the fingers, nails, shoes, etc.	
	Swastikas	Two crossed grooves with sharp angles.	
	Labyrinths	A complex circular motif. An assemblage of circles, arcs, conjoined ends, etc.	
	Palettes	Typically a motif composed by a square from where a linear	

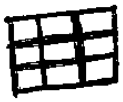
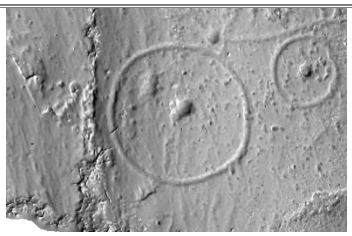
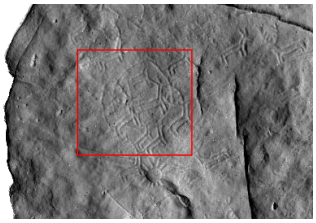
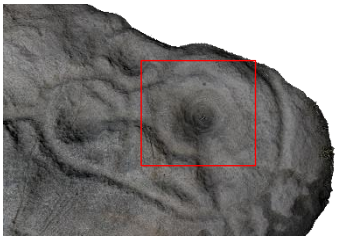
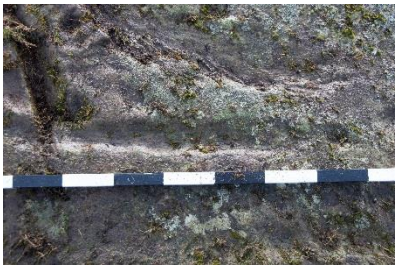
		groove departs, ending on a cup-mark.	
	Grid/Hatching	Parallel and perpendicular grooves making a checkerboard pattern.	
	Cross	Two linear grooves carved perpendicular to each other and intersected in their middles.	
	Presence of historic motif	Any modern motif that represents non-prehistoric carvings.	
ERASED FEATURES	Circles	A circle shaped depression completely pecked on the inside, suggesting a motif has been removed.	
	Squares	A square-shaped depression, completely pecked on the inside, suggesting a motif has been removed.	
	Others	Other shapes that may have been erased from the rock surface through pecking.	
UNIDENTIFIED		Motifs with difficult identifications or whose shape is not recognisable.	

Table 23 Description of attributes in the category of Motif Behaviour, included in the Graphic Scale.

MOTIF BEHAVIOUR			
CUP-MARKS	Linear Row	When three or more cup-marks were carved in a linear fashion.	
	Curvilinear Row	When three or more cup-marks were carved in a curvilinear line.	
	Clustered Cup-marks	A group of 3 cups displayed randomly and in close proximity.	
	Clustered mini cup-marks	Same as the above but cup-marks are of small size.	
	Conjoined cup-marks	When two or more cup-marks were carved contiguously.	
CIRCLES	Converging Circles	When two or more individual circular motifs are depicted adjoined to each other	
RADIALS	Direction Consistency	When two or more radial grooves on the same panel are consistently orientated towards the same direction (excluding paired radials).	
	Direction Variation	When two or more radial grooves on the same panel have different orientations.	

ENCLOSURES	Convergence	Two or more closed grooves that bordered.	
PARALLEL GROOVES	Diagonal	Linear grooves developing in a diagonal fashion.	
	Consistent Length	Straight linear grooves disposed parallel to each other, sharing an approximate length.	
	Length Gradation	A set of parallel, straight grooves that vary in length.	
GENERAL	Linearity	When there is a general sense of linear organization on the composition.	
	Convergence	When there is a sense of motif convergence on the composition.	

Table 24 Description of the attributes of Carving Techniques category, included in the Graphic Scale of analysis.

CARVING TECHNIQUES		
Pecking	Regular pecking probably made with a chisel.	
Rough Pecking	Uneven pecking, with no refined finishing.	
Incision	Fine lines made with a sharp tool.	
Abrasion	When the motifs are scraped on the surface.	
Linear Cup-marks	Motif designed with a succession of cup-marks, generally of consistent sizes.	
Joined Cup-marks	Motif designed with a succession of cup-marks that are then joined together through abrasion.	

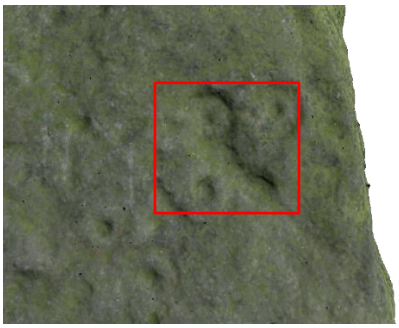
Combination of Pecking and Abrasion	When motifs are firstly carved through pecking and finished with abrasion.	
Combination of Cup-marks and Pecking	Motifs are done with a combination of cup-marks and pecking.	
Sunken Motifs (depressions on surface)	This technique is usually applied to cup-marks or cup-and-ring circles. Grooves are not carved but polished on the stone, resulting in soft depressions that are shaped to form the motifs.	

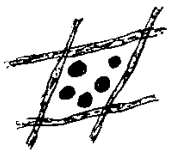
Table 25 The compositional subclasses used to define the carved panels.

COMPOSITIONAL SUBCLASSES	
Single	Where a carved surface features only one motif.
Simple	Where a composition features a simple arrangement of a small number of motifs (1 to 2 simple motifs or a relatively plain composition of motifs).
Clustered	Where a number of motifs are closely spaced or arranged in order to cover a limited area (half or less) of the panel.
Prominent Motif	Where a single motif occupies a central position in a composition due to their location or size. Similar to the 'Prominent central motif Style' defined by Eogan (1986:122), but with less emphasis on centrality.
Irregular	Where the motifs are dispersed in an apparently random and irregular manner across the panel. Similar to Eogan's 'Random Style' (1986:165) and in principle to the 'Loughcrew Style', by Shee Twohig (1981:106).
Dispersed	Where a series of motifs are widely, but relatively evenly, arranged across the carved surface.
Dense	Where a series of closely set and / or interconnected motifs of various types occur across the entire or majority of the panel surface, or arranged across a sizable area within the overall panel surface, giving an integrated and complex effect. Generally does not apply to panels where fewer than 4 different types of motifs are represented. Similar to Eogan's 'Lavish Style' (1986:164) and the principle of 'Fourknocks Style' after Shee Twohig (1981:106).

Table 26 Motif Range Subclasses, another component used to approach motif classification.

	MOTIF RANGE SUBCLASSES	
A	***Dominant Type***	Where a panel is dominated by a single motif, due to its frequency.
B	***Limited Type***	The panel is dominated by two or three motif types due to their frequency (no more than four motif types present).
C	***Varied Type***	Where a panel features five or more different types of motifs.

Table 27 Details regarding the structural variants underpinning the compositions of the carved rocks. These elements contribute for the spatial organization of the compositions but are not necessarily motifs on their own.

STRUCTURAL VARIANTS			
Fissure Variants	Fissure truncation	When a motif is seemingly truncated (i.e. partial) due to its relationship with natural fissures and ancient cracks.	
	Fissure as radial	When an ancient fissure or crack is apparently acting as a radial groove for a cup-and-ring motif.	
	Fissure convergence	When a groove or motif was depicted in order to meet an ancient natural fissure or crack on the rock face.	
	Fissure enhanced	When an ancient crack or fissure has been enhanced through pecking (lengthened, deepened or widened).	
	Fissure – dividing or enclosing	When natural fissures and/or cracks are included in the composition, either by dividing or enclosing motifs.	
Natural Depressions	Natural depressions enclosed by cup-marks	When a set of cup-marks are carved around a natural element (i.e. solution hole)	
	Natural depressions enclosed by ring	When a ring is enclosing a natural depression (i.e. solution hole, crack, etc.)	
	Natural depressions enclosed by +2 rings	When 2 rings or more are enclosing a natural depression (i.e. solution hole).	

	Natural depressions intersected by motifs	When motifs interact with natural depressions on the surface.	
	Natural depressions in relation to motifs	When motifs are depicted taking into account nearby natural depressions, although not physically relating.	
Structural Variants	Superimpositions	When two or more motifs overlap.	
	Conjoined motifs	When two or more motifs are depicted side by side, abut to each other.	
	Intricate network of lines joining motifs	When motifs are connected by a number of grooves that can be wavy, curvilinear, straight, angular, etc.	
Panel Edge Convergence Variants	Panel Edge convergence	Where a design physically joins the edge of a rock surface.	
	Panel Edge Motif Truncation	Incomplete motif due to proximity to the panel edge.	
	Panel Edge Compositional Effect	Where the edge of the panel is seemingly part of the composition, impacting or restricting the carved motifs.	

Table 28 Assemblage of characteristics used to describe the type of rocks used to carve.

MEDIUM CHARACTERIZATION		
Surface Type	Boulder	Motifs were inscribed on an earthfast boulder/erratic.
	Outcrop	Motifs were carved on a rock formation that is visible on the surface.
	Shelter/Cliff	Motifs were carved on a natural and protective rocky structure.
Rock Surface Topography	Horizontal	General topography of the carved rock is horizontal.
	Vertical	General topography of the carved rock is vertical.
	Plain	General topography of the carved rock is flat.
	Concave	General topography of the carved rock is rounded inward.
	Convex	General topography of the carved rock is rounded outward.
	Sloped	General topography of the carved rock is inclined.
Rock Surface Texture	Smooth	Carved surface is continuous and even with few fissures.
	Rough	Carved surface is irregular and uneven, interrupted by a number of elements.
Rock Surface Morphology	Fissures/Cracks	Presence of fissures or cracks on the carved surface.
	Natural hollows	Presence of natural hollows on the carved surface.
	Bedding plains	Presence of bedding plains on the carved surface.
	Solution holes	Presence of solution holes on the carved surface.
	Basin	Presence of a basin or more on the carved surface.
	Rectilinear depression	Presence of depressions with rectilinear morphology.

Rock Grain Type	Fine grain	Rock surface made of very fine grains, almost indistinguishable individually.
	Medium grain	Rock surface made of medium sized grains, distinguishable individually.
	Large grain	Rock surface made of large grains, easily identifiable individually.
Visible Components	Quartz	Presence of large components or veins of quartz on the rocky surface
	Mica	Presence of large components of mica on the rocky surface
	Feldspar	Presence of large components of feldspar on the rocky surface
	Others	Other types of inclusions that may be visible to the naked eye on the rock surface.
Inclination of the Carved Panel	Flat/Plain	Carved panel is flat, generally close to the ground level
	Smooth	Carved panel is not completely flat, but slopes slightly.
	Accentuated	Carved panel has a noticeable inclination.
	Very Accentuated	Carved panel is very sloped.
	Vertical	Carved panel is vertical.
Inclination of the Slope	Flat/Plain	A plain terrain.
	Smooth	Inclination of the terrain is soft.
	Accentuated	Inclination of the slope is slightly abrupt.
	Very Accentuated	Inclination of terrain is very steep.
Geology Type	Granite	Carved rock is made of granite.
	Limestone	Carved rock is made of limestone.
	Greywacke	Carved rock is made of greywacke.
	Sandstone	Carved rock is made of sandstone.
	Schist	Carved rock is made of schist.
	Others	Other types of rocks that are not on the list.

6.3. ENVIRONMENTAL SCALE: THE WIDER LANDSCAPE

Table 29 Assemblage of parameters used to characterize the landscape location of the carved rocks.

LANDSCAPE SITUATION			
Topography	Highlands	When the carved rocks are located on higher grounds, i.e. top areas of mountains or close.	
	Lowlands	When carved rocks are located in the base of mountains or low grounds of valleys.	
	In Between	When the carved rocks are located on hillsides or half-way up slopes.	
Relief	Valley Bottom	Rocks located in the flat, lower area of the depressions which are valleys.	
	Spur	Rocks located on a lateral ridge of a mountain or hill.	
	Knoll	Rocks located on a hillock, or small, round natural hill.	
	Plateau	Rocks located where the land is flat.	
	Top (summit/hill)	Rocks located on the top of a hill.	
	Middle (hillside)	Rocks located on the sloping side of a hill.	
Slope	Flat/Gentle	0 – 2 %[29]	Plain terrain.
	Soft/Smooth	2 – 5 %	Gentle inclination of the terrain.
	Medium	5 – 15 %	Terrain slopes more evidently.
	Accentuated	15 – 45%	Steep slopes.
	Very Accentuated	45 – 100%	Very steep slopes.

[29] This slope categorization can be found here: http://geographyfieldwork.com/SlopeSteepnessIndex.htm

Table 30 Preferential visibilities is another component used to characterize the landscape setting of the carved rocks. Each rock can have a preferential viewshed towards more than one direction.

VISIBILITY PREFERENCES	
Preferential Orientation of Visibility Patterns	North
	Northeast
	East
	Southeast
	South
	Southwest
	West
	Northwest

Table 31 Criteria for the fieldwork assessment of Landscape Analysis.

LANDSCAPE ENQUIRIES TO THE ROCKS	
Does the rock stand out in the landscape?	Refers to the prominence of the rock and how visible it is in the landscape.
Other archaeological sites within a 500 m radius?	If there are any other archaeological sites of different types within a radius of 500 m.
Other archaeological sites within 1 km radius?	If there are any other archaeological sites of different types within a radius of 1 km.
Proximity to other carved rocks? (less than 50 m)	If there are any other carved rocks in 50 m or less.
Proximity to other carved rocks? (up to 100 m)	If there are any other carved rocks in a distance of up to 100 m.
Intervisibility with other carved rocks?	If from the rock being documented, other carved rocks can be seen in the landscape.
Intervisibility with other archaeological sites?	If from the rock being documented, other archaeological sites can be seen in the landscape.
Is the rock accessible?	If it is easy to access the rock in terms of trekking time, energy and obstacles.
Rock situated in natural pathway?	If it can be considered that the rock is located in areas of optimal routeways.
Rock situated in modern pathway?	If the rock is located in the proximities or by a modern pathway.
Discrete Location in Landscape?	If the rock is 'hidden' in the landscape.
Large audiences at site?	Can large numbers of people congregate in the area where the rock is located.
Large Audiences looking at motifs?	Can large numbers of people visualise the motifs on the rock simultaneously.

APPENDIX 7

LIST OF VARIABLES USED ON THE DIFFERENT APPROACHES TO THE PRESENCE/ABSENCE MATRIX AND NETWORK ANALYSIS.

A. FIRST APPROACH

Motif Variation

Cupmark Variants
Unstructured Pecking
Ring Variants
Penannular Rings Variants
Rosette Variants
Spiral Variants
Radial Groove Variants
Keyhole Variants
Enclosure Variants
Groove Variants
Parallel Groove Variants
Animal Variants
Human Variants
Weapon Variants
Miscellaneous
Idols
Erased Features

Structural Variants

Fissure Variants
Natural Depressions
Structural Variants
Panel Convergence Variants

Motif Behaviour

Linearity
Conjoined/Convergence Variants
Radials - Consistent Direction
Radials - Varied directions

Medium Characterization

Boulder
Outcrop
Shelter/Cliff
Rock Surface Horizontal
Rock Surface Vertical
Rock Surface Plain
Rock Surface Concave
Rock Surface Convex
Rock Surface Sloped

Landscape Situation

Highlands
Lowlands
In between
Slope Flat/Gentle (0 - 2%)
Slope Soft/Smooth (2 - 5%)
Slope Medium (5 - 15%)
Slope Accentuated (15 - 45%)
Slope Very Accentuated (45 - 90%)

B. Second Approach

Motif Variation

Isolated Cup-marks
Rows of Cup-marks
Clusters of Cup-marks
Enclosed Cup-marks
Cup-marks in rings
Cup-marks in grooves
Conjoined Cup-marks
Dumbbells
Disc/Oval Cupmarks
Cup-marks with Internal Features
Solution holes as Cup-marks
Intestinal Grooves
Pecking - Random
Pecking - Condensed
Simple Rings
Cup-and-Rings
Rings surrounding wise cups/depressions
Gapped rings
Combined Rings
Rings with converging ends
Rings with conjoined ends
Terminus Convergence
Ring Extended
Wide spaced ring with cup
Simple Ovals
Ovals with cup-marks
Squared rings with cup-marks
Simple U
U with cup-marks
Segmented circles

Circular Penannulars
Oval Penannulars
Combined Penannulars
Rosettes Simple
Rosettes Composed
Left-handed spirals
Right-handed spirals
Radial from cup-mark (simple)
Single radials
Multiple radials
Enclosed Radial
Dumbbell Radial
Paired Radial
Simple Keyholes
Multiple Keyholes
Penannular Keyholes
Rectilinear Enclosures simple
Rectilinear Enclosures Multiple
Rectilinear Enclosures with cups
Segmented rectilinear enclosures
Curvilinear enclosures simple
Curvilinear enclosure multiple
Curvilinear enclosure with cups
Segmented curvilinear enclosure
Others
Grooves Linear
Grooves Rectilinear
Grooves Curvilinear
Partly enclosing
Arcs
Chevrons
Animals - Horse
Animals - Deer
Animals Other
Humans Solo
Humans Riding Scene
Weapons Axe
Weapons Dagger
Weapons Other/Unknown
Idols
Misc. Wishbone
Misc. Soliforms
Misc. Swastika
Misc. Grids
Misc. Cross
Misc. Historical
Misc. Labyrinth

Erased Features

Structural Variants
Fissure Interaction
Use of Natural Features
Structural Variants
Panel Convergence Variants

Structural Variants

Superimpositions
Conjoined/Convergence motifs
Networks of lines

Motif Behaviour

Linearity
Radials - Consistent Direction
Radials - Varied directions

Panel Edge Convergence Variants

Panel Convergence

Carving Techniques

Pecking
Rough Pecking
Incision
Abrasion
Linear cup-marks
Joined cup-marks
Combination of Pecking and Abrasion
Combination of Cup-marks and Pecking
Combination of Cup-marks and Abrasion
Sunken motifs (depressions on the surface)

Medium Characterization

Boulder
Outcrop
Shelter/Cliff
Surface Flat/Plain
Surface Smooth
Surface Accentuated
Surface Very Accentuated
Surface Vertical

Landscape Situation

Highlands

Lowlands
In between
Slope Flat/Gentle (0 - 2%)
Slope Soft/Smooth (2 - 5%)
Slope Medium (5 - 15%)
Slope Accentuated (15 - 45%)
Slope Very Accentuated (45 - 90%)

Visibility Preferences / Visibility Analysis

North
Northeast
East
Southeast
South
Southwest
West
Northwest

Landscape Analysis

Prominent Rock
Proximity to Carved Rocks
Proximity to Archaeological Sites
Intervisibility with carved rocks
Intervisibility with archaeological sites
Accessible
Large Audiences on site

C. Third Approach (all categories and variants)

Motif Variation

Isolated Cup-marks
Linear row of cup-marks
Curvilinear row of cup-marks
Cluster of cup-marks
Enclosed cup-mark
Cluster of central cup-marks
Satellite cup-mark (in ring)
Cup-mark at ring terminus
Terminal cup-mark in groove
Cup-mark along groove
Cup-mark adjoining ring
Cup-mark adjoining groove
Cup-mark between rings
Cup-mark in ring gap
Off centre cup-mark

Multiple enclosed cup-marks
Conjoined cup-marks
Disc cup-mark
Cup-mark with internal features
Dumbbell
Oval cup-mark
Isolated Mini cup-mark
Linear row of mini cupmarks
Cluster of mini cup-marks
Enclosed mini cup-marks
Enclosed central mini cup-mark
Solution holes used/transformed into cup-marks
Intestinal (conjoined linear cup-marks)
Condensed pecking
Random pecking
Enclosed dense pecking
Single Ring (without cup-mark)
Double Ring (without cup-mark)
Multiple Rings (without cup-marks)
Gapped Single Ring (without cup-mark)
Double gapped ring (without cup-mark)
Gapped Single Ring (with cup-mark)
Gapped Double Ring (with cup-mark)
Gapped multiple Ring (with cup-mark)
Cup and 1 ring
Cup and 2 rings
Cup and 3 rings
Cup and 4 rings
Cup and 5 rings
Cup and 6 rings
Cup and 7 rings
Cup and 8 rings
Cup and 9 rings
Cup and 10 rings
Partial ring
Double partial ring
Multiple partial 3 rings
Multiple partial 4 rings
Multiple partial +5 rings
Gapped and complete combination ring (2 rings)
Gapped and complete combination (3 rings)
Gapped and complete combination (+ 4 rings)
Gapped ring on one side, with radial
Gapped ring on one side, with radial (2 rings)
Gapped ring on one side, with radial (3 or + rings)
Ring Extended
Converging Circles
Ring with cup and converging ends (1 ring)
Ring with cup and converging ends (2 rings)
Ring with cup and converging ends (3 or + rings)
Ring with gapped, converging ends

Ring with 1 conjoined end
Ring with conjoined end (1 ring)
Ring with conjoined ends (2 rings)
Ring with conjoined ends (3 or + rings)
Ring terminus convergence
Ring surrounding large cup-mark/central depression (1 ring)
Ring surrounding large cup-mark/central depression (2 rings)
Ring surrounding large cup-mark/central depression (3 or + rings)
Wide spaced ring with central cup-mark
Single oval ring
Double val without cup-mark
Multiple oval without cup-mark
Oval ring with central cup-mark
Oval ring with central cup-mark (2 rings)
Oval ring with central cup-marl (3 or + rings)
Single squared-ring with central cup-mark
Double squared-ring with central cup-mark (2 rings)
Multiple squared-ring with central cup-mark (3 or + rings)
Single 'U' shape without cup-mark
Double 'U' shape without cup-mark
Single 'U' shape with cup-mark
Double 'U' shape with cup-mark (2 rings)
Multiple 'U' shape with cup-marks (3 or + rings)
Compartmentalised circle
Single Penannular
Double Penannular (2 arcs)
Multiple Penannular (3 or + arcs)
Single Oval Penannular
Double oval penannular (2 arcs)
Multiple oval penannular (3 or + arcs)
Combined penannular (2 rings)
Combined penannulas (3 rings)
Combined penannular (4 or + rings)
Rosette Simple (arrangement of cup-marks)
Rosette - Enclosed cup-marks without central cup-mark
Rosette - Enclosed cup-marks with central cup-mark
Rosette with enclosed cupmarks and groove
Incipient right-handed spiral ring (without cup-mark)
Incipient right-handed spiral ring (with cup-mark)
Incipient left-handed spiral ring (without cup-mark)
Incipient left-handed spiral ring (with cup-mark)
Right-handed spiral without cup-mark
Righ-handed spiral with central cup-mark
Left-handed spiral without cup-mark
Left-handed spiral with central cup-mark
Running spiral
Right-handed horn spiral
Left-handed horn spiral
Righ-handed double link 'S' spiral
Left-handed double link 'S' spiral

Right-handed serpentiform spiral
Left-handed serpentiform spiral
Triple spiral
Combined Spiral and cup-and-ring
Radial from cup-mark
Truncating radial
Non-truncating radial
Combined radial (truncating and non-truncating)
Link radial
Multiple radial
Radial from inner ring
Radial from outer ring
Partial radial
Enclosed radial
Paired radial
Dumbbell radial
Angular radial
Radial continuation
Simple keyhole
Keyhole around cup-mark
Keyhole around ring
Keyhole around cup and groove
Multiple keyholes around cup-mark
Multiple keyholes around cup-mark and groove
Penannular around keyhole
Penannular around keyhole with cup-mark
Paired radial groove (keyhole variant)
Enclosure - Curvilinear
Enclosure - Curvilinear with cup-marks
Enclosure - Rectilinear with cup-marks
Enclosure - Semi-circular enclosure
Enclosure - Simple rectilinaer/square/rectangle
Enclosure - Multiple rectilinear/square/rectangle
Enclosure - Multiple Curvilinear/Circle/Oval
Enclosure - Segmented Rectilinear Enclosure
Enclosure - Segmented Curvilinear Enclosure
Enclosure - Cartouche
Enclosure - Diamond-shaped enclosure
Enclosure - Triangle
Enclosure with internal segmentation
Groove - Rectilinear
Groove - Curvilinear
Groove - Wavy line
Groove - Linear straight
Groove - Linear Smooth
Groove - Linear angular
Groove - Partly enclosing
Groove - Single Arc
Groove - Single chevron
Groove - Double chevron
Groove - Serpentiform

Groove - 'V' shaped
Parallel Grooves - Straight
Parallel Grooves - Wavy line
Parallel Grooves - Diagonal
Parallel Grooves - Originating from linear stem
Parallel Grooves - Ladder
Parallel Grooves - Parallel Arc
Parallel Grooves - Enclosed
Parallel Grooves - Unenclosed
Parallel Grooves - Central division
Parallel Grooves - In ring
Animal - Stylized deer
Animal - Naturalistic deer
Animal - Linear deer
Animal - Stylized hore
Animal - Naturalistic horse
Animal - Linear horse
Animal - Stylized unidentified species
Animal - Naturalistic unidentified species
Animal - Linear unidentified species
Animal footprints (hooves)
Animal - Serpent
Humans - Stylized human figure
Humans - Detailed human figure
Humans - Riding scene
Weapons - Axe
Weapons - Dagger
Weapons - Short-sword
Weapons - Halberd
Weapons - Shield
Weapons - Spear
Weapons - Unknown
Simple Idols
Segmented Idols
Misc. Wishbone
Misc. Soliforms
Misc. Podomorphs
Misc. Swastikas
Misc. Labyrinths
Misc. Palettes
Misc. Grid
Misc. Cross
Misc. Historical Motifs
Misc. Unidentified
Erased - Circle
Erased - Square/Rectangle
Erased – Others

Fissure Variants

Fissure Truncation

Fissure as radial
Fissure convergence
Fissure enhanced
Fissure - dividing or enclosing

Natural Depressions

Enclosed by cup-marks
Enclosed by ring
Enclosed by 2+ rings
Intersected by motifs
In relation to motifs
Enhanced

Structural Variants

Superimpositions
Conjoined motifs
Intricate network of lines joining motifs

Panel Convergence Variants

Panel edge convergence
Panel edge motif truncation
Panel edge compositional effect

Motifs behaviour

Linearity
Radials - Consistent Direction
Radials - Varied directions

Carving Techniques

Pecking
Rough Pecking
Incision
Abrasion
Linear cup-marks
Joined cup-marks
Combination of Pecking and Abrasion
Combination of Cup-marks and Pecking
Combination of Cup-marks and Abrasion
Sunken motifs (depressions on the surface)

Medium Characterization

Boulder
Outcrop
Shelter/Cliff
Rock Surface Horizontal
Rock Surface Vertical

Rock Surface Plain
Rock Surface Concave
Rock Surface Convex
Rock Surface Sloped
Surface Texture Smooth
Surface Texture Rough
Surface Morphology Fissures/Cracks
Surface Morphology Natural Hollows
Surface Morphology Bedding Planes
Surface Morphology Solution holes
Surface Morphology Basin
Surface Morphology Rectilinear depression
Fine Grain
Medium Grain
Large Grain
Visible Components Quartz
Visible Components Mica
Visible Components Feldspar
Visible Components Others
Carved Panel - Flat/Plain
Carved Panel - Smooth
Carved Panel - Accentuated
Carved Panel - Very Accentuated
Carved Panel - Vertical
Rock Medium Flat/Plain
Rock Medium Smooth
Rock Medium Accentuated
Rock Medium Very Accentuated
Rock Medium Vertical
Granite
Limestone
Greywacke
Sandstone
Schist

Landscape Situation

Topography - Highlands
Topography - Lowlands
Topography - In between
Valley Bottom
Spur
Knoll
Plateau
Top (summit/hill)
Middle (hillside)
Slope - Flat/Gentle (0 - 2%)
Slope - Soft/Smooth (2 - 5%)
Slope - Medium (5 - 15%)
Slope - Accentuated (15 - 45%)
Slope - Very Accentuated (45 - 90%)

Visibility Preferences / Visibility Analysis

North
Northeast
East
Southeast
South
Southwest
West
Northwest

Landscape Analysis

Prominent Rock
Proximity to Carved Rocks
Proximity to Archaeological Sites
Intervisibility with carved rocks
Intervisibility with archaeological sites
Accessible
Large Audiences on site

APPENDIX 8

RESULTS: MOTIF AND PRESENCE/ABSENCE MATRIX

8.1. GRAPHIC SCALE: THE MOTIFS

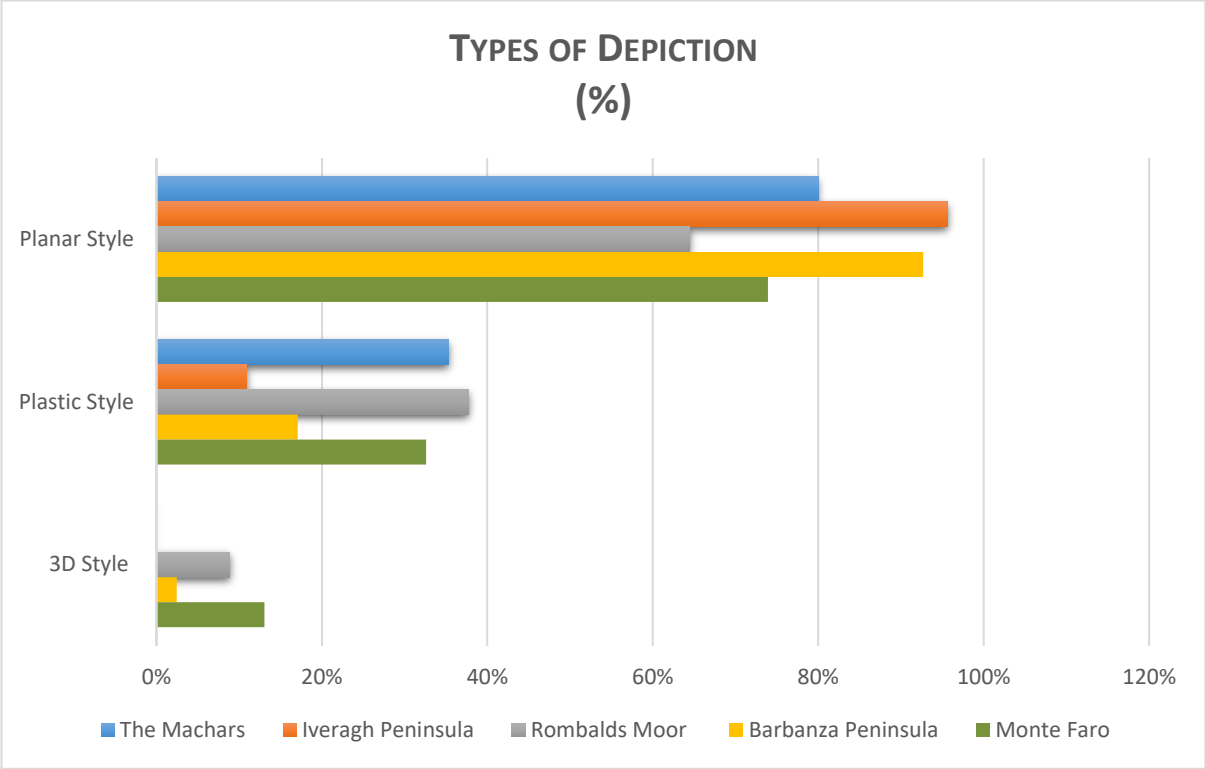
A. Category: Types of Depictions

Table 32 Results of the category 'Types of Depictions' in counts.

	TYPE OF DEPICTION (COUNTS)				
	The Machars	**Iveragh Peninsula**	**Rombalds Moor**	**Barbanza Peninsula**	**Monte Faro**
Planar Style	68	44	29	39	34
Plastic Style	30	5	17	7	15
3D Style	0	0	4	1	6

Table 33 Results of the category 'Types of Depictions' in percentages.

	TYPE OF DEPICTION (%)				
	The Machars	**Iveragh Peninsula**	**Rombalds Moor**	**Barbanza Peninsula**	**Monte Faro**
Planar Style	80%	95.65 %	64.44%	92.68%	73.91%
Plastic Style	35.29%	10.87%	37.78%	17.07%	2.44%
3D Style	0%	0%	8.89%	2.44%	13.04%



Graphic 1 Graphic representation of the percentage of different *Types of Depiction* in each study area.

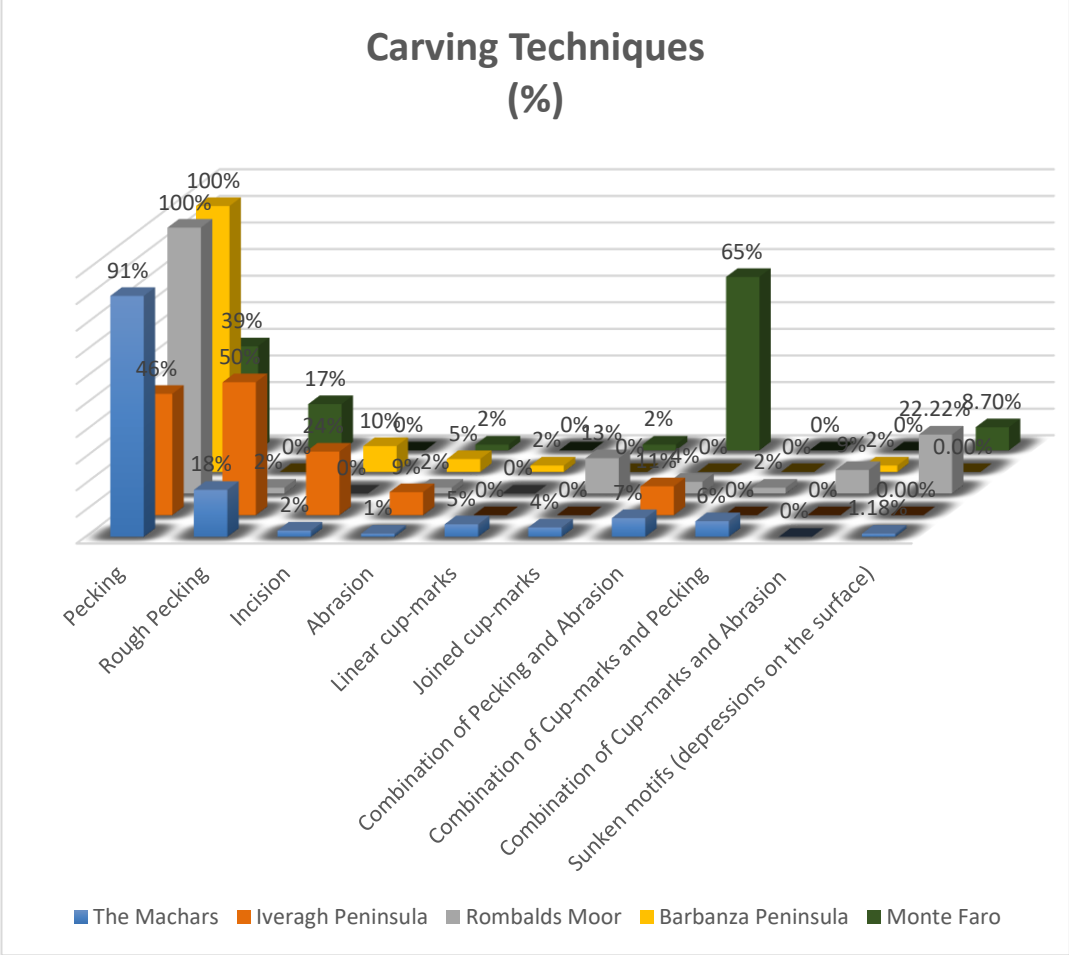
B. Category: Carving Techniques

Table 34 Results of the category 'Carving Techniques' in counts.

CARVING TECHNIQUES (COUNTS)					
	The Machars	**Iveragh Peninsula**	**Ilkley Moor**	**Barbanza Peninsula**	**Monte Faro**
Pecking	77	21	45	41	18
Rough Pecking	15	23	1	0	8
Incision	2	11	0	4	0
Abrasion	1	4	1	2	1
Linear Cup-marks	4	0	0	1	0
Joined Cup-marks	3	0	6	0	1
Combination of Pecking and Abrasion	6	5	2	0	30
Combination of Cup-marks and Pecking	5	0	1	0	0
Combination of Cup-marks and Abrasion	0	0	4	1	0
Sunken Motifs (depressions on surface)	1	0	10	0	4

Table 35 Results of the categories 'Carving Techniques' in percentages.

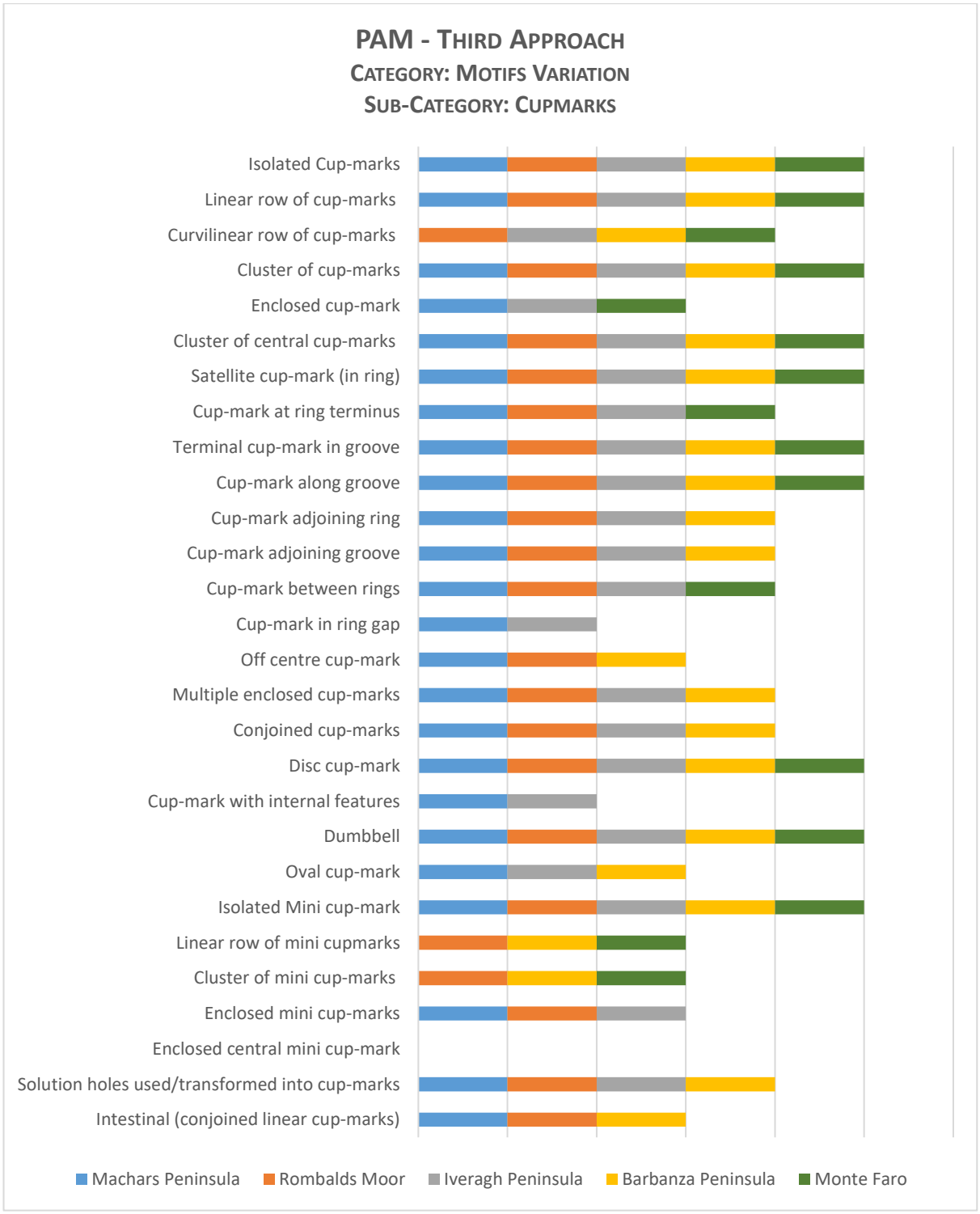
CARVING TECHNIQUES (%)					
	The Machars	**Iveragh Peninsula**	**Ilkley Moor**	**Barbanza Peninsula**	**Monte Faro**
Pecking	90.59%	45.65%	100%	100%	39.13%
Rough Pecking	17.65%	50%	2.22%	0%	17.39%
Incision	2.35%	23.91%	0%	9.76%	0%
Abrasion	1.18%	8.70%	2.22%	4.88%	2.17%
Linear Cup-marks	4.71%	0%	0%	2.44%	0%
Joined Cup-marks	2.53%	0%	13.33%	0%	2.17%
Combination of Pecking and Abrasion	7.06%	10.87%	4.44%	0%	65.22%
Combination of Cup-marks and Pecking	5.88%	0%	2.22%	0%	0%
Combination of Cup-marks and Abrasion	0%	0%	8.89%	2.44%	0%
Sunken Motifs (depressions on surface)	1.18%	0%	22.22%	0%	8.70%



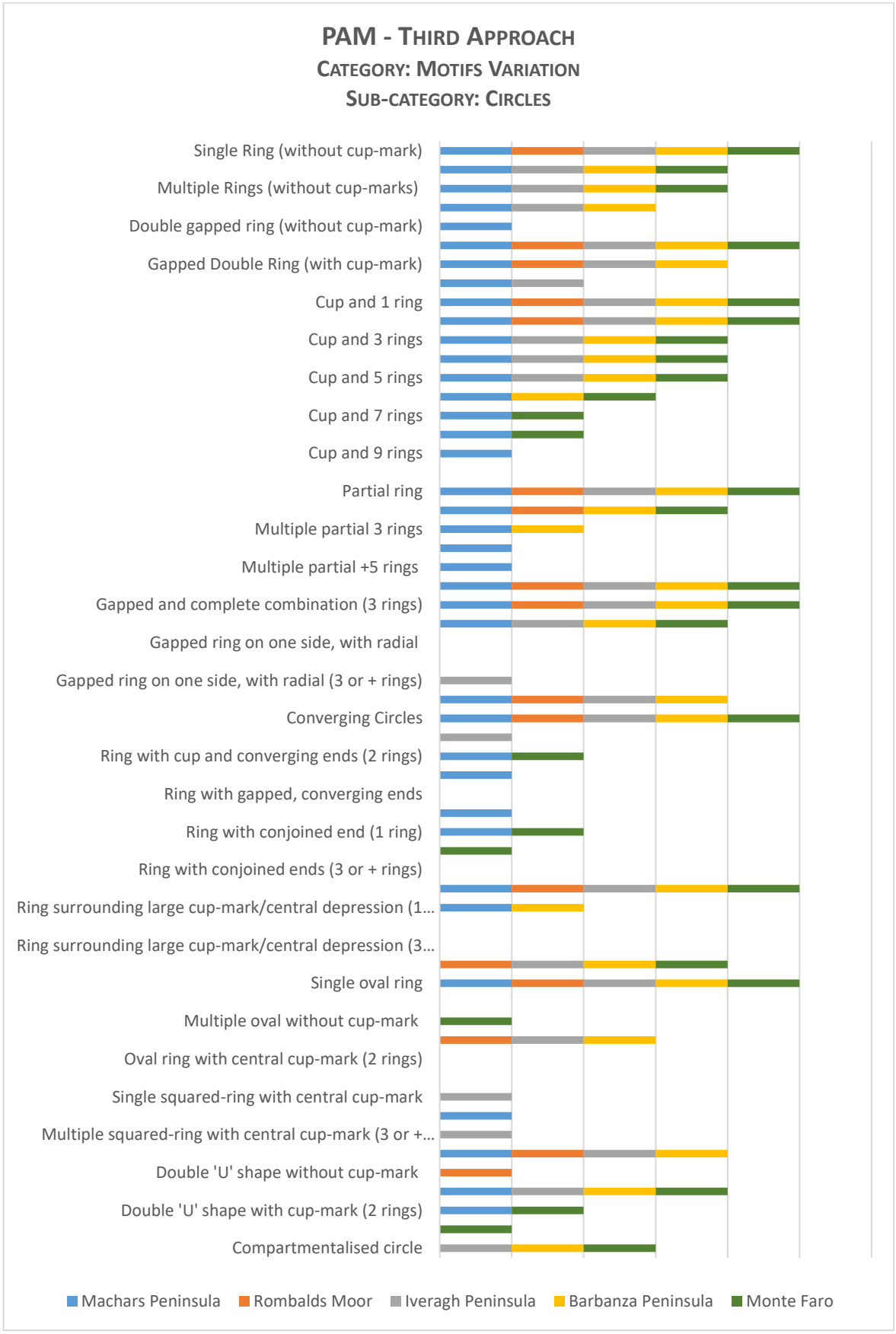
Graphic 2 Graphic with the representation in percentage of the different *Types of Carving Techniques* identified, per study area.

C. Motif Variants

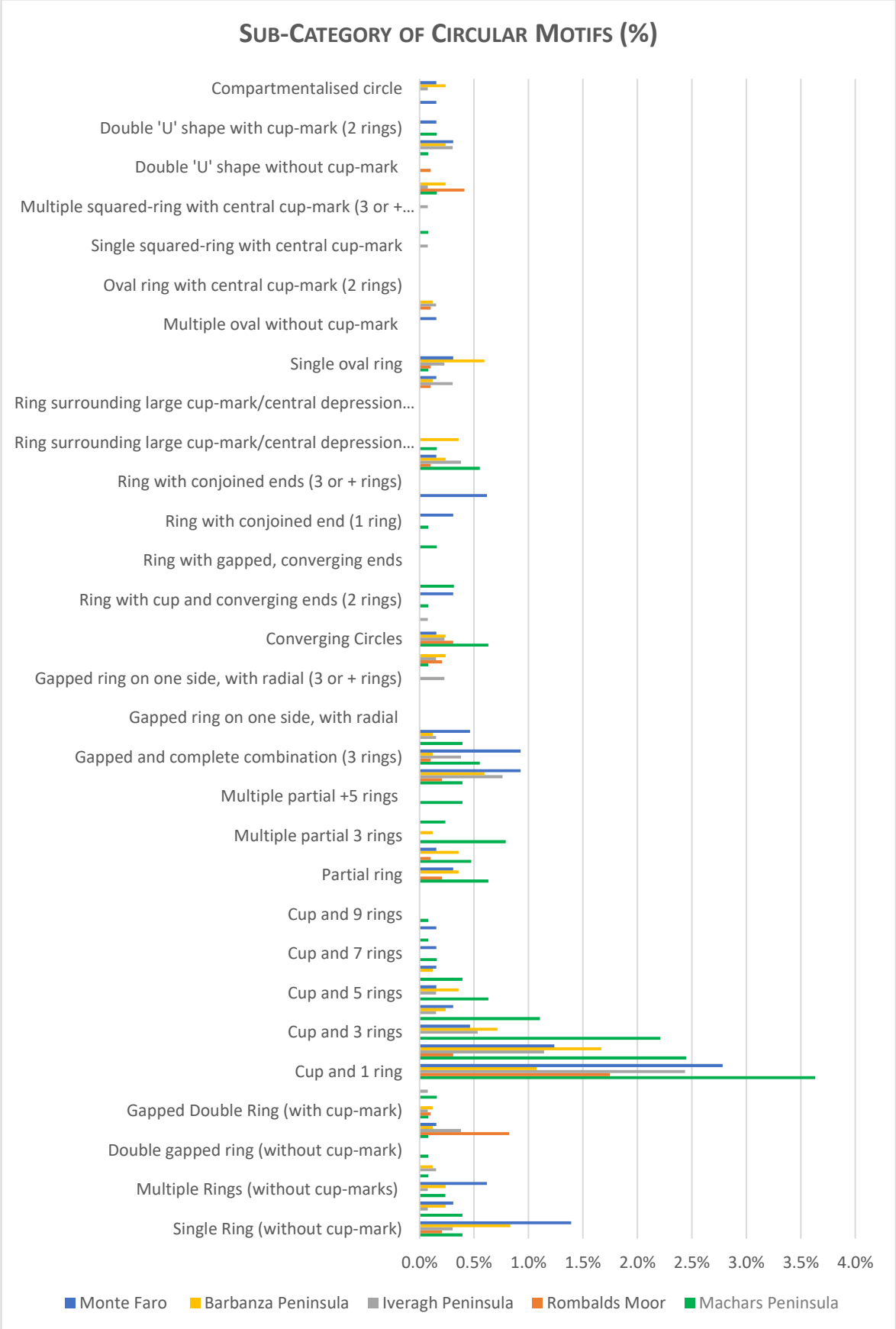
Sub-Category: Cup-marks



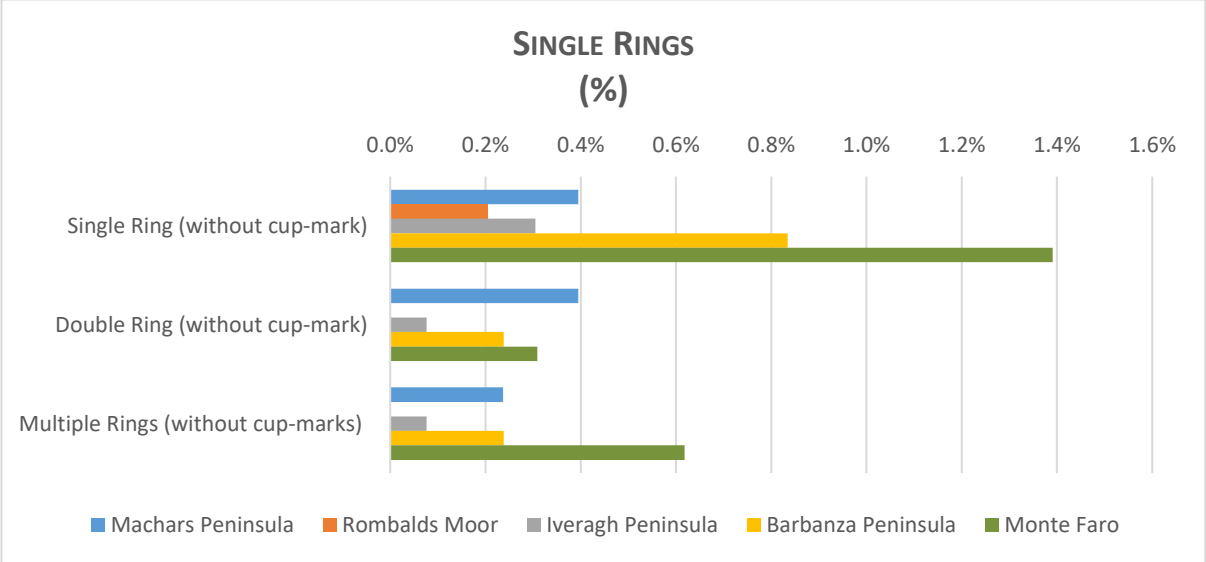
Graphic 3 Presence/Absence of all types of *cup-mark variants* per region.



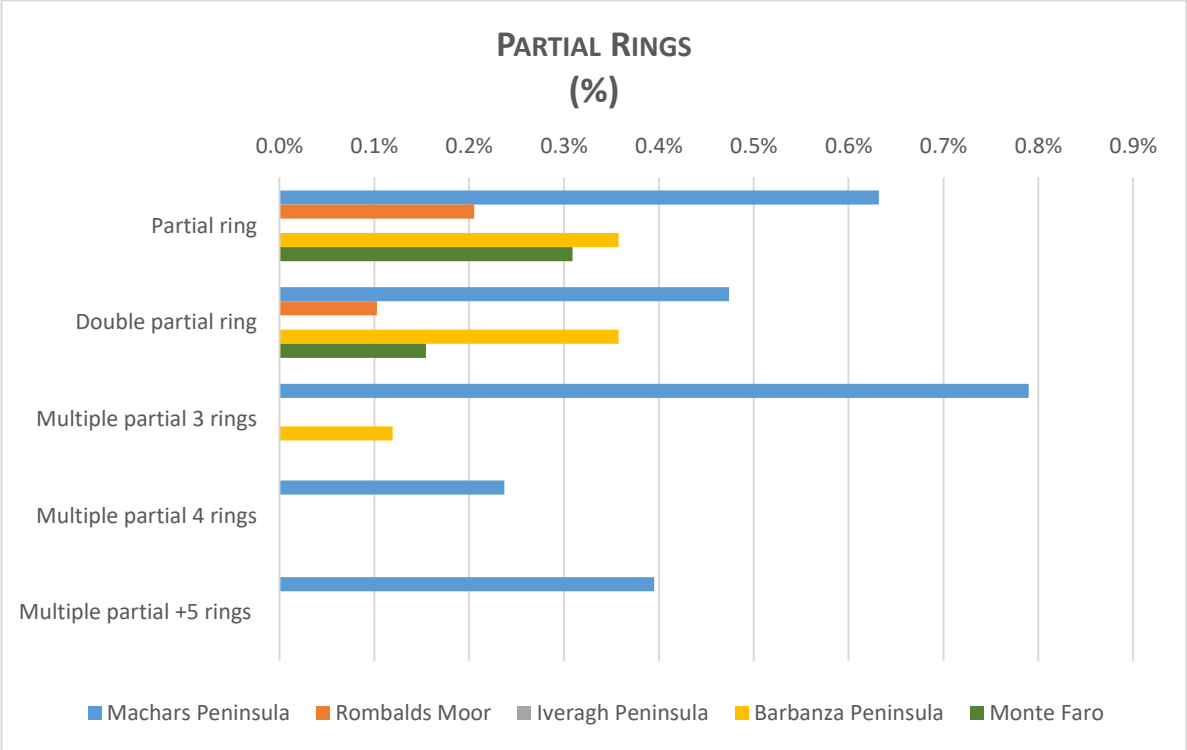
Graphic 4 Partial graphic of the Presence/Absence of all variants of *circles* per region



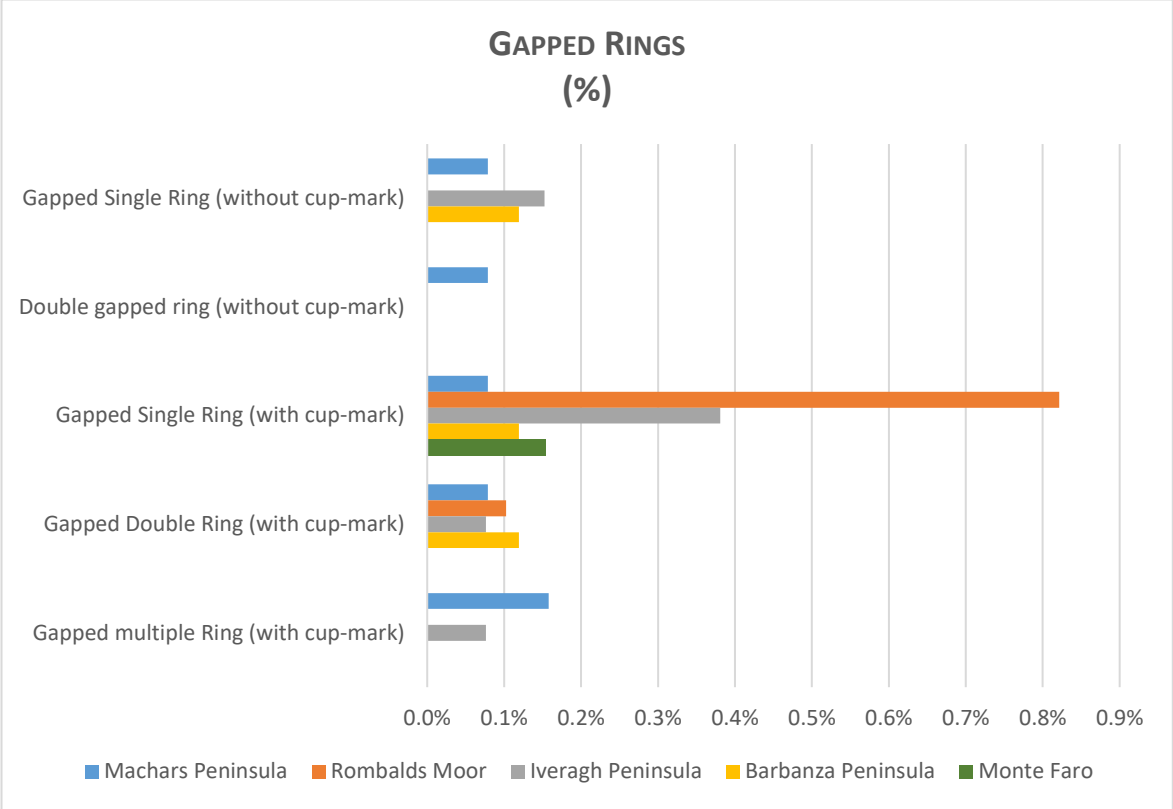
Graphic 5 Partial Graphic of all the types of *circular variants* existent in each study area.



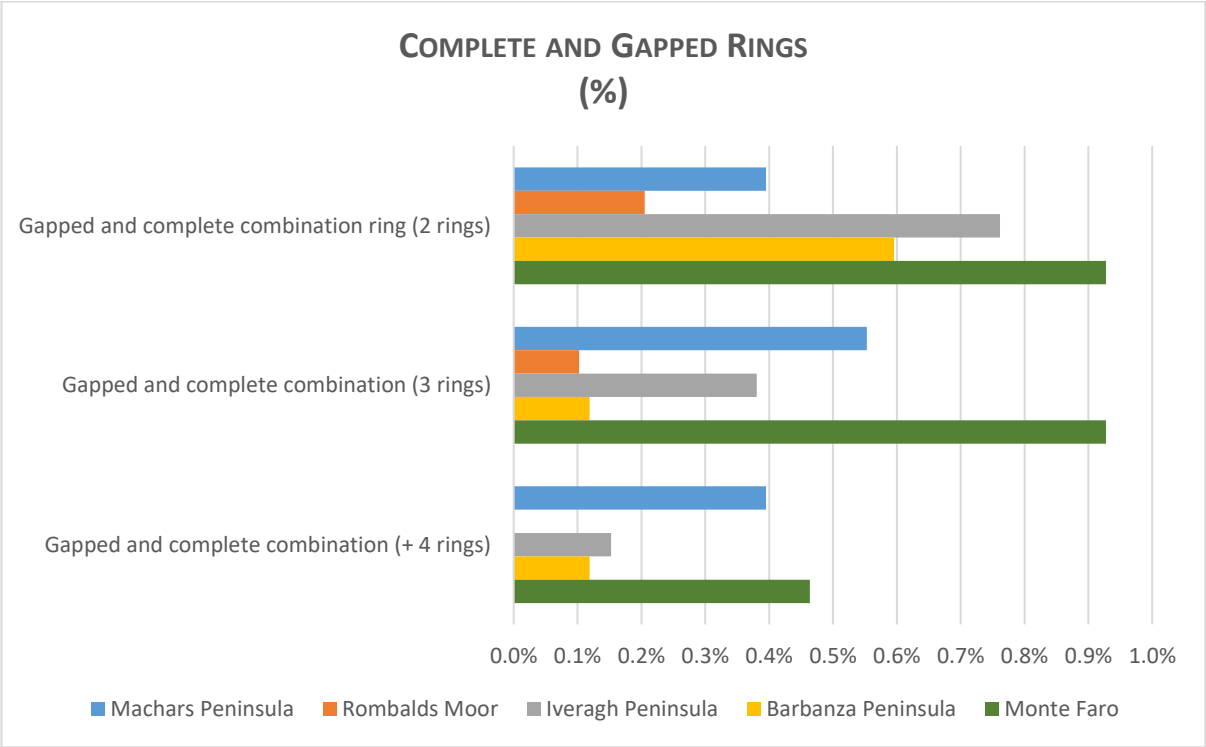
Graphic 6 Percentage of *Single Rings* per region.



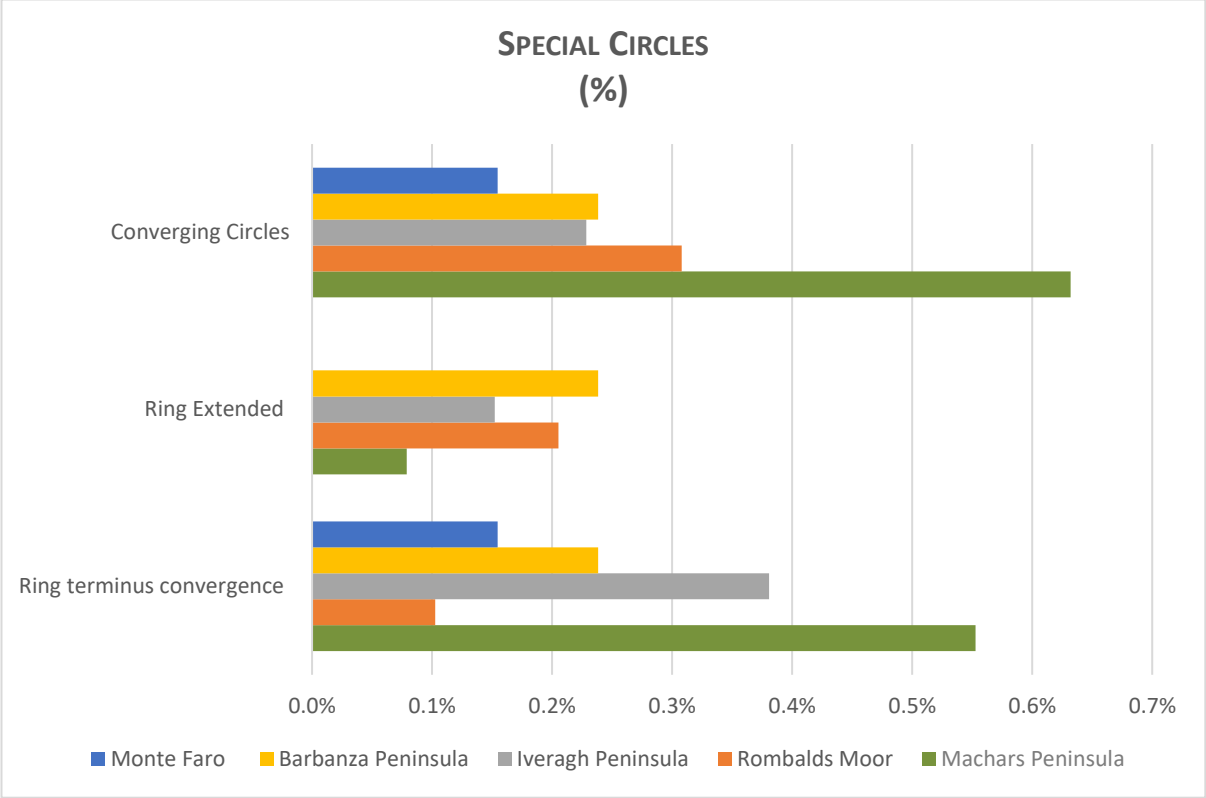
Graphic 7 Percentage of *Partial Rings* and its variants in each study area.



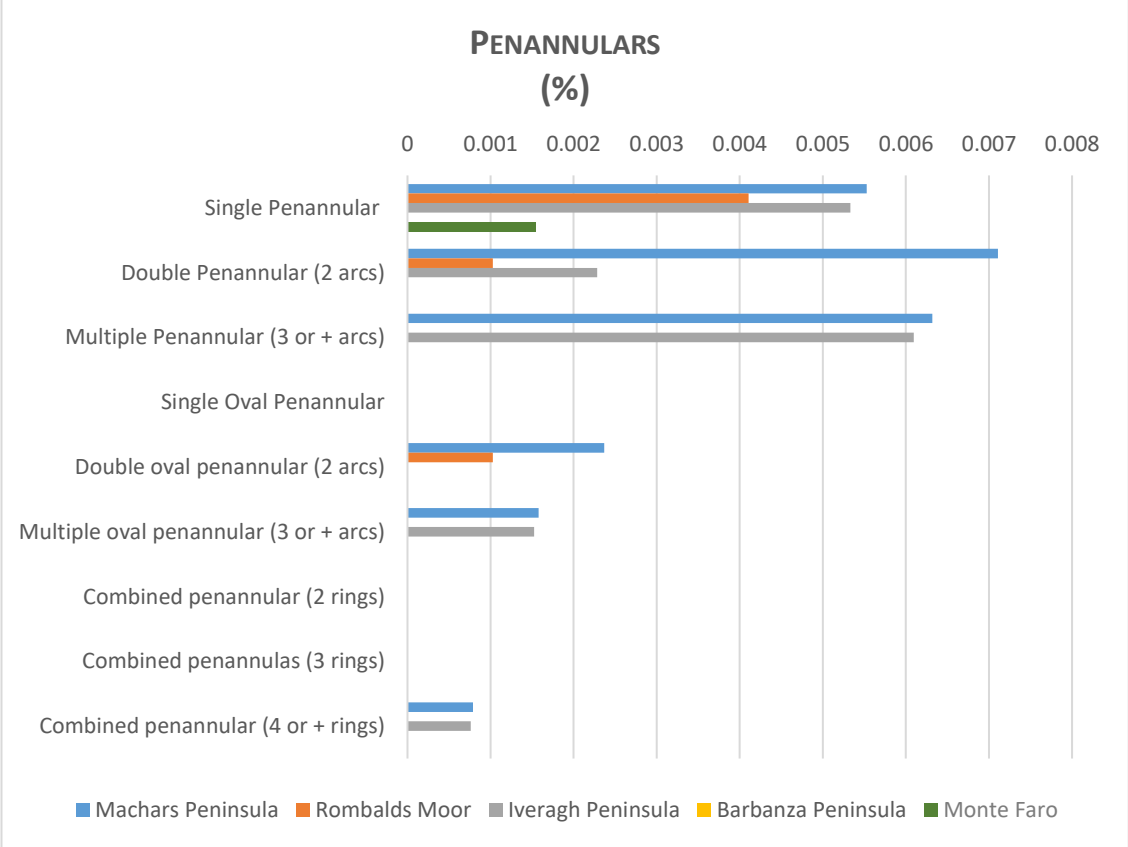
Graphic 8 Percentage of *Gapped Rings* (with and without central cup-mark) per region.



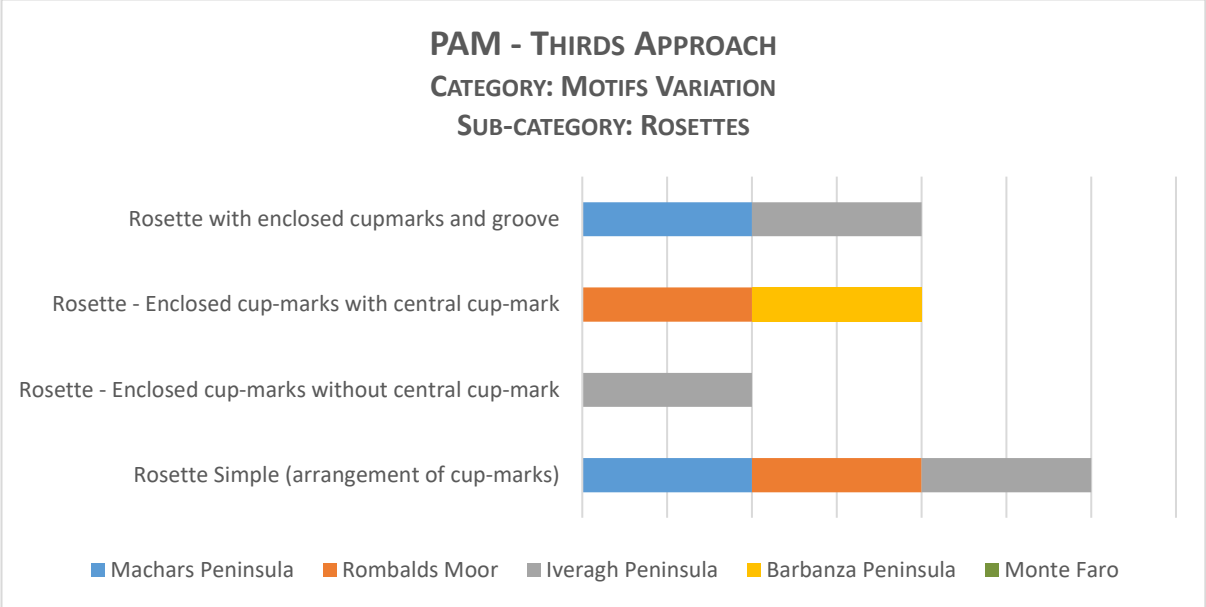
Graphic 9 Presence of *Complete and Gapped Rings* variant per study area.



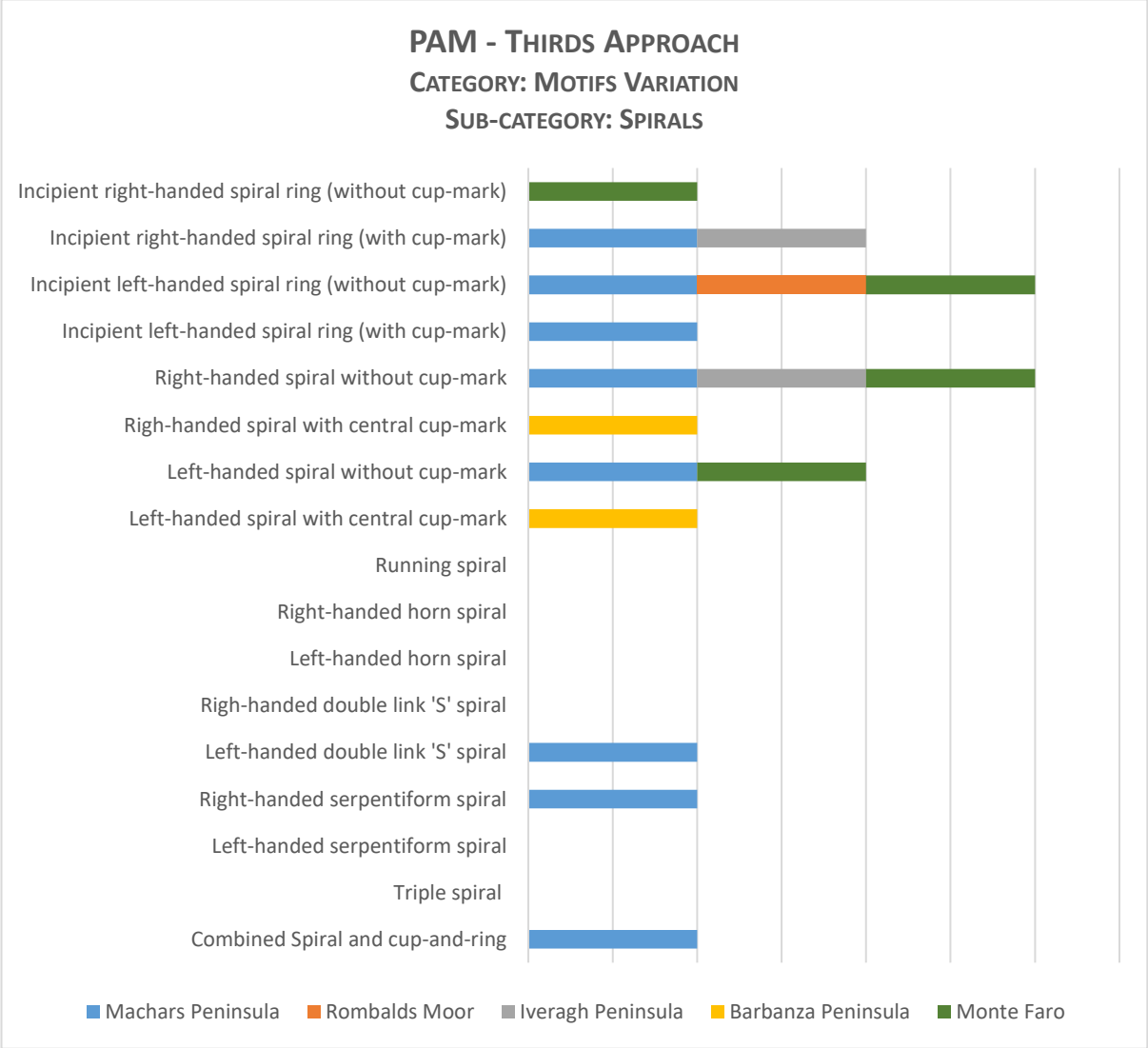
Graphic 10 Percentage of particular types of circles, involving specific ways of making, in each study area.



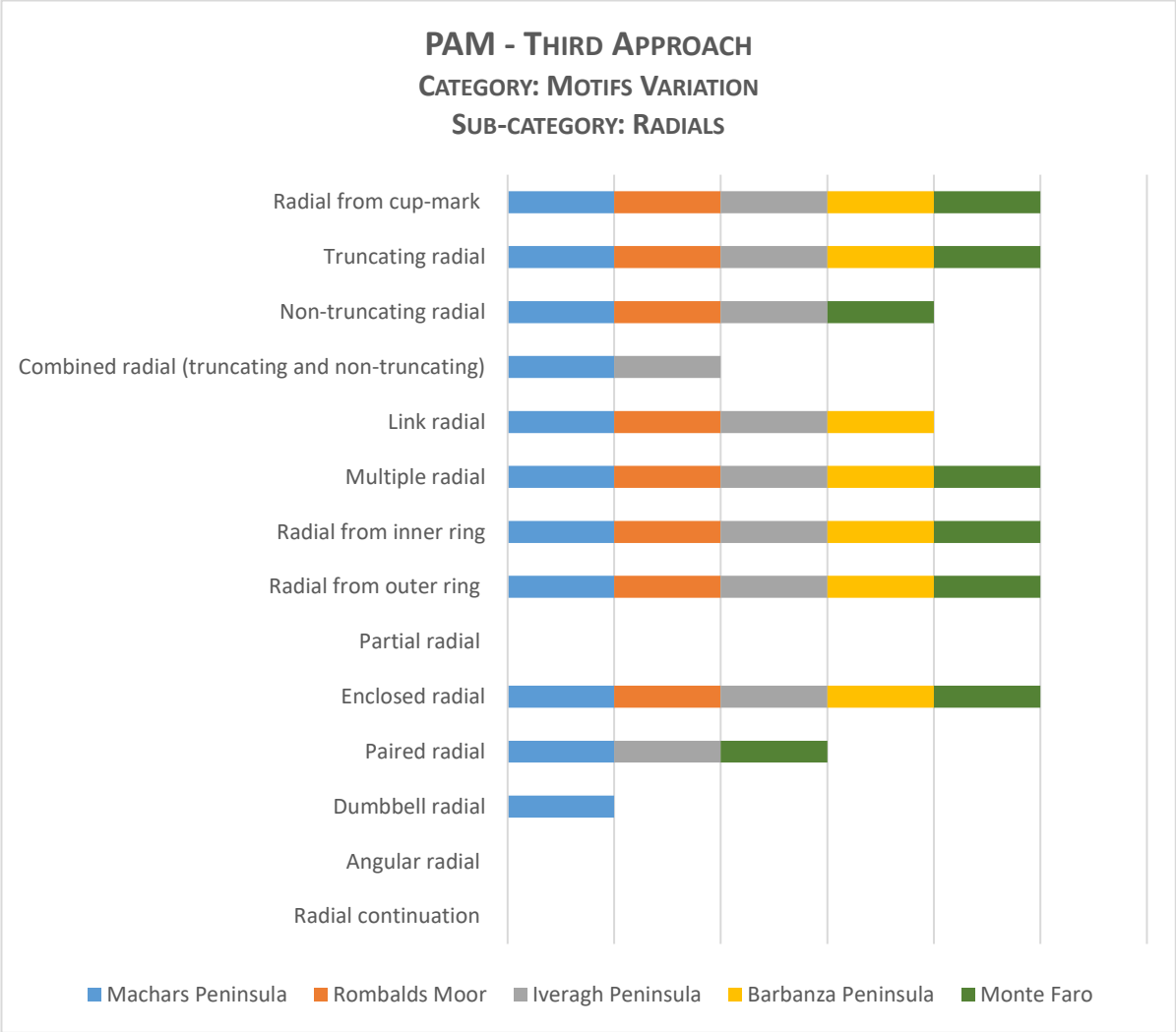
Graphic 11 Percentage of *Penannular* motifs per region.



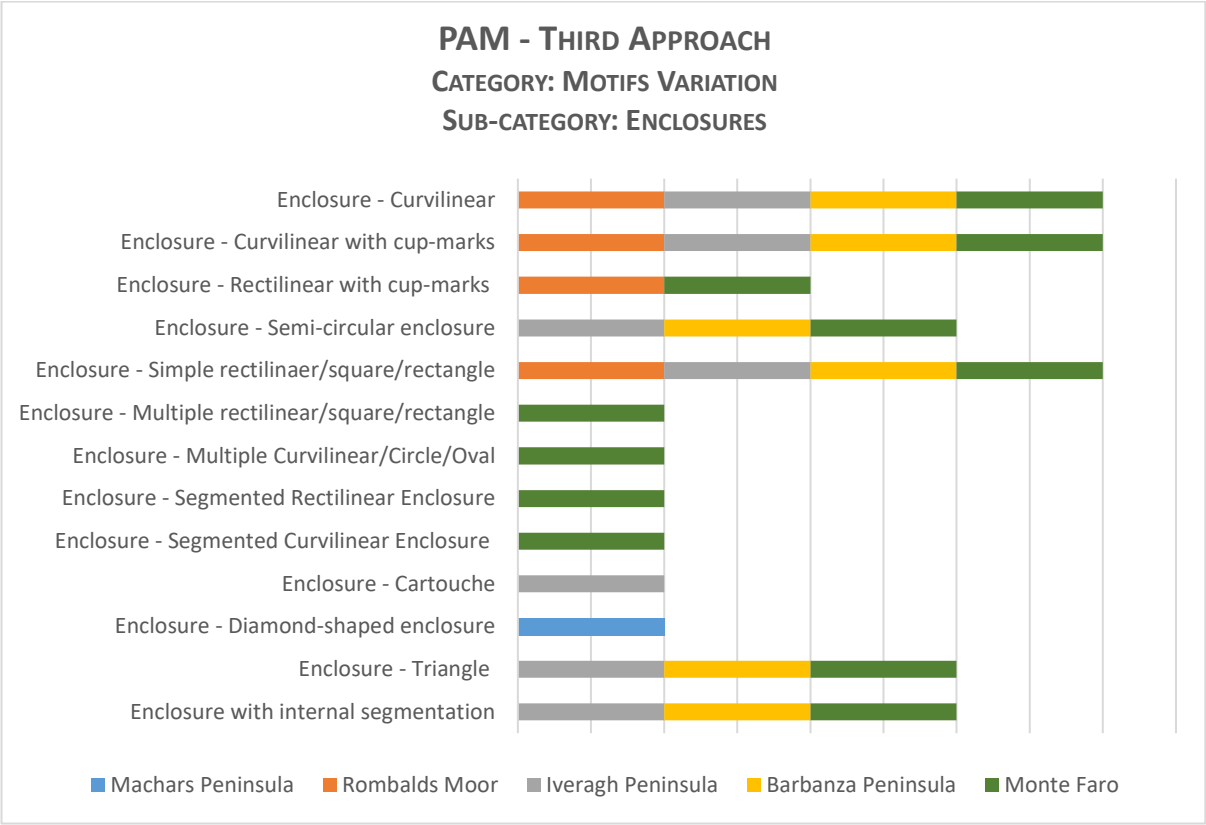
Graphic 12 Presence/Absence of *Rosettes* per region.



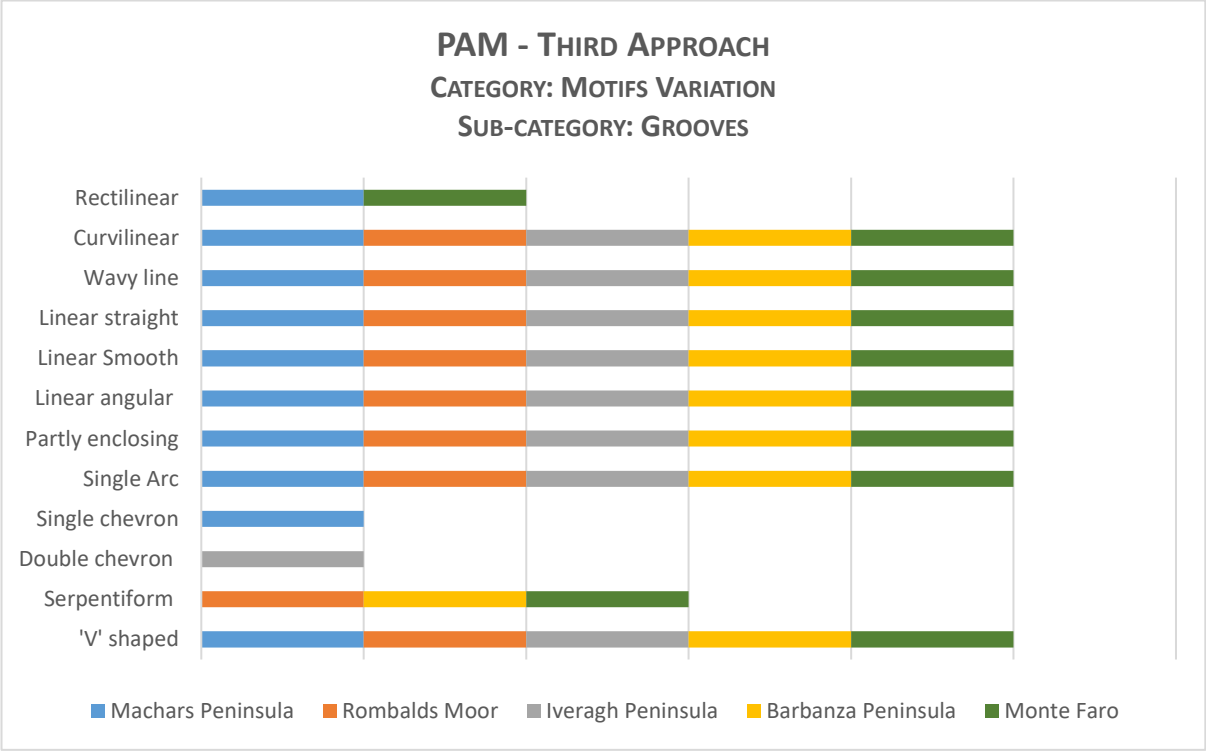
Graphic 13 Presence/Absence of *Spiral* motifs per region.



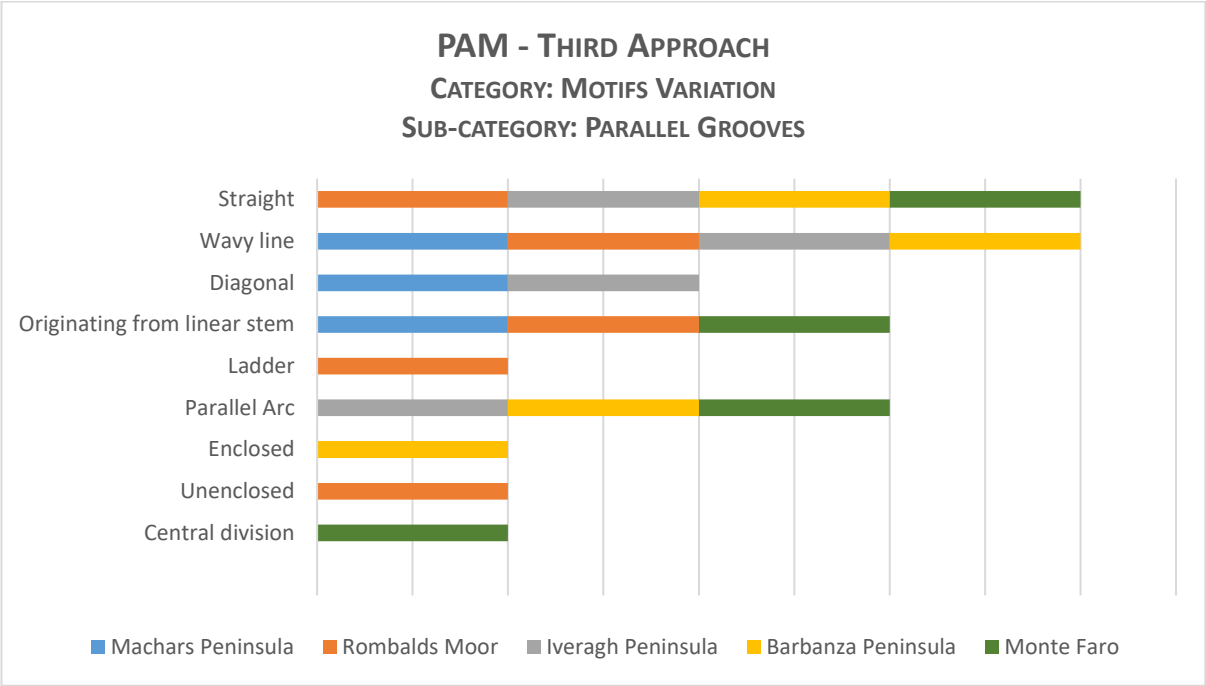
Graphic 14 Presence/Absence of different *Types of Radials* per study area.



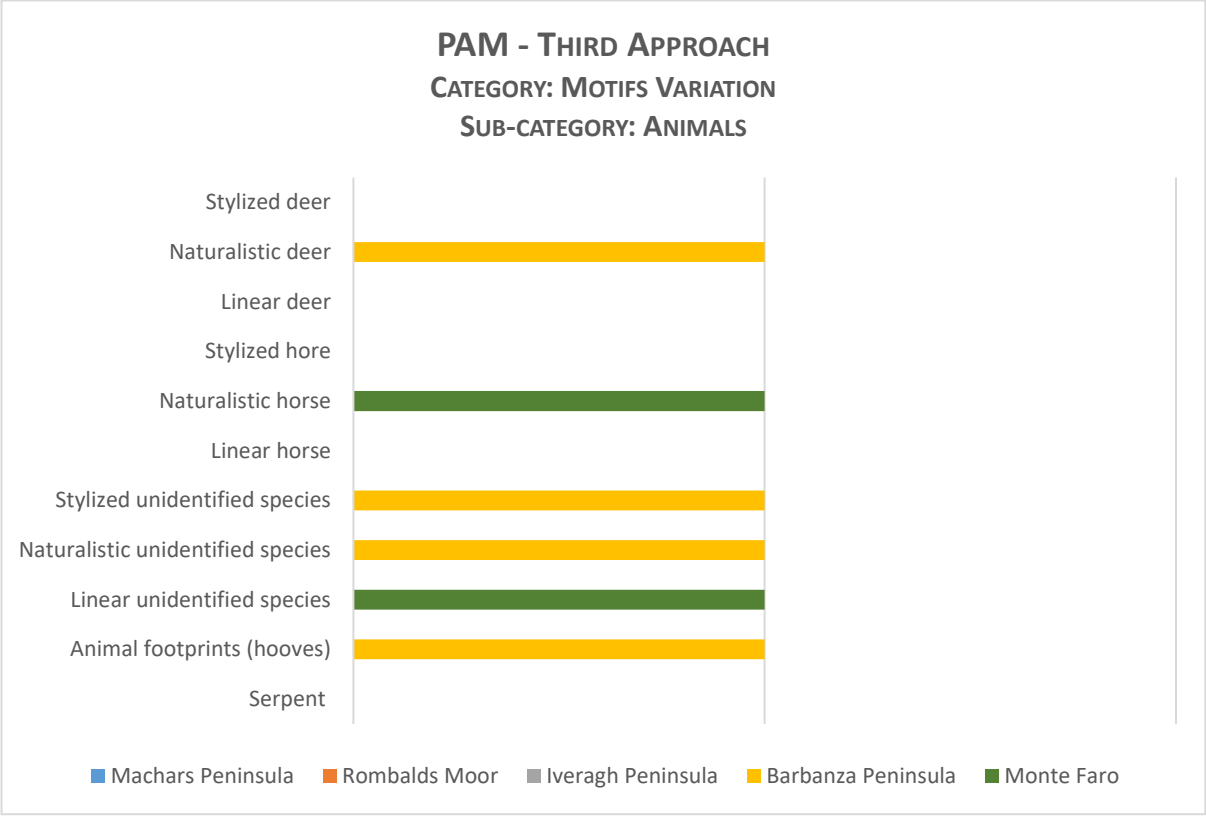
Graphic 15 Presence/Absence of *Enclosure* motifs per region.



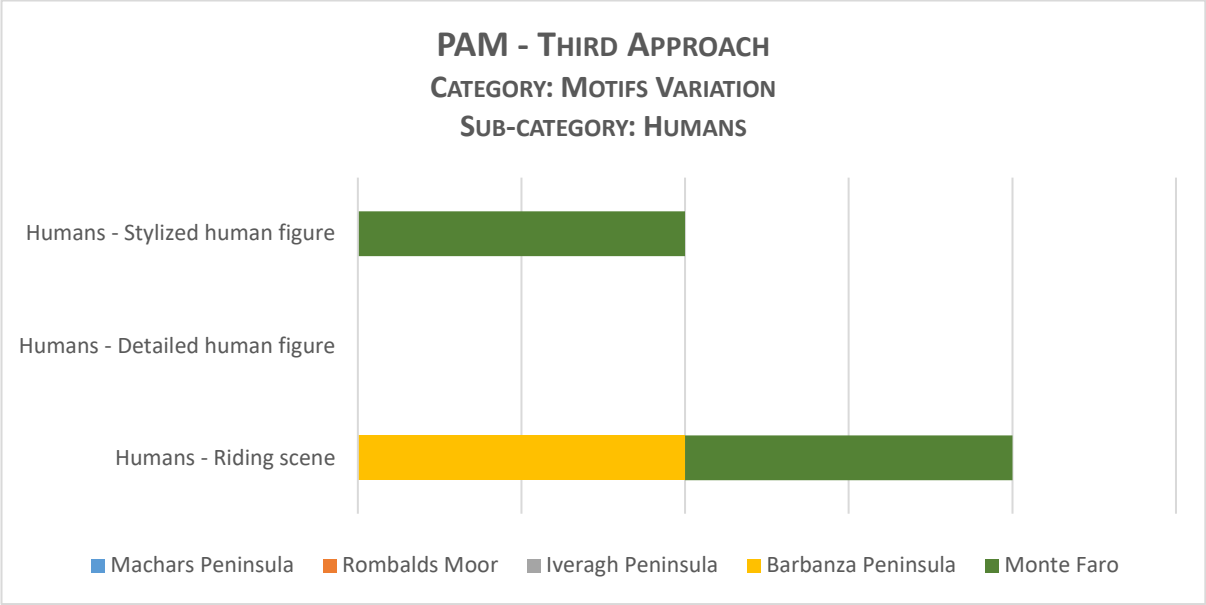
Graphic 16 Presence/Absence of *Groove* types.



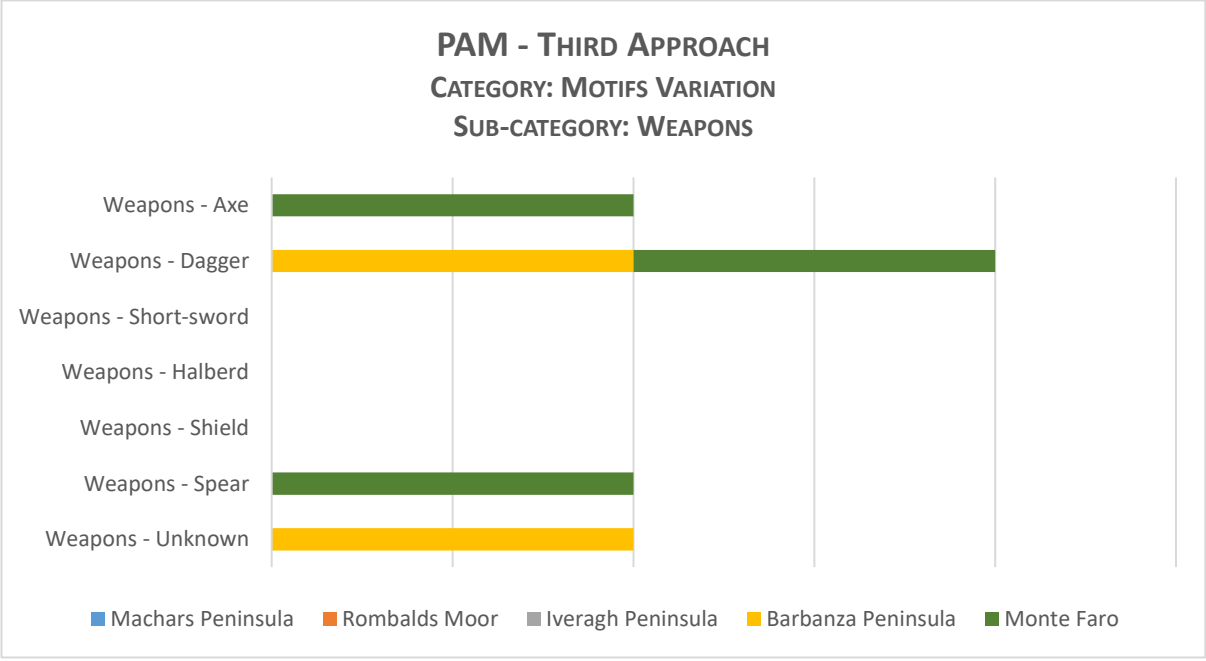
Graphic 17 Presence/Absence of *Parallel Grooves*.



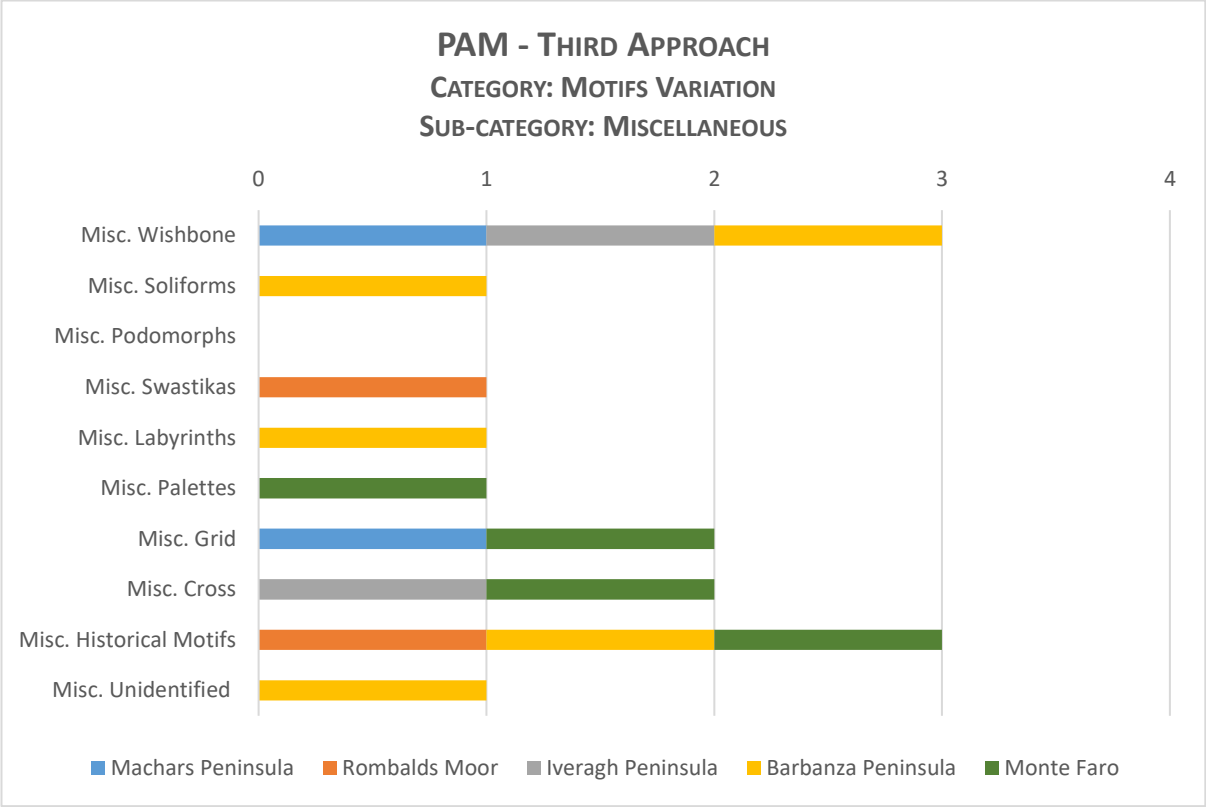
Graphic 18 Presence/Absence of *Animal motifs*.



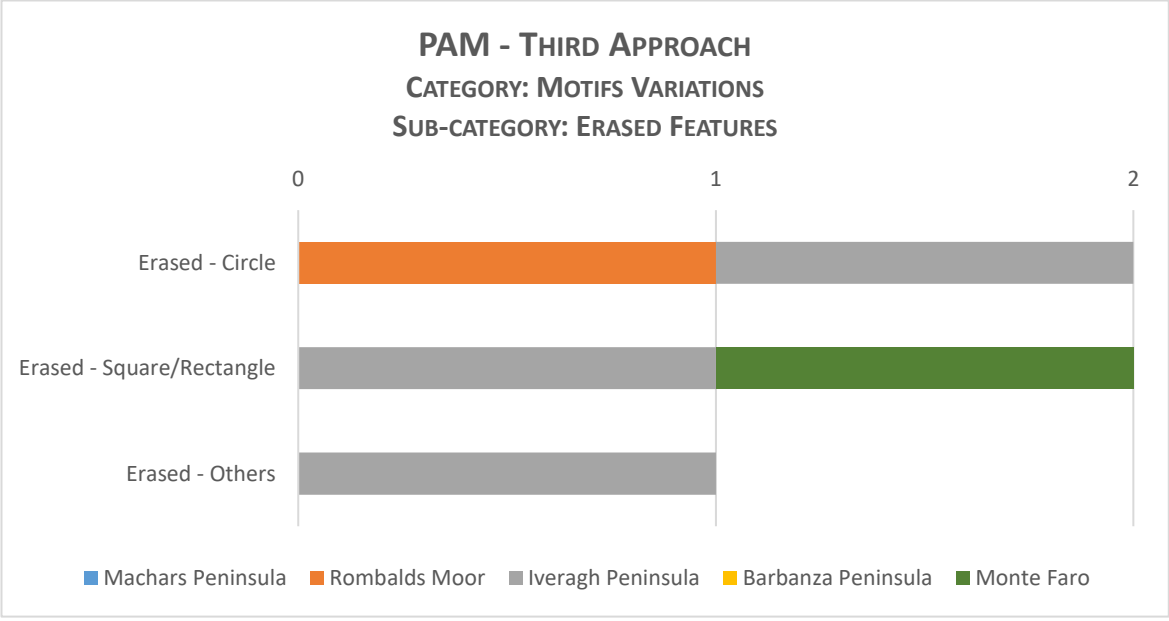
Graphic 19 Presence/Absence of *Human figures*.



Graphic 20 Presence/Absence of *Weapon* representations.



Graphic 21 Presence/Absence of various types of motifs, categorized as '*Miscellaneous*'



Graphic 22 Presence/Absence of *Erased motifs*.

8.2. SENSORIAL SCALE: THE ROCK MEDIUM

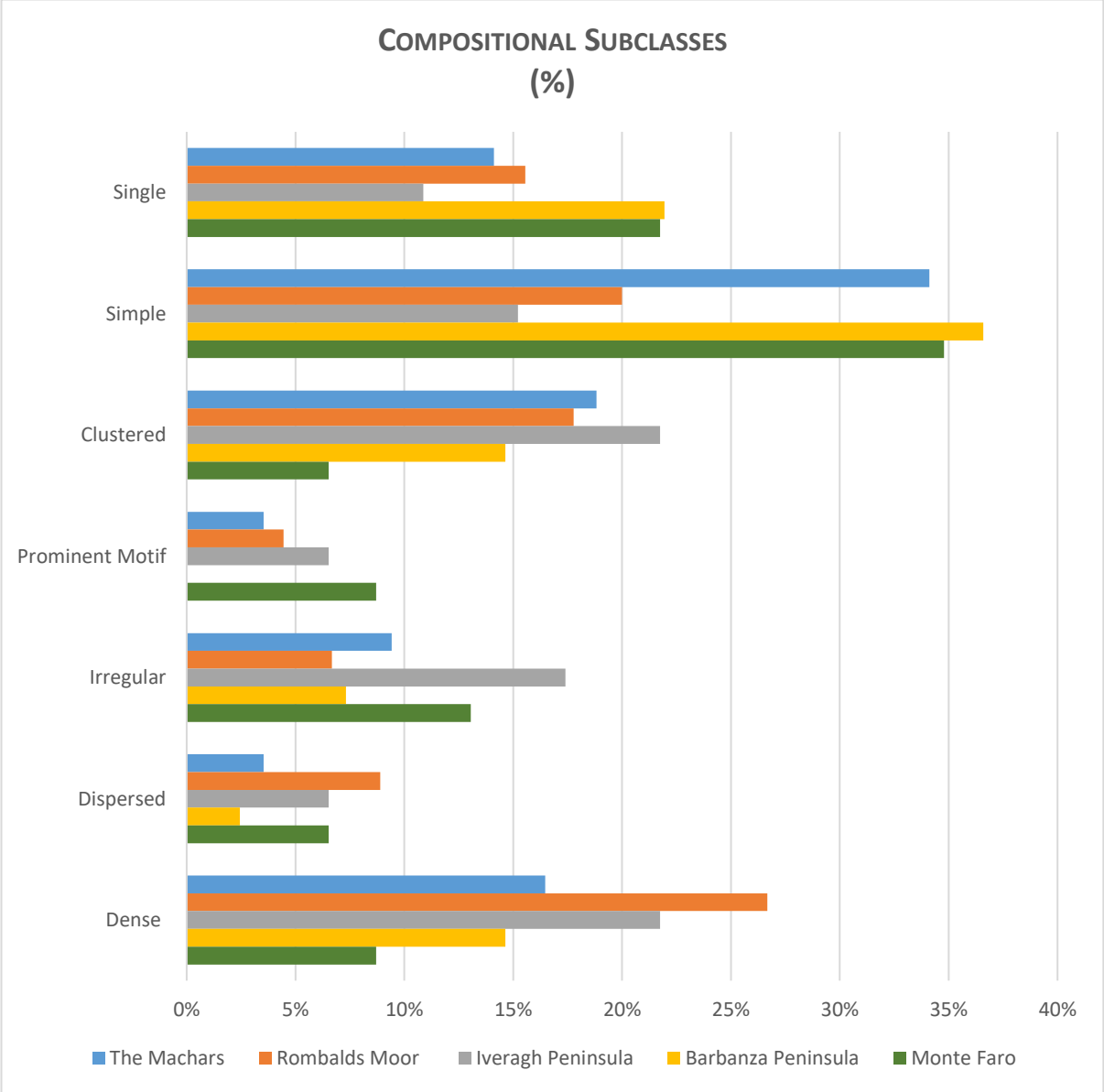
CATEGORY: COMPOSITIONAL SUBCLASSES

Table 36 Results of the category 'Compositional Subclasses' in counts.

COMPOSITIONAL SUBCLASSES (COUNTS)					
	The Machars	**Iveragh Peninsula**	**Rombalds Moor**	**Barbanza Peninsula**	**Monte Faro**
Single	12	5	7	9	10
Simple	29	7	9	15	16
Clustered	16	10	8	6	3
Prominent Motif	3	3	2	0	4
Irregular	8	8	3	3	6
Dispersed	3	3	4	1	3
Dense	14	10	12	6	4

Table 37 Results of the category 'Compositional Subclasses' in percentage.

COMPOSITIONAL SUBCLASSES (%)					
	The Machars	**Iveragh Peninsula**	**Rombalds Moor**	**Barbanza Peninsula**	**Monte Faro**
Single	14.12%	10.87%	15.56%	21.95%	21.74%
Simple	34.12%	15.22%	20%	36.59%	34.78%
Clustered	18.82%	21.74%	17.78%	14.63%	6.52%
Prominent Motif	3.53%	6.52%	4.44%	0%	8.70%
Irregular	9.41%	17.39%	6.67%	7.32%	13.04%
Dispersed	3.53%	6.52%	8.89%	2.44%	6.52%
Dense	14.47%	21.74%	26.67%	14.63%	8.70%



Graphic 23 Graphic with the results for the category of *Compositional Subclasses*, demonstrating a clear preference for simple compositions.

CATEGORY: STRUCTURAL VARIANTS

The first two tables will display the total (counts and percentage) results for each sub-category of structural variants. These will be broken down in further tables as being observer under the Second of Third order of approach. In the second approach the attributes of categories will be general, just representing the percentage of their presence within the samples. In the third approach, each of the sub-category will be developed in a number of more detailed attributes.

SECOND APPROACH

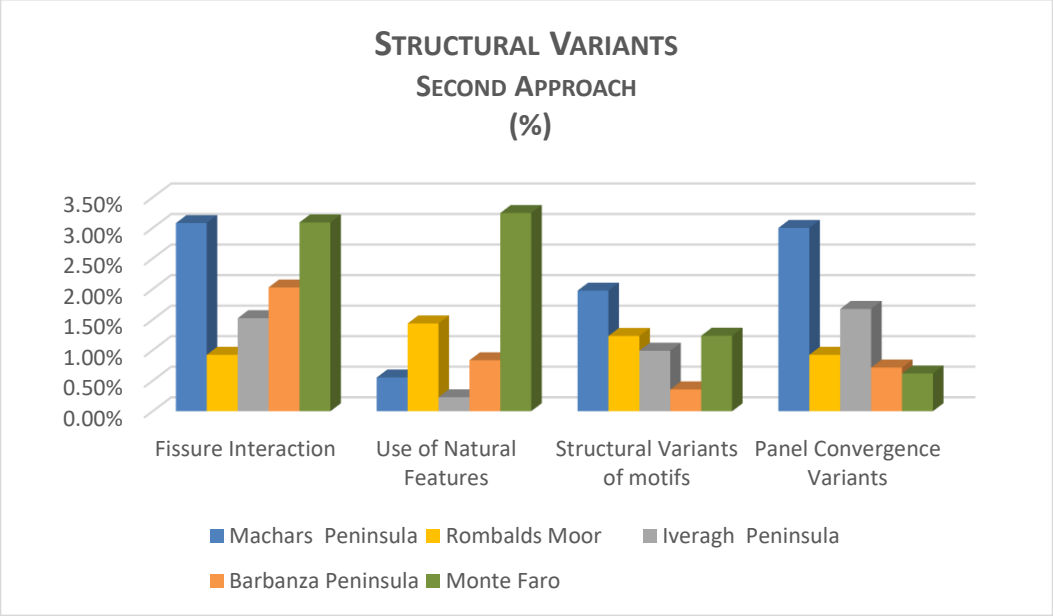
Structural Variants (General)

Table 38 Total results for the category of 'Structural Variants'. These were only acquired according to a binary system and therefore this table will only show the frequency of the attributes for each study area.

STRUCTURAL VARIANTS (TOTAL COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh**	**Barbanza**	**Monte Faro**
Fissure Variants	39	9	20	17	20
Natural Features	7	14	3	7	21
Structural Variants	25	12	13	3	8
Panel Convergence Variants	38	9	22	6	4

Table 39 Results for the category of 'Structural Variants' reflecting the results of the previous table. This table will display he percentage of frequency regarding the presence of each characteristics per study area.

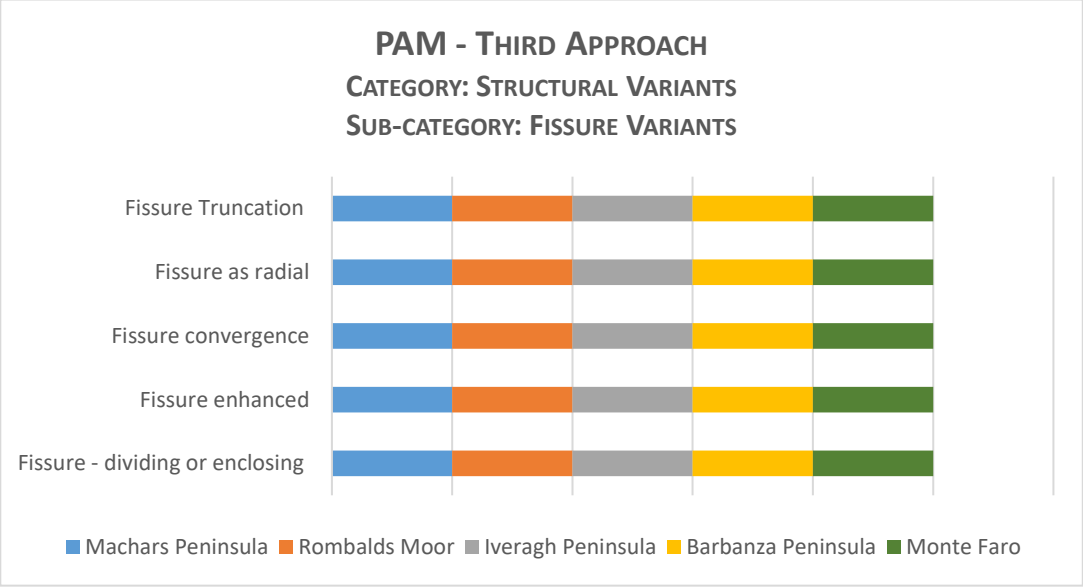
STRUCTURAL VARIANTS (TOTAL %)					
	The Machars	**Iveragh**	**Rombalds Moor**	**Barbanza**	**Monte Faro**
Fissure Variants	3.08%	0.92%	1.52%	2.03%	3.09%
Natural Features	0.55%	1.44%	0.23%	0.83%	3.25%
Structural Variants	1.97%	1.23%	0.99%	0.36%	1.24%
Panel Convergence Variants	3.00%	0.92%	1.68%	0.72%	0.62%



Graphic 24 Percentage of the total of *Structural Variants* identified per region.

THIRD APPROACH

Sub-Category: Fissure Variants



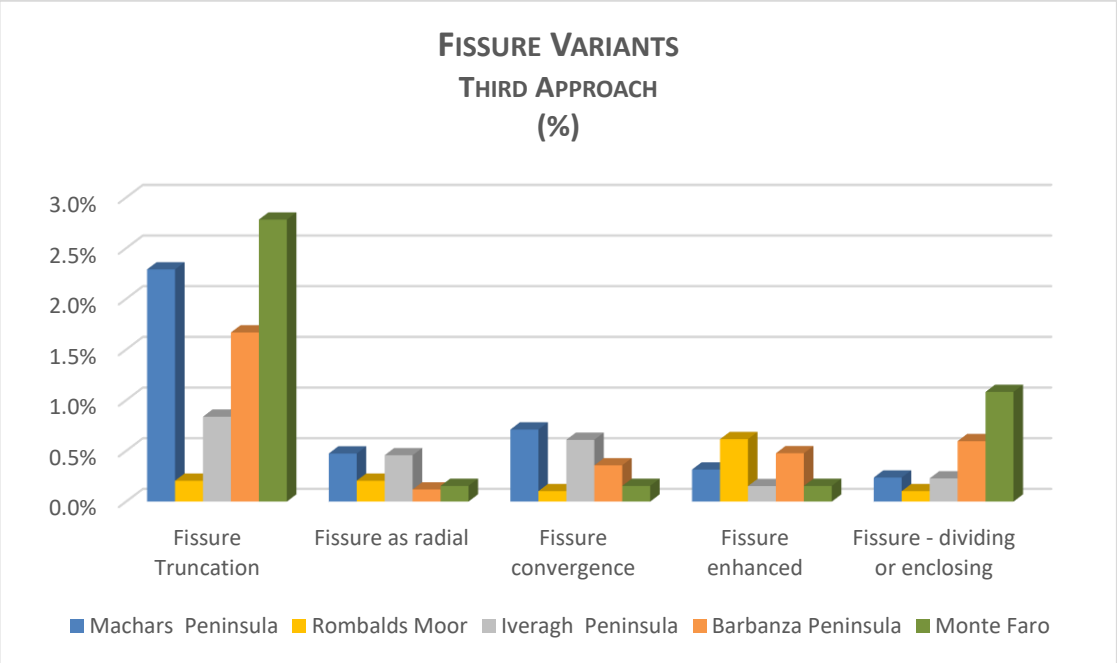
Graphic 25 Presence/Absence of interaction between motifs and *Natural Fissures*, whether deliberate or accidental.

Table 40 *Fissure variants*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

FISSURE VARIANTS (TOTAL COUNTS)					
	The Machars	**Iveragh**	**Rombalds Moor**	**Barbanza**	**Monte Faro**
Fissure Truncation	29	11	2	14	18
Fissure Radial	6	6	2	1	1
Fissure Convergence	9	8	1	3	1
Fissure Enhanced	4	2	6	4	1
Fissure Dividing or Enclosing	3	3	1	5	7

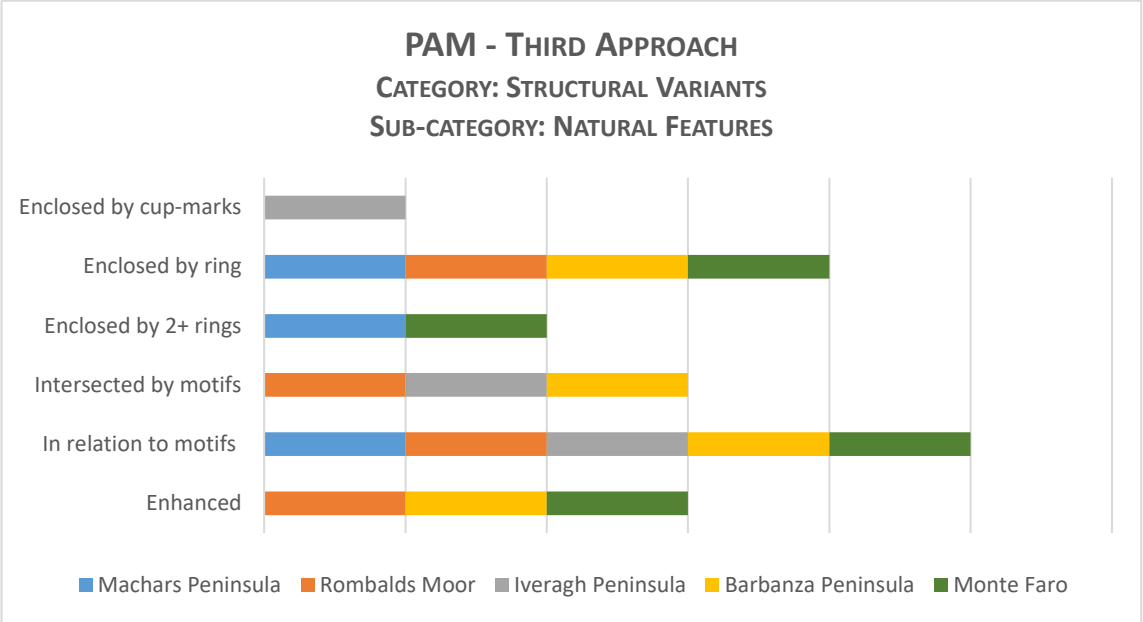
Table 41 *Fissure variants*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

FISSURE VARIANTS (TOTAL %)					
	The Machars	**Iveragh**	**Rombalds Moor**	**Barbanza**	**Monte Faro**
Fissure Truncation	2.3%	0.5%	0.7%	0.3%	0.2%
Fissure Radial	0.2%	0.2%	0.1%	0.6%	0.1%
Fissure Convergence	0.8%	0.5%	0.6%	0.2%	0.2%
Fissure Enhanced	1.7%	0.1%	0.4%	0.5%	0.6%
Fissure Dividing or Enclosing	2.8%	0.2%	0.2%	0.2%	1.1%



Graphic 26 Graphic with the percentage of sites in which carved motifs and natural fissures display some kind of interaction.

Sub-category: Natural Features Variants



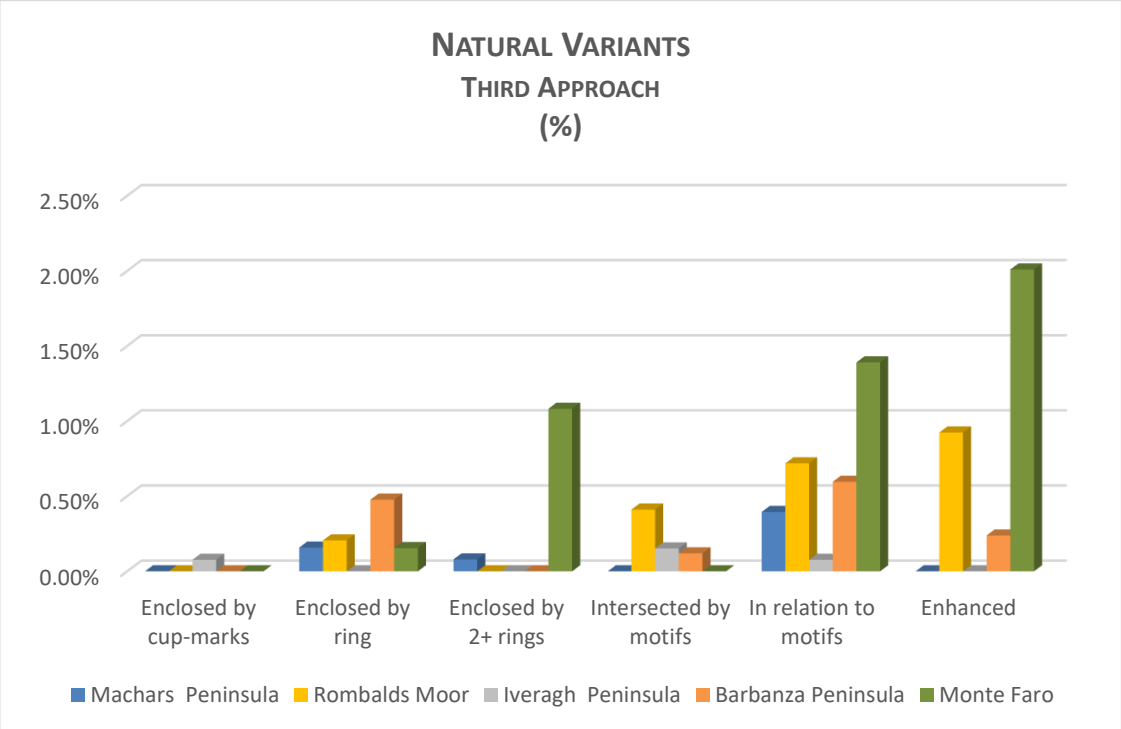
Graphic 27 Presence/Absence of inclusion of *Natural Features* in compositions.

Table 42 *Natural Features,* a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

NATURAL FEATURES (TOTAL COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh**	**Barbanza**	**Monte Faro**
Enclosed by Cup-marks	0	0	1	0	0
Enclosed by ring	2	2	0	4	1
Enclosed by two rings	1	0	0	0	7
Intersected by motifs	0	4	2	1	0
In relation to motifs	5	7	1	5	9
Enhanced	0	0	1	0	0

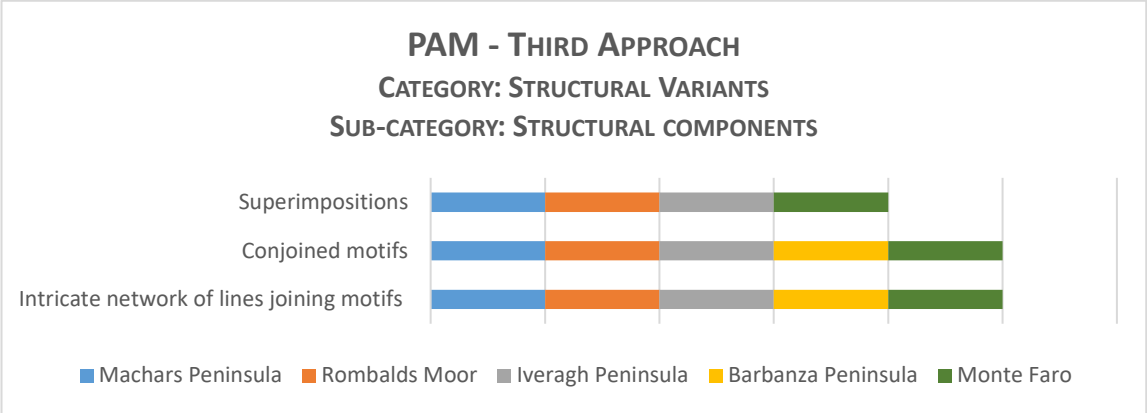
Table 43 *Natural Features*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

NATURAL FEATURES (TOTAL %)					
	The Machars	**Rombalds Moor**	**Iveragh**	**Barbanza**	**Monte Faro**
Enclosed by Cup-marks	0.00%	0.00%	0.08%	0.00%	0.00%
Enclosed by ring	0.16%	0.21%	0.00%	0.48%	0.15%
Enclosed by two rings	0.08%	0.00%	0.00%	0.00%	1.08%
Intersected by motifs	0.00%	0.41%	0.15%	0.12%	0.00%
In relation to motifs	0.39%	0.72%	0.08%	0.60%	1.39%
Enhanced	0.00%	0.92%	0.00%	0.24%	2.01%



Graphic 28 Percentage of *natural features* that were included in the compositions, per region.

Sub-Category: Other Structural Variants (of Motifs)



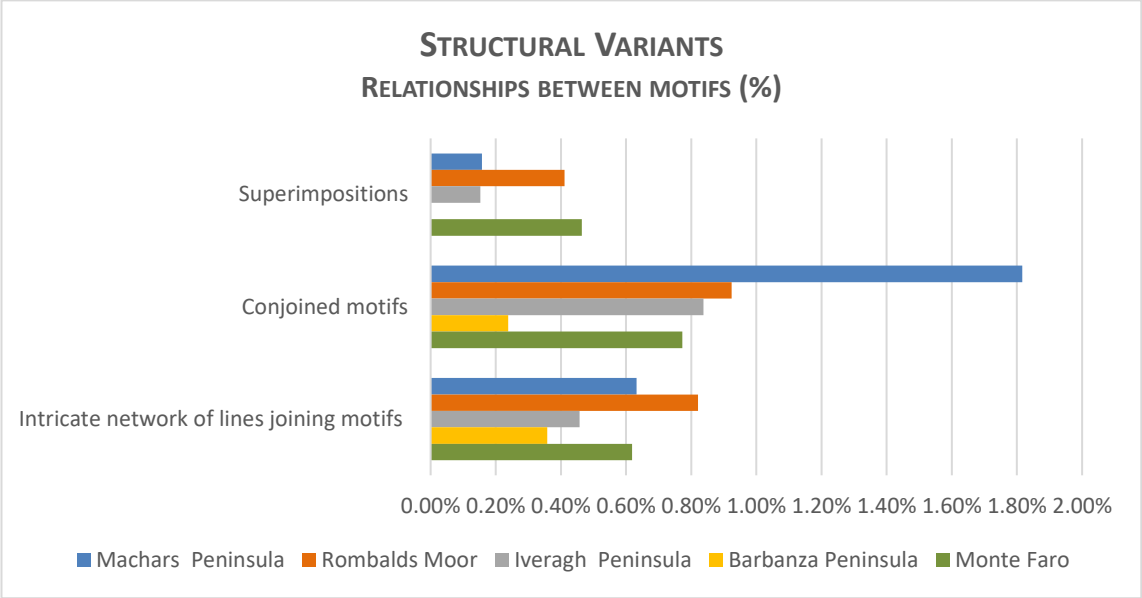
Graphic 29 Presence/Absence of *structural behaviour* per region.

Table 44 *Structural Variants*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

STRUCTURAL VARIANTS (TOTAL COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh**	**Barbanza**	**Monte Faro**
Superimpositions	2	4	2	0	3
Conjoined Motifs	23	9	11	2	5
Intricate network of lines joining motifs	8	8	6	3	4

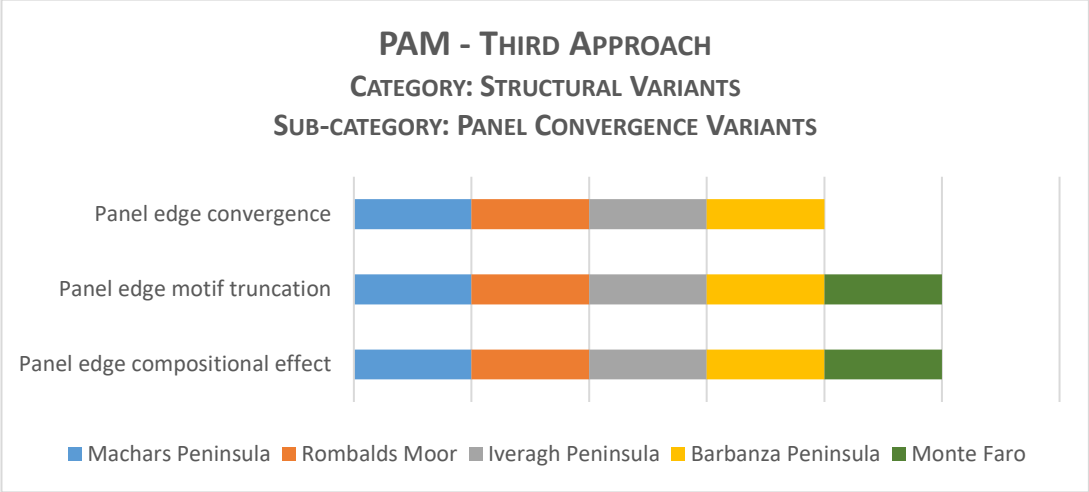
Table 45 *Structural Variants*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

STRUCTURAL VARIANTS (TOTAL %)					
	The Machars	**Rombalds Moor**	**Iveragh**	**Barbanza**	**Monte Faro**
Superimpositions	0.16%	0.41%	0.15%	0.00%	0.46%
Conjoined Motifs	1.82%	0.92%	0.84%	0.24%	0.77%
Intricate network of lines joining motifs	0.63%	0.82%	0.46%	0.36%	0.62%



Graphic 30 Presence of features structuring motifs in the panels, per region.

Sub-Category: Panel Edge Compositional Effect Variants



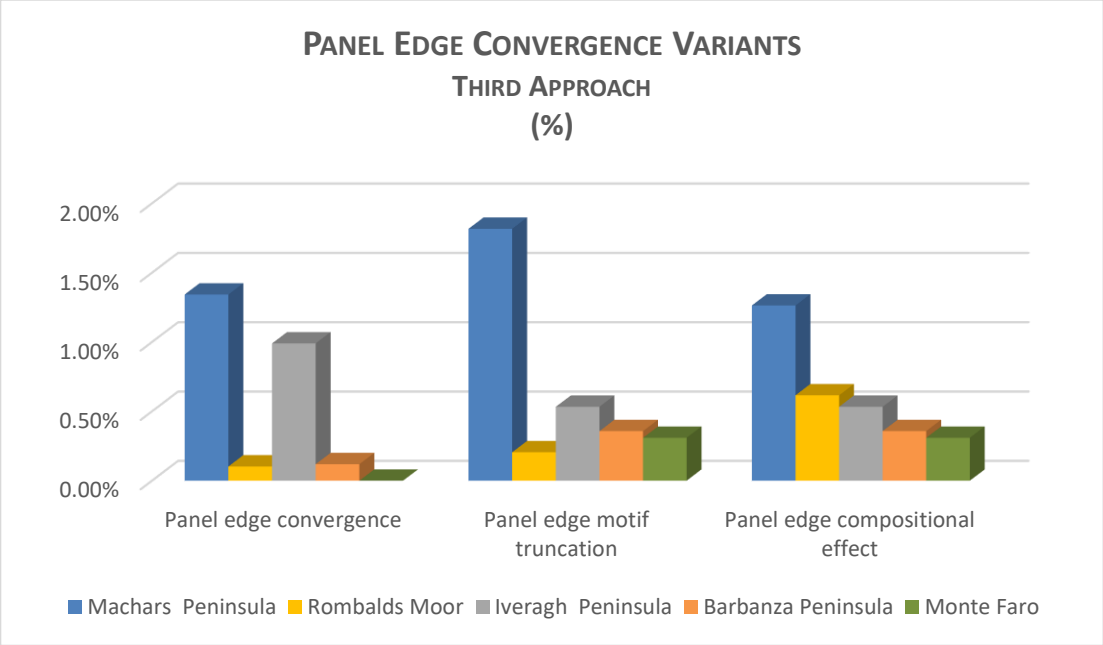
Graphic 31 Presence/Absence of the integration of the edges of the rocks into the compositions.

Table 46 *Panel Edge Variants*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

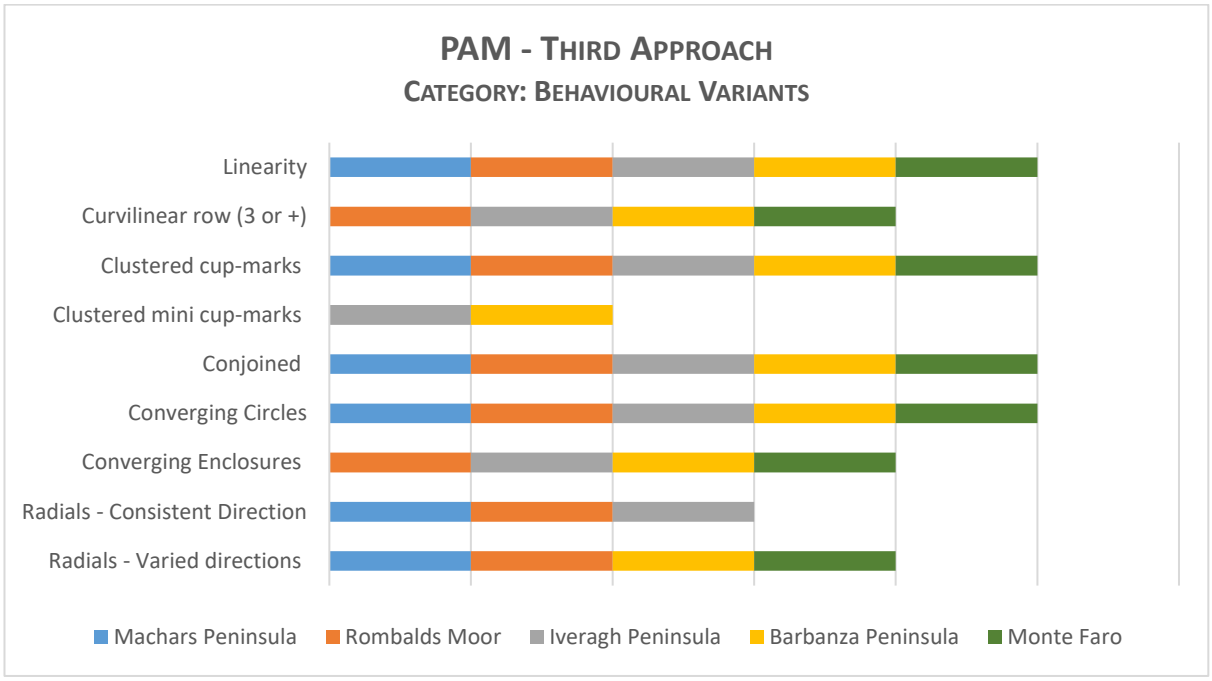
PANEL EDGE VARIANTS (TOTAL COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh**	**Barbanza**	**Monte Faro**
Panel Edge Convergence	17	1	13	1	0
Panel Edge Motif Truncation	23	2	7	3	2
Panel Edge Compositional Effect	16	6	7	3	2

Table 47 *Panel Edge Variants*, a variable of the Structural Variants Category. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

PANEL EDGE VARIANTS (TOTAL %)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Panel Edge Convergence	1.34%	0.10%	0.99%	0.12%	0.00%
Panel Edge Motif Truncation	1.82%	0.21%	0.53%	0.36%	0.31%
Panel Edge Compositional Effect	1.26%	0.62%	0.53%	0.36%	0.31%

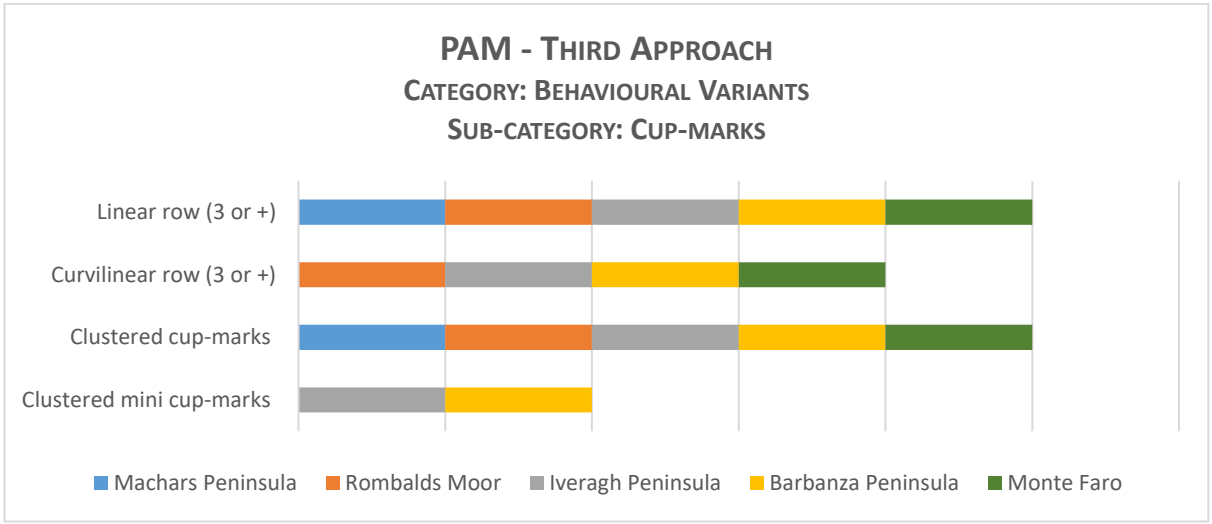


Graphic 32 Percentage of panels per region in which the edges of the rocks are part (intentional or due to accident) of the composition.



Graphic 33 Graphic translating the PAM for the category of *Behavioural Variants*. Each bar corresponds to the presence or absence of the features and their behaviour per country.

Sub-category: Behaviour of cup-marks



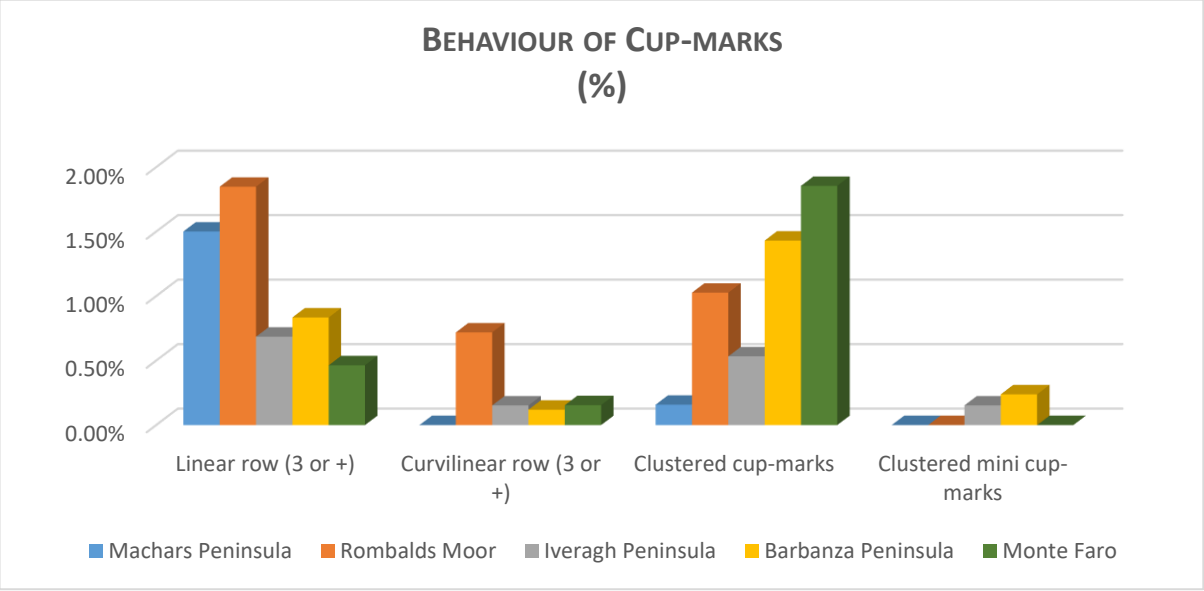
Graphic 34 Presence/Absence of *Behavioural Variants*.

Table 48 Sub-category of *behavioural variants* related to the cup-mark motif. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

CUP-MARKS (COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Linear Row (3 or +)	19	18	9	7	3
Curvilinear Row (3 or +)	0	7	2	1	1
Clustered Cup-marks	2	10	7	12	12
Clustered Mini-cups	0	0	2	2	0

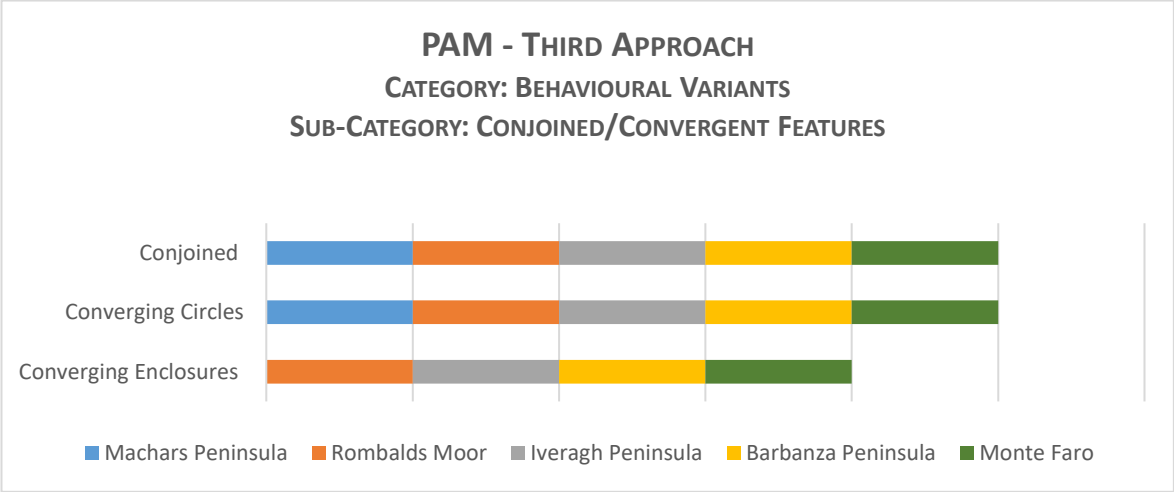
Table 49 Sub-category of *behavioural variants* related to the cup-mark motif. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

CUP-MARKS (%)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Linear Row (3 or +)	1.50%	1.85%	0.69%	0.83%	0.46%
Curvilinear Row (3 or +)	0.00%	0.72%	0.15%	0.12%	0.15%
Clustered Cup-marks	0.16%	1.03%	0.53%	1.43%	1.85%
Clustered Mini-cups	0.00%	0.00%	0.15%	0.24%	0.00%



Graphic 35 Patterns of behaviour of cup-marks on the rock surfaces.

Sub-Category: Converging Features



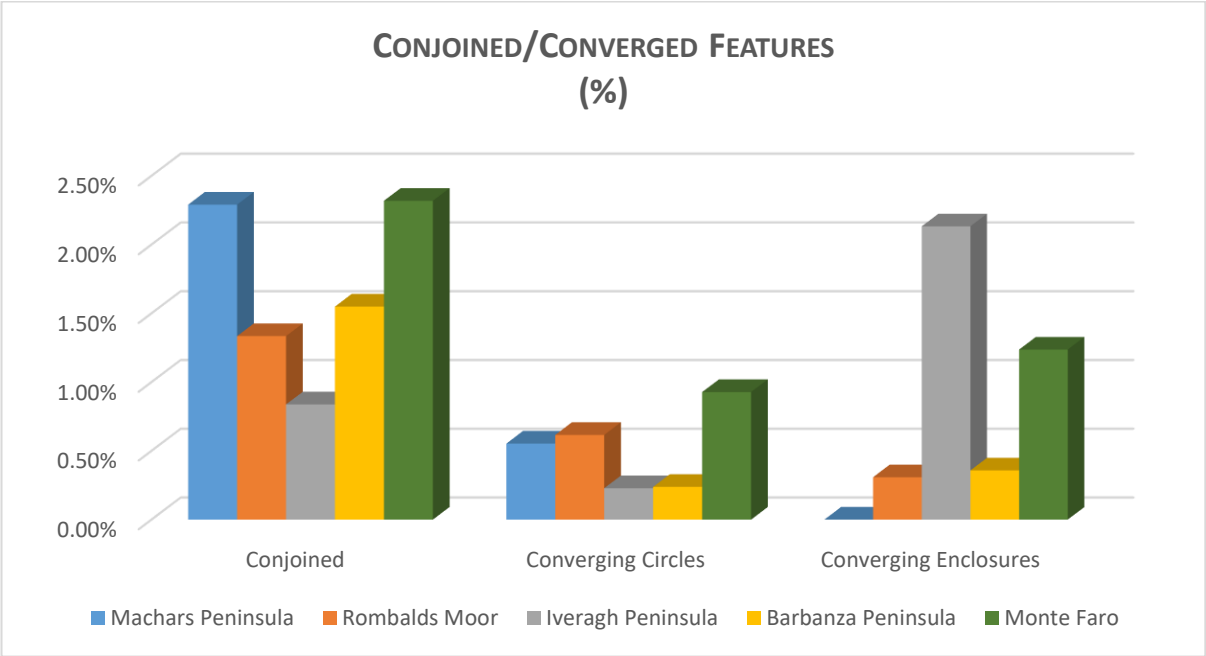
Graphic 36 Presence/Absence of *conjoined and convergent features*.

Table 50 Sub-category of behavioural variants related to the motifs that area features in close proximity, whether conjoined or converged. Values obtained through a system of presence/absence representing the frequency of each attribute (Counts).

CONJOINED/CONVERGING FEATURES (COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Conjoined Features	29	13	11	13	15
Converging Circles	7	6	3	2	6
Converging Enclosures	0	3	28	3	8

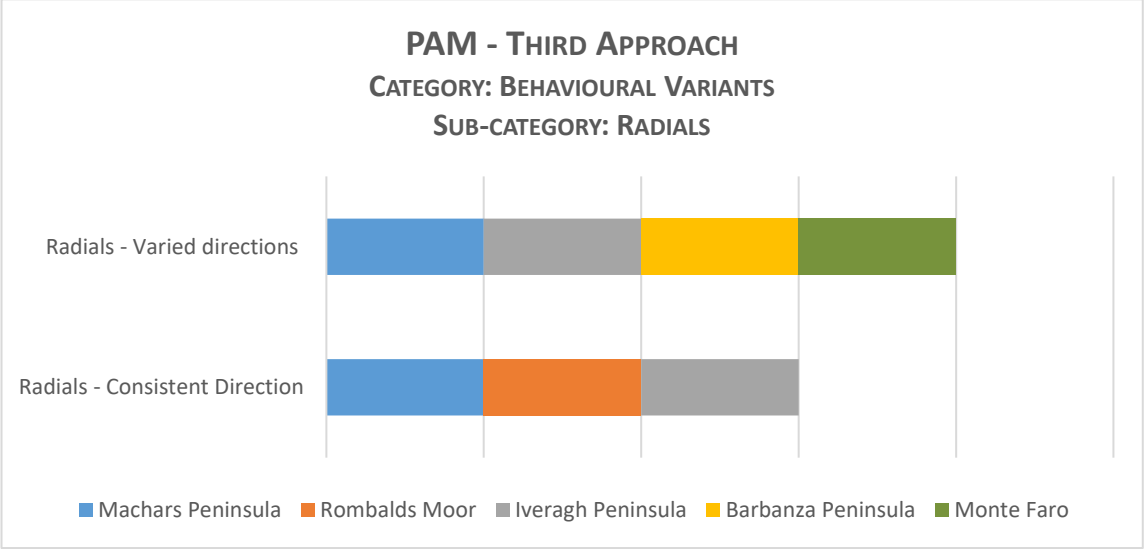
Table 51 Sub-category of behavioural variants related to the motifs that area features in close proximity, whether conjoined or converged. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

CONJOINED/CONVERGING FEATURES (%)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Conjoined Features	2.29%	0.55%	0.00%	2.29%	0.55%
Converging Circles	1.33%	0.62%	0.31%	1.33%	0.62%
Converging Enclosures	0.84%	0.23%	2.13%	0.84%	0.23%



Graphic 37 Percentage of the presence of *conjoined and converged motifs*, part of the compositions.

Sub-Category: Radials Behaviour



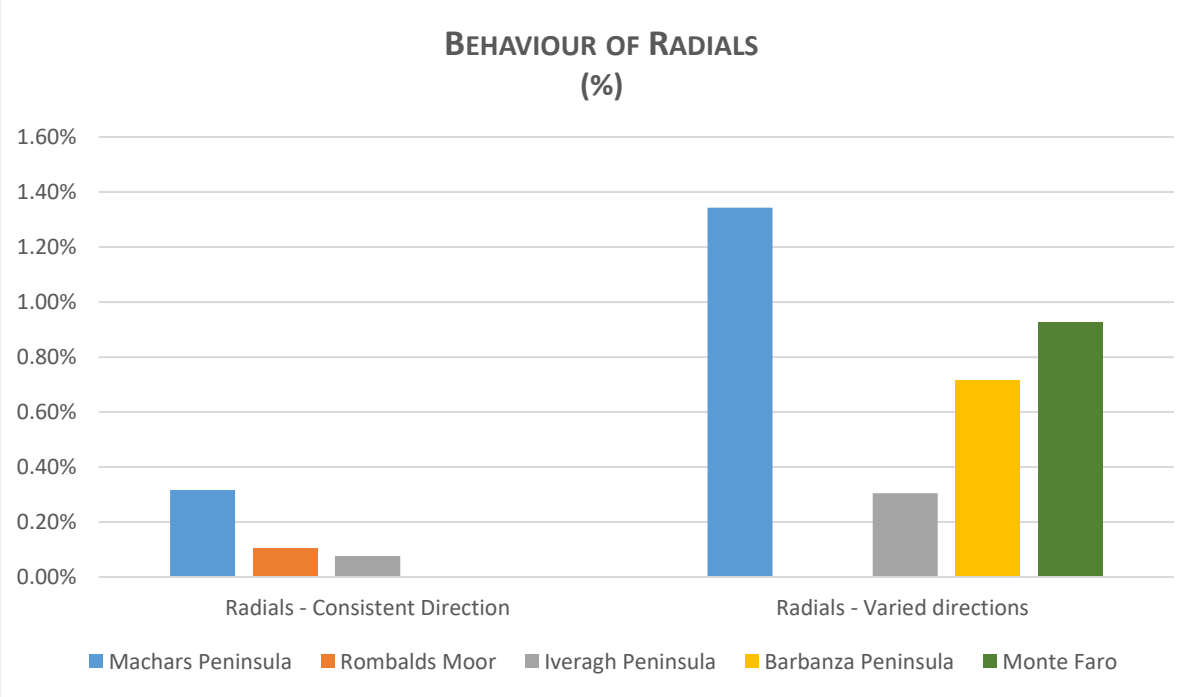
Graphic 38 Presence/Absence of behaviours related to the radials in concentric circles.

Table 52 Sub-category of behavioural variants related to the radial element. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

RADIALS BEHAVIOUR (COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Direction Consistency	4	1	1	0	0
Direction Variations	17	0	4	6	6

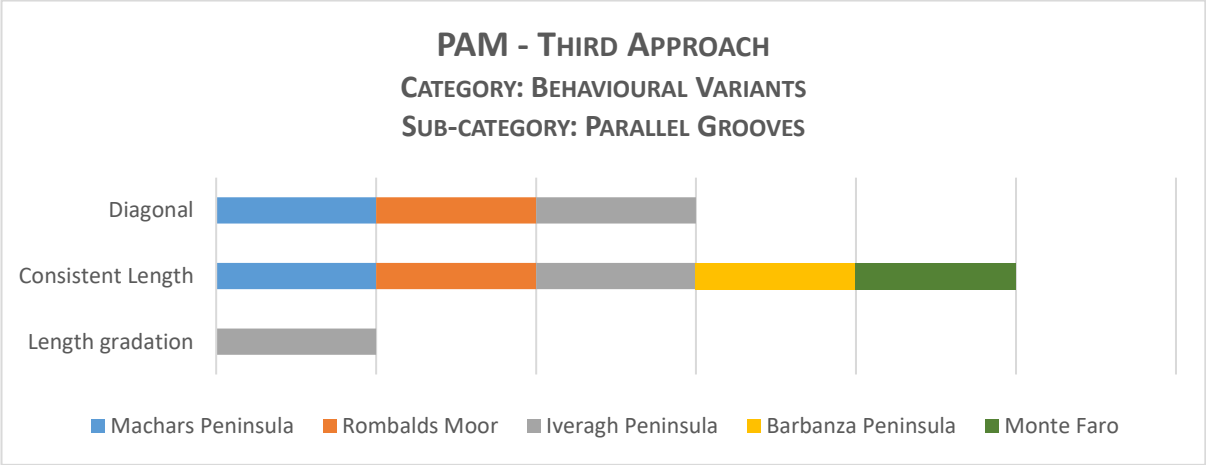
Table 53 Sub-category of behavioural variants related to the radial element. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

RADIALS BEHAVIOUR (%)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Direction Consistency	0.32%	0.10%	0.08%	0.00%	0.00%
Direction Variations	1.34%	0.00%	0.30%	0.72%	0.93%



Graphic 39 Graphic representing the *directionality of radials* on the carved rocks.

Sub-Category: Parallel Grooves Behaviour



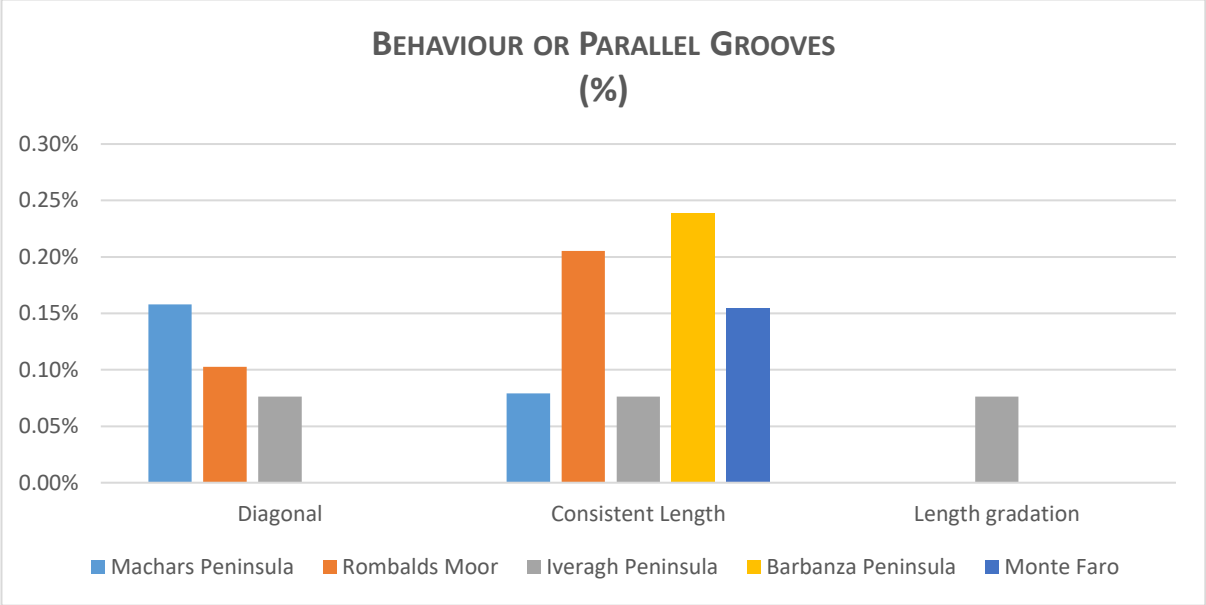
Graphic 40 Presence/Absence of parallel grooves with distinct behaviours.

Table 54 Sub-category of behavioural variants related to parallel grooves. Values obtained through a system of presence/absence representing the frequency of each attribute (counts).

PARALLEL GROOVES (COUNTS)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Diagonal	2	1	1	0	0
Consistent Length	1	2	1	2	1
Length Gradation	0	0	1	0	0

Table 55 Sub-category of behavioural variants related to parallel grooves. Values obtained through a system of presence/absence representing the frequency of each attribute (%).

PARALLEL GROOVES (%)					
	The Machars	**Rombalds Moor**	**Iveragh Peninsula**	**Barbanza Peninsula**	**Monte Faro**
Diagonal	0.16%	0.10%	0.08%	0.00%	0.00%
Consistent Length	0.08%	0.21%	0.08%	0.24%	0.15%
Length Gradation	0.00%	0.00%	0.08%	0.00%	0.00%



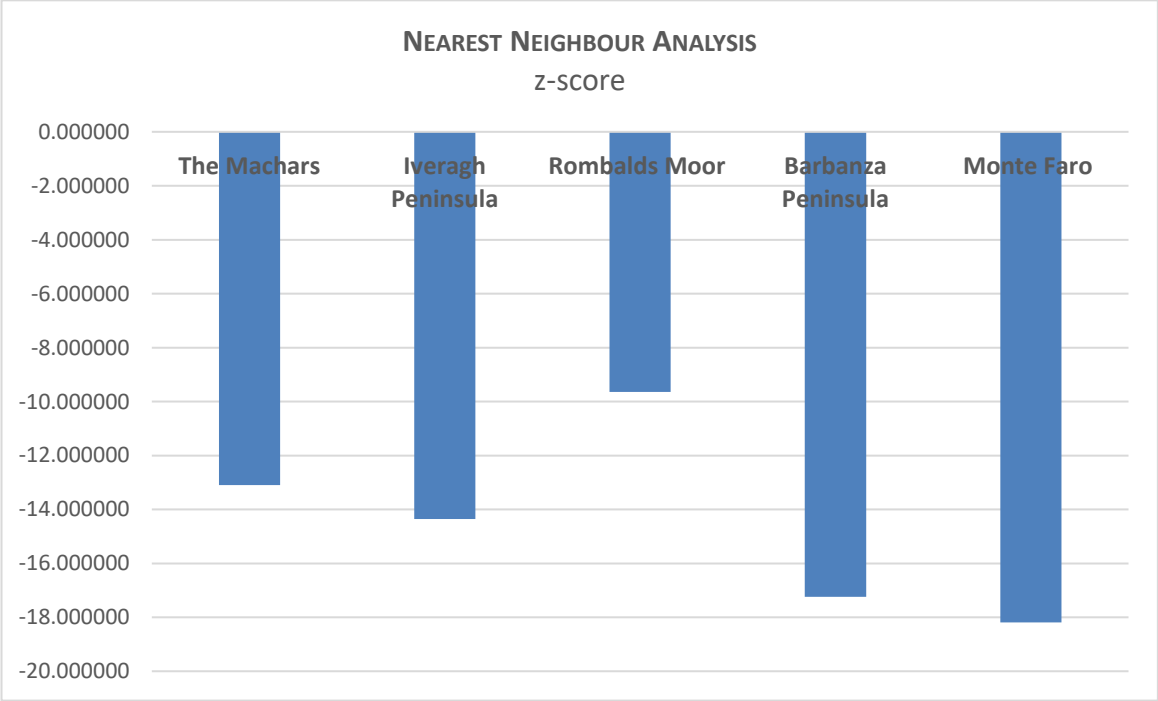
Graphic 41 Assessment of *parallel grooves*, when these are displayed in particular positions.

8.3. Environmental Scale: The Wider Landscape

Rock Art Clusters: Nearest Neighbour Analysis

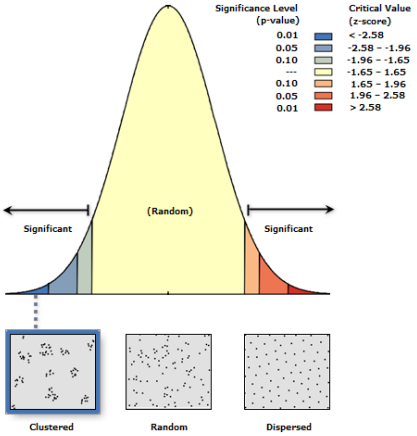
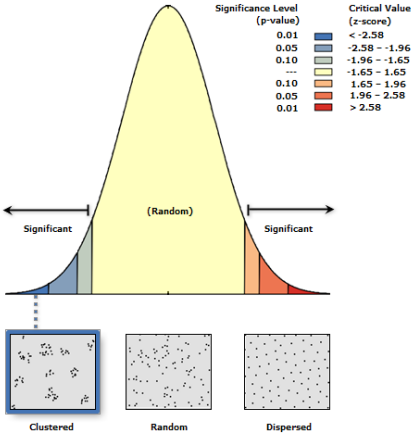
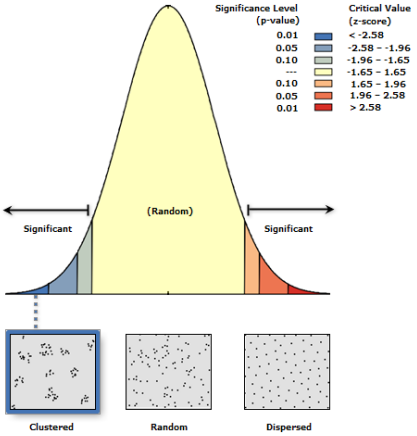
Table 56 Results obtained through the calculation of Nearest Neighbour Analysis with ArcGIS 10.4.1. This algorithm was applied to each study area, in this case, cnsidering the total areas and the carved rocks included in the main datasets.

Nearest Neighbour Analysis (Euclidean Distances)					
	The Machars Peninsula	Rombalds Moor	Iveragh Peninsula	Barbanza Peninsula	Monte Faro
NN Ratio	0.18717	0.117684	0.551492	0.29539	0.145785
NN Z- Score	-13.1027	-11.323	-4.928995	-8.735832	-11,203,321
P-Value	0	0	0.000001	0	0
NN Expected	954.13	698.6593	1928.27119	322.8937	48.4545
NN Observed	178.5843	82.22101	1063.42545	1093.1093	332.3684



Graphic 42 Z-Score of all areas.

Table 57 ArcGIS graphic outputs with the results of NN Analysis for each case-study. Additional information of the number of sites and total area used in each calculation is provided on the left column.

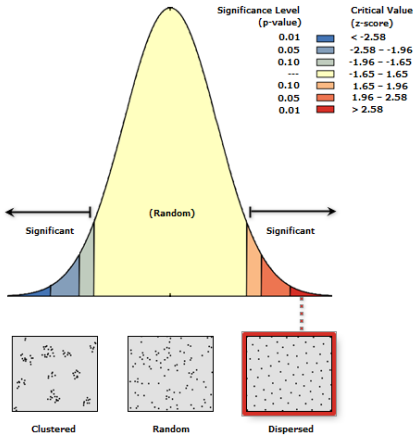
NEAREST NEIGHBOUR ANALYSIS (GRAPHICS)	
The Machars Peninsula *71 sites* *248.8 Km²* *Z-Score: -13.1027*	
Rombalds Moor *45 sites* *87.86 Km²* *Z-Score: -11.323*	
Iveragh Peninsula (Whole Area) *33 sites* *814.73 Km²* *Z-Score: -4.928995*	

Iveragh Peninsula (North Area)

11 sites

217.65 Km²

Z-Score: 16.410025

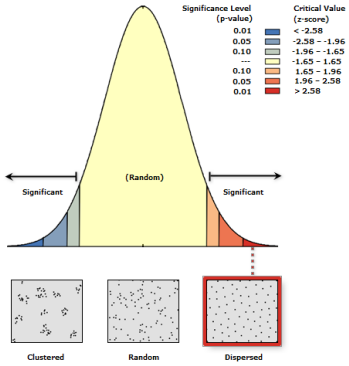


Iveragh Peninsula (South Area)

20 sites

467.11 Km²

Z-Score: 19.08968

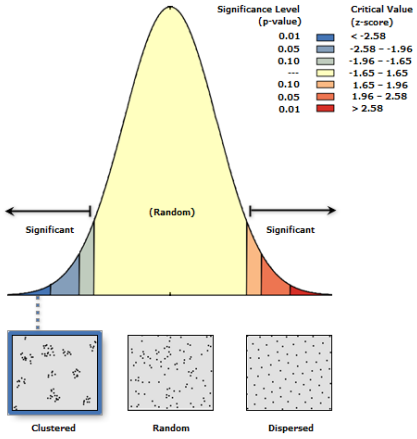


Barbanza Peninsula

40 sites

200.74 Km²

Z-Score: -8.735832

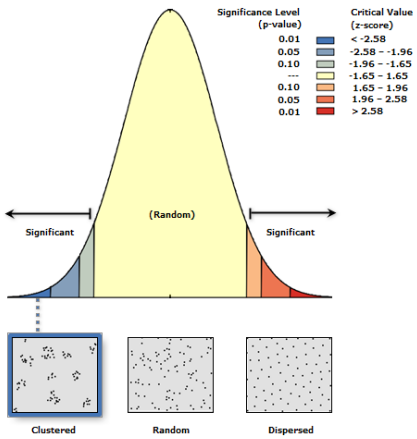


Monte Faro

34 Km²

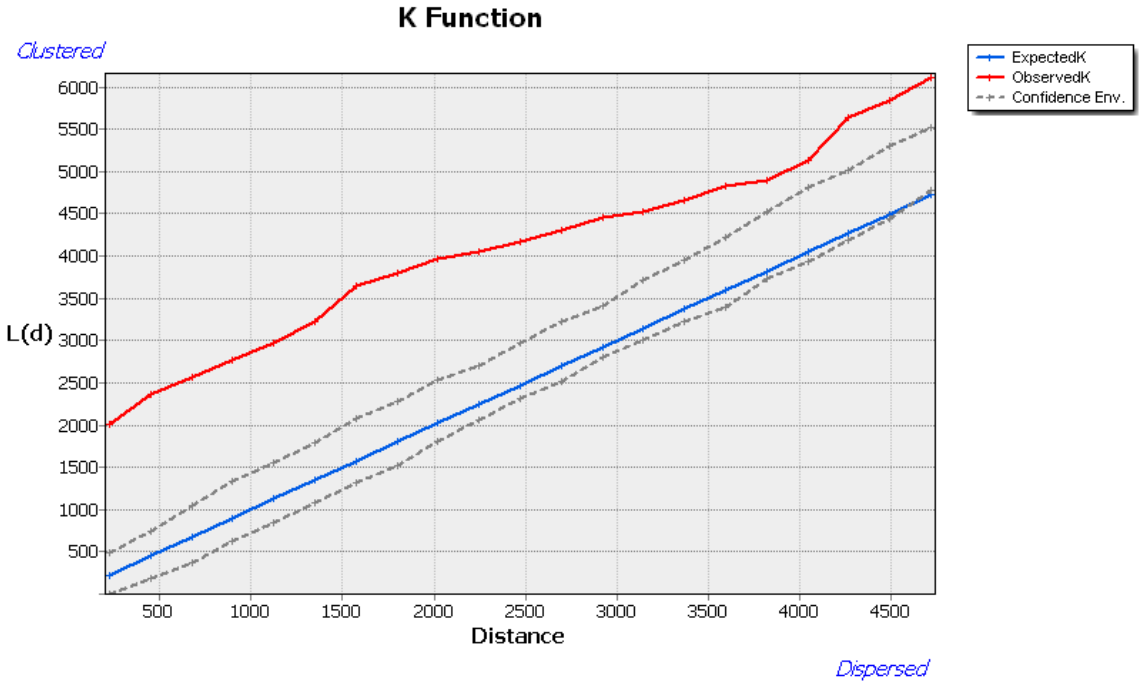
47 sites

Z-Score: -11,203321



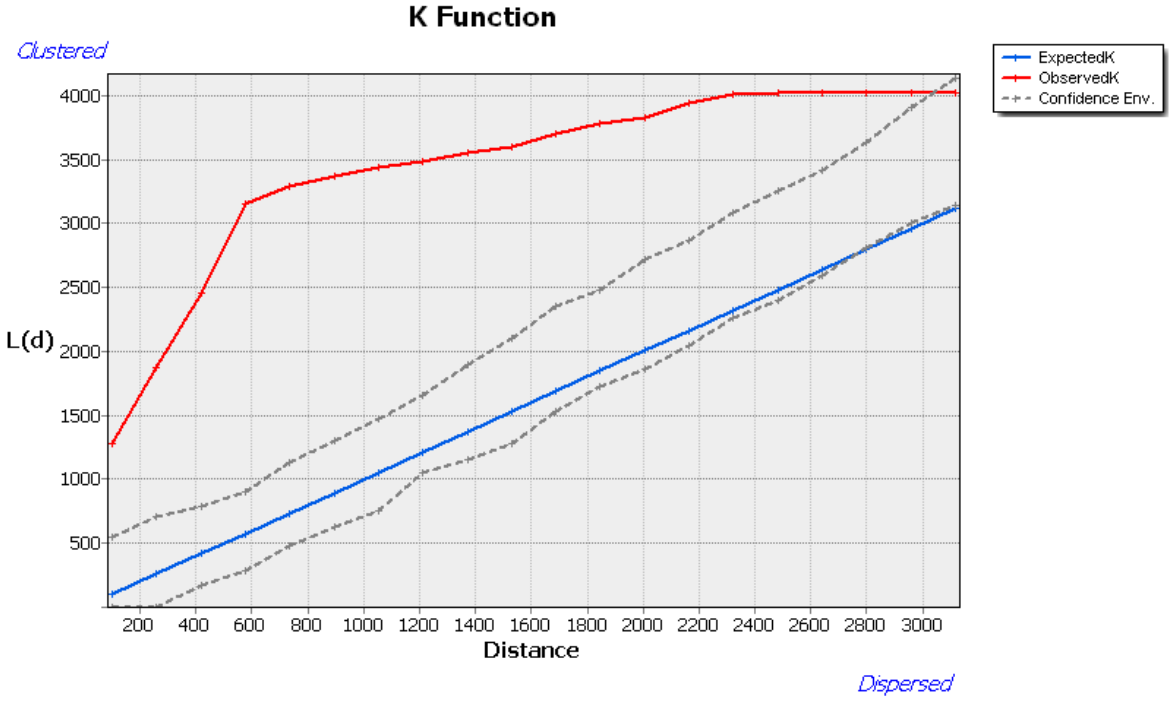
ROCK ART CLUSTERS: RIPLEY'S K FUNCTION

The Machars

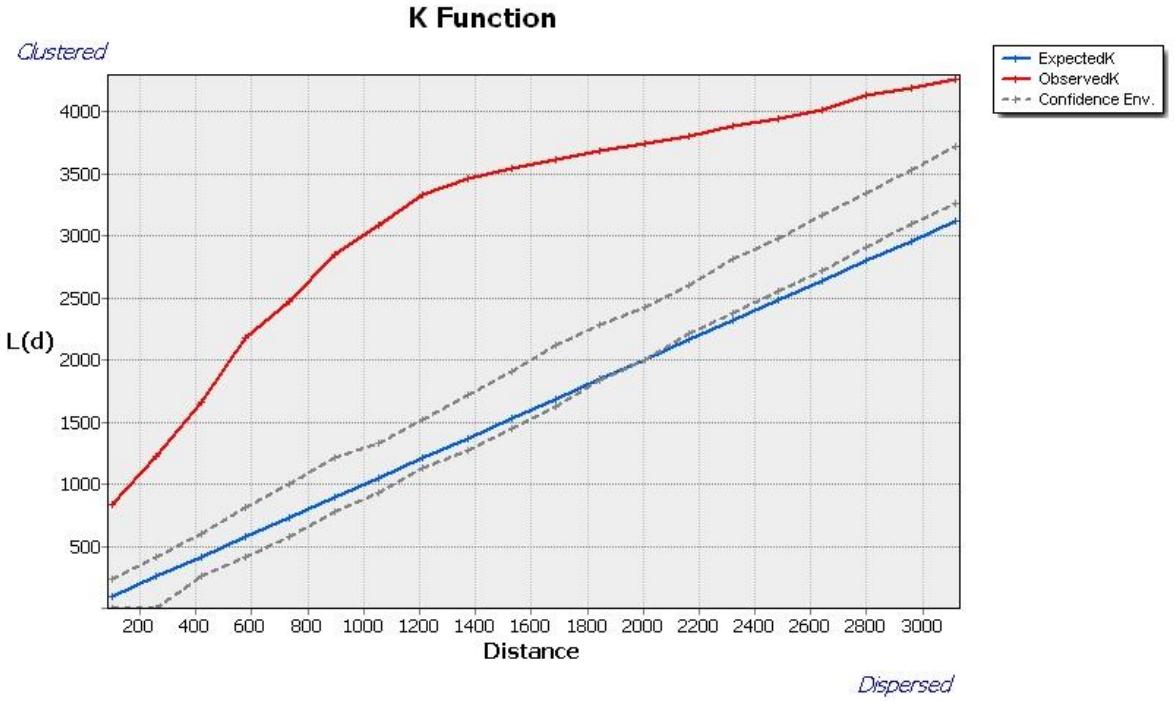


Graphic 43 Ripley's K Function calculated to the main dataset of Rombalds Moor. It shows that the sites are clustered.

Rombalds Moor

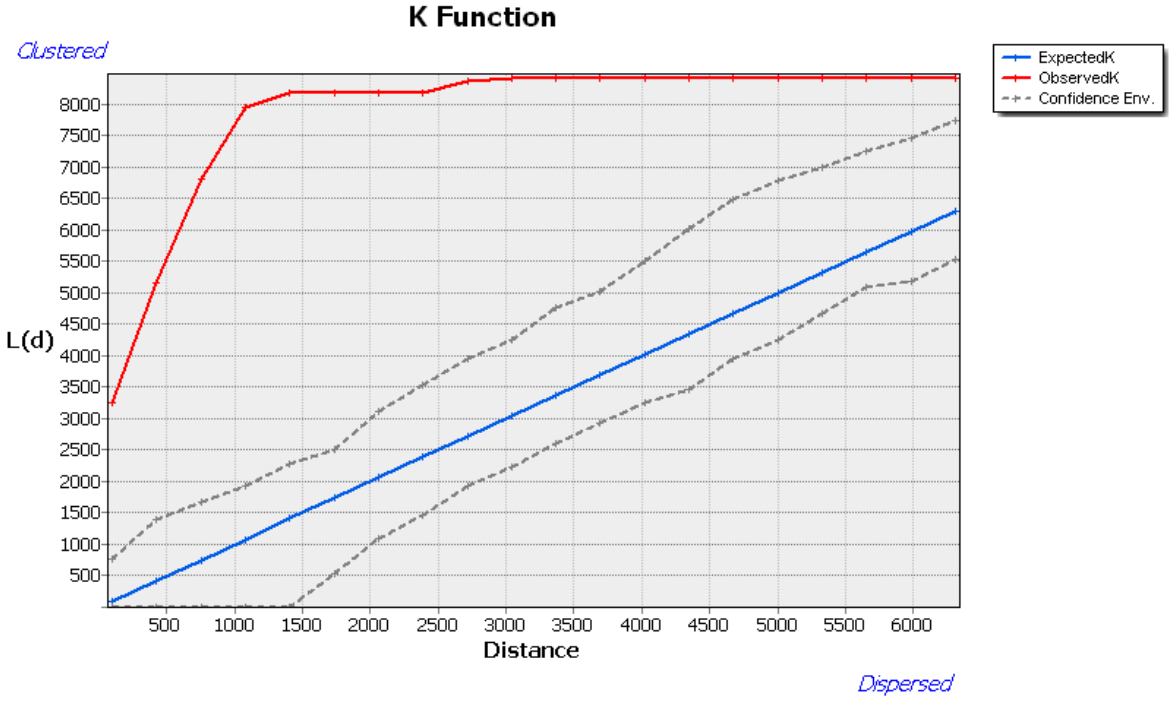


Graphic 44 Ripley's K Function calculated to the main dataset of Rombalds Moor. It shows that the sites are clustered.

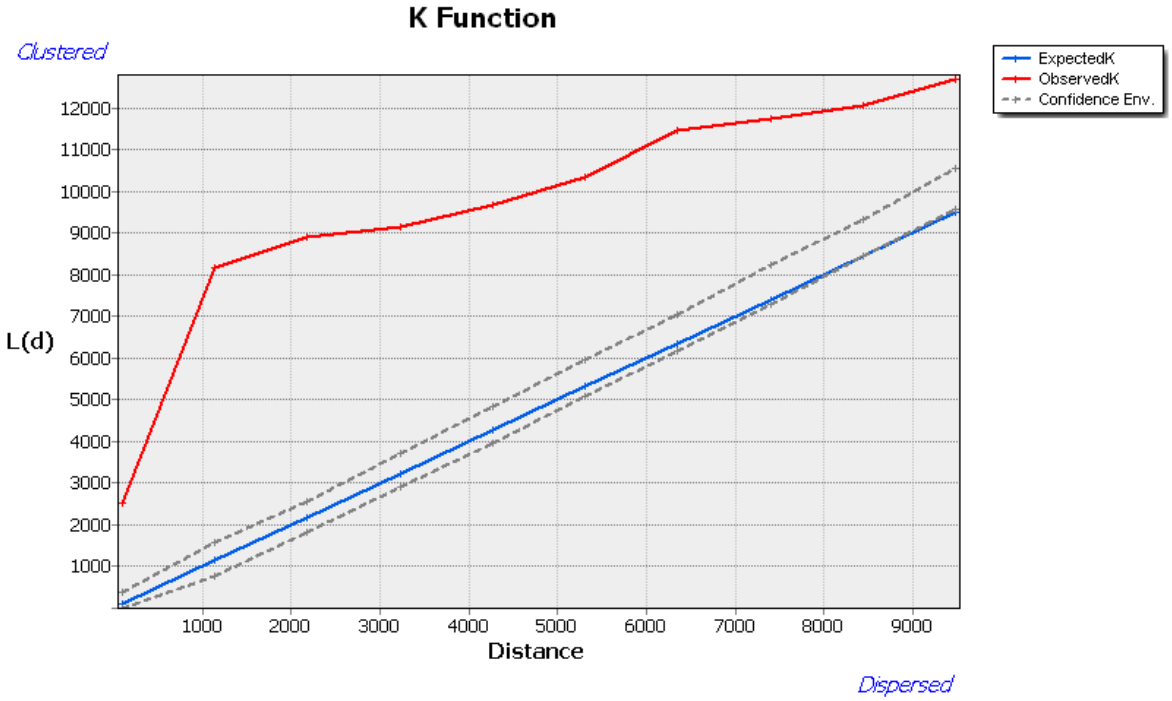


Graphic 45 Ripley's K Function calculated to the whole dataset of Rombaldes Moor (Source: ERA). It confirms that the sites are clustered.

Iveragh Peninsula

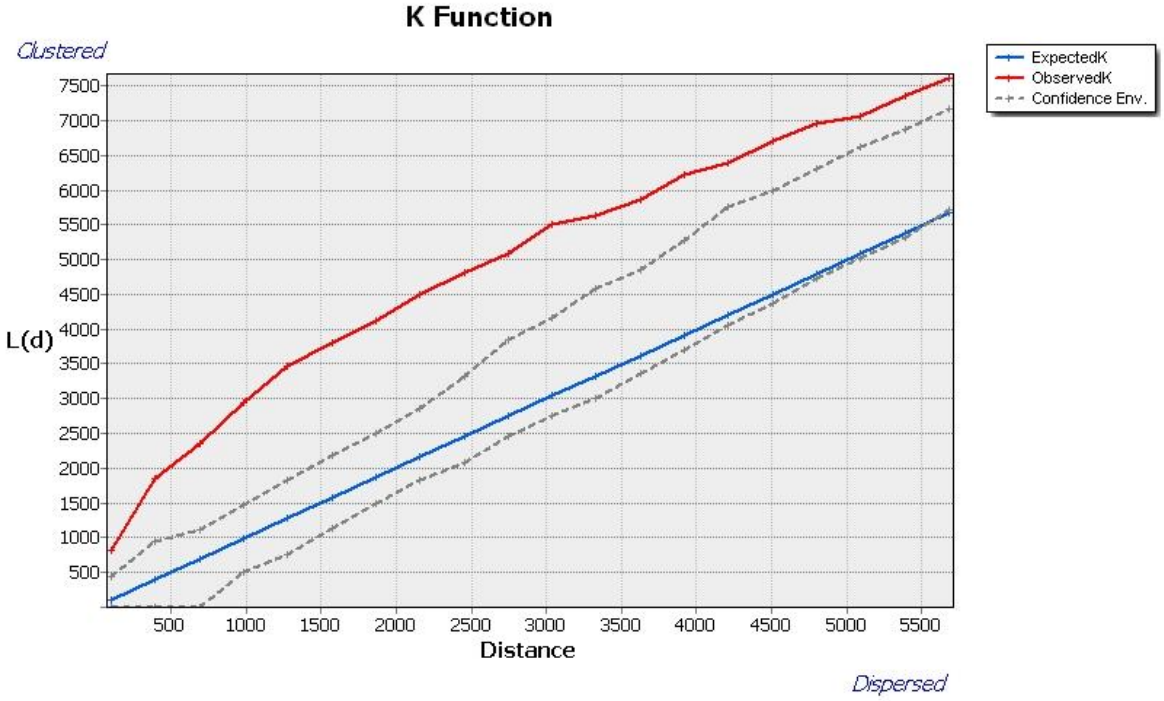


Graphic 46 Ripley's K Function calculated to the main dataset of Iveragh Peninsula. It shows a very striking pattern of clustering between the sites.

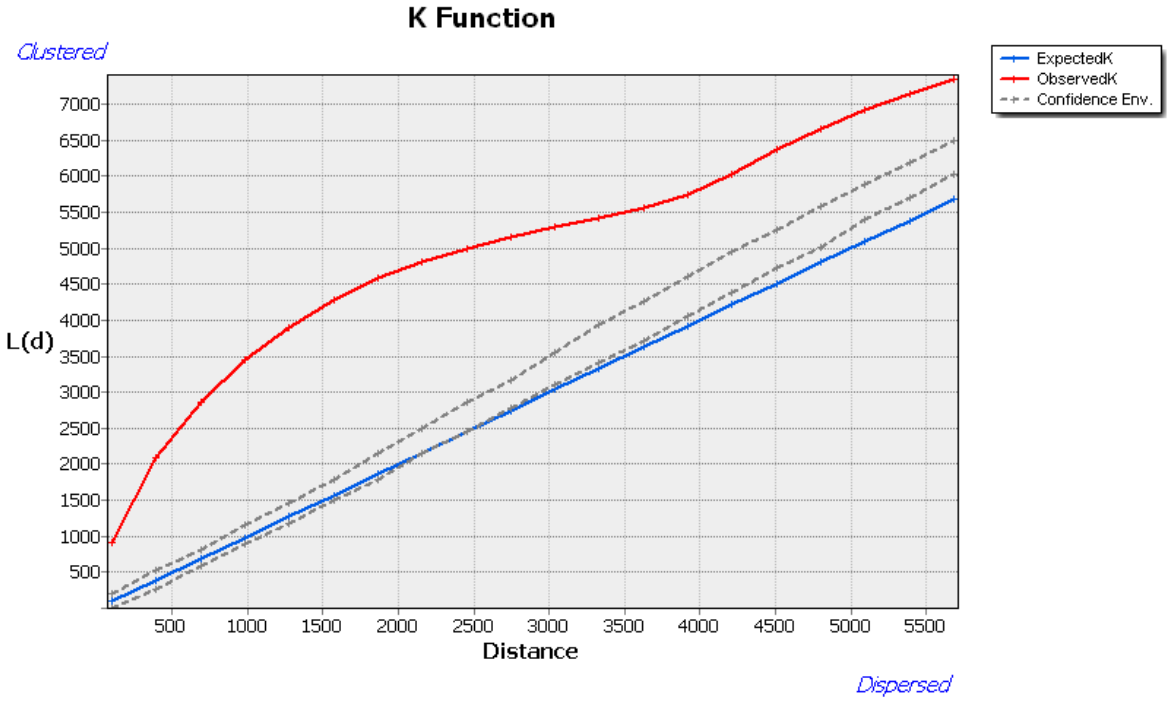


Graphic 47 Ripley's K Function calculated to the whole dataset of Iveragh Peninula (National Monuments Service of Ireland). It confirms the previous suggestion of clustering, obtained with the smaller samples.

Barbanza Peninsula

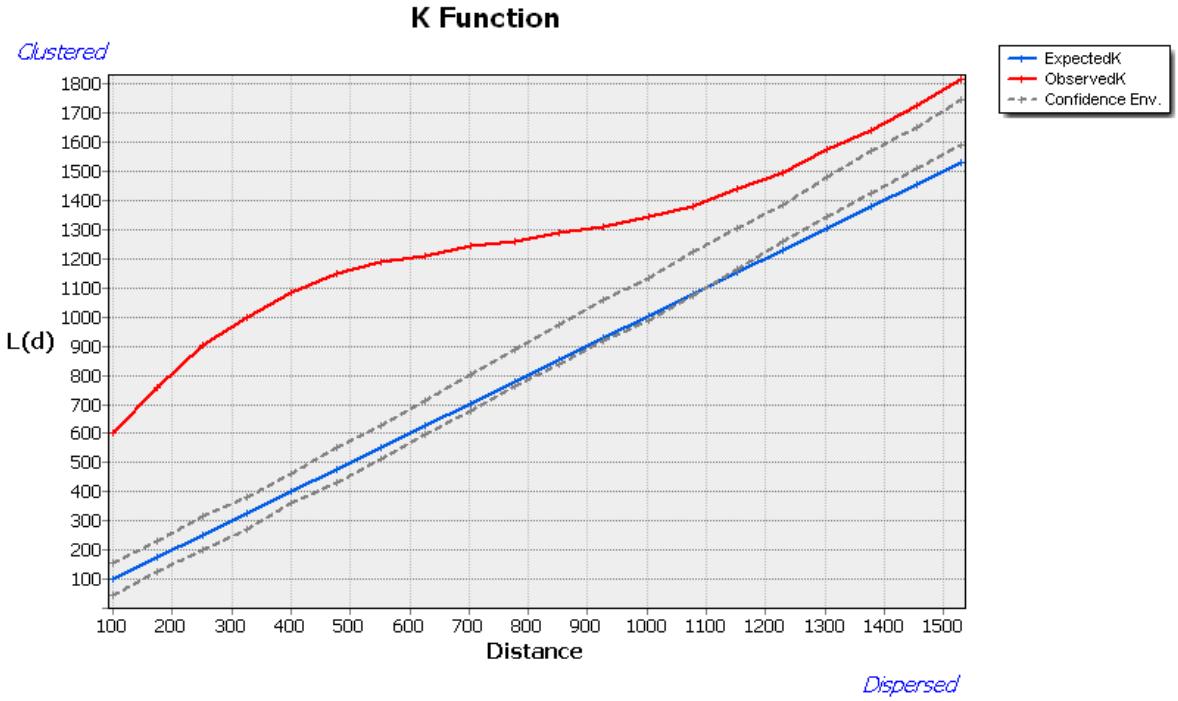


Graphic 48 Ripley's K Function calculated to the main dataset of Barbanza Peninsula. Indicates that sites are clustered.



Graphic 49 Ripley's K Function calculated to the comprehensive dataset of Barbanza Peninsula (Fábregas-Valcarce and Rodríguez-Rellán 2012a). Indicates that sites are clustered.

Monte Faro



Graphic 50 Ripley's K Function calculated to the whole date of Monte Faro (Source: Alves and Reis 2017a). It indicates that there is clustering between the sites.

The Machars (Scotland)

Table 58 Preferential orientation of the terrain in which carved rock is located in the Machars, according to field observations.

ASPECT/SLOPE ORIENTATION (FIELD OBSERVATIONS)										
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**	**Rock Face**
Boyach Farm		1								NE
Gallows Outon 1										
Gallows Outon 2	1				1			1		
Drummoral	1	1						1		
Glasserton Mains A						1	1			
Glasserton Mains B						1	1			
Glasserton Mains C						1	1			
Glasserton Mains D						1	1			
Glasserton Mains 2						1				
Knock 1A							1			Flat
Knock 1B							1			Flat
Knock 2B		1								SW
Knock 3A								1		NW
Knock 3B						1				SW
Knock 3C				1						SE
Knock 3D				1						SE
Knock 3E								1		
Knock 4								1	1	Flat
Knock 5										
Blairbuy 1								1		
Blairbuy 2							1	1		
Blairbuy 3			1							E
Blairbuy 4AB							1			
Blairbuy 4C						1				SE
Blairbuy 5					1		1	1		Flat
Blairbuy 6A								1		Flat
Blairbuy 6B								1		
Blairbuy 7A								1		
Blairbuy 7B										
Big Balcraig 1	1	1								
Big Balcraig 2		1								

Big Balcraig 3ABC			1							
Big Balcraig 4B								1	1	Flat
Big Balcraig 5							1			Flat
Drumtroddan 1			1	1			1	1	1	Flat
Drumtroddan 2A				1			1	1	1	NW
Drumtroddan 2B	1			1			1		1	NW
Drumtroddan 2C	1			1			1		1	NW
Drumtroddan 3A	1			1			1		1	NW
Drumtroddan 3B	1			1			1		1	Flat
Drumtroddan 3C	1			1					1	E
Drumtroddan 3D	1			1			1		1	Flat
Drumtroddan 4	1			1	1					NE
Drumtroddan 5	1			1			1			Flat
Penkiln 1A										
Penkiln 1B										
Penkiln 2A					1		1	1		
Penkiln 2B										
Penkiln 4A	1				1		1			
Penkiln 4B	1				1		1			
Culscadden 1A					1		1		1	Flat
Culscadden 1B					1		1		1	Flat
North Balfern		1	1							NW
Broughton Mains 1A		1		1				1		
Brouhgton Mains 1B										
Broughton Mains 1C										
Broughton Mains 2A										
Broughton Mains 2B										
Claunch 1 (A & B)		1	1							
Claunch 2		1								
Claunch 3			1							
Claunch 4		1	1							E
Claunch 5		1	1							Flat
Claunch 6		1	1			1				

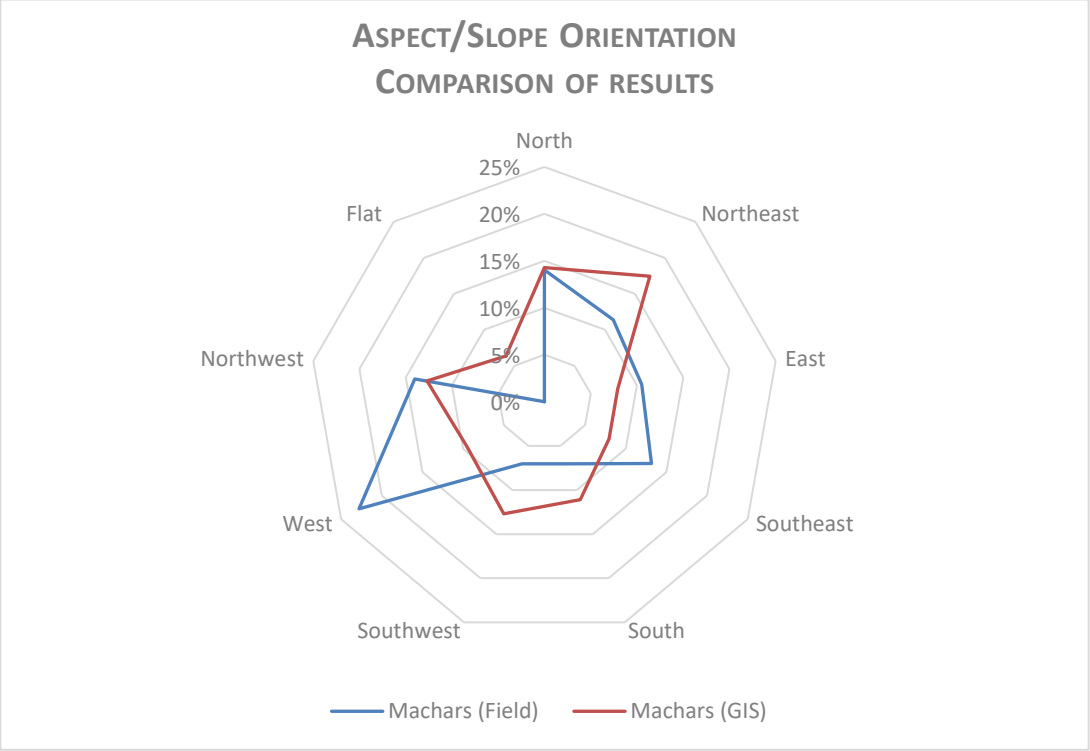
Claunch 7		1			Flat
Claunch 8			1		NW
Claunch 10			1		Flat
Culnoag 1A	1	1		1	Flat
Culnoag 1B	1	1		1	
Culnoag 1C	1	1		1	

Table 59 Preferential orientation of the terrain in which carved rock is located in the Machars, according to GIS Analysis.

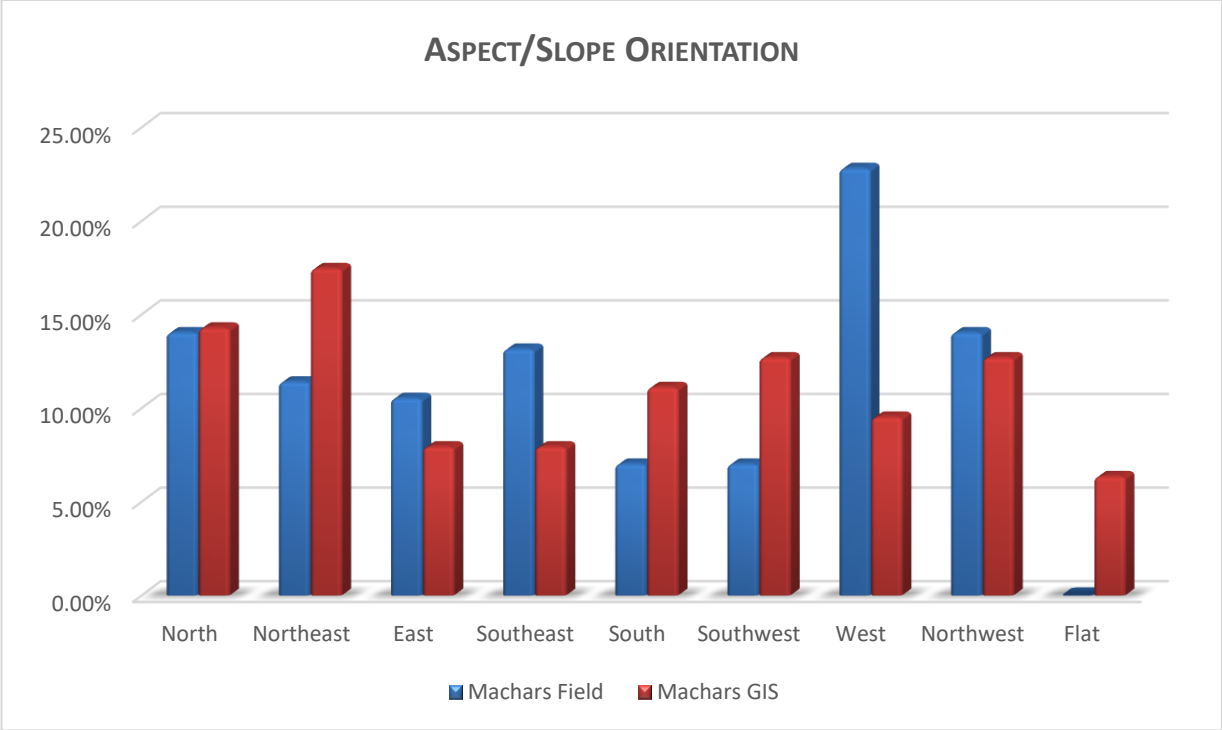
	ASPECT / SLOPE ORIENTATION (GIS)								
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**
Boyach Farm								1	
Gallows Outon 1							1		
Gallows Outon 2						1			
Drummoral		1							
Glasserton Mains 1					1				
Glasserton Mains 2		1							
Knock 1A						1			
Knock 1B				1					
Knock 2B	1								
Knock 3A			1						
Knock 3B		1							
Knock 3C		1							
Knock 3D			1						
Knock 3F			1						
Knock 4							1		
Blairbuy 1							1		
Blairbuy 2							1		
Blairbuy 3	1					1			
Blairbuy 4AB									
Blairbuy 4C						1			
Blairbuy 5					1				
Blairbuy 6A								1	
Blairbuy 6B	1								
Blairbuy 7A								1	

Blairbuy 8					1				
Big Balcraig 1	1								
Big Balcraig 2						1			
Big Balcraig 3ABC							1		
Big Balcraig 4B					1				
Big Balcraig 5					1				
Drumtroddan 1	1								
Drumtroddan 2A		1							
Drumtroddan 2B				1					
Drumtroddan 2C				1					
Drumtroddan 3A	1								
Drumtroddan 3B	1								
Drumtroddan 3C	1								
Drumtroddan 3D	1								
Drumtroddan 4		1							
Drumtroddan 5							1		
Penkiln 2A						1			
Penkiln 3		1							
Penkiln 4A									1
Penkiln 4B									1
Penkiln 5			1						
Penkiln 6						1			
Penkiln 7					1				
Culscadden 1A								1	
Culscadden 1B								1	
North Balfern		1							
Broughton Mains 1A									1
Brouhgton Mains 1B									

Broughton Mains 1C								
Broughton Mains 2A								
Broughton Mains 2B								
Claunch 1 (A & B)	1							
Claunch 2								1
Claunch 3					1			
Claunch 4		1						
Claunch 5	1							
Claunch 6			1					
Claunch 7	1							
Claunch 8				1				
Claunch 10			1					
Culnoag 1A							1	
Culnoag 1B							1	
Culnoag 1C							1	



Graphic 51 Graphic representation of the preferential orientations of the slopes in which the carved rocks of the Machars are located.



Graphic 52 Graphic representation of the preferential orientations of the slopes in which the carved rocks of the Machars are located.

Rombalds Moor (England)

Table 60 Preferential orientation of the terrain in which carved rock is located in Rombalds Moor, according to field observations.

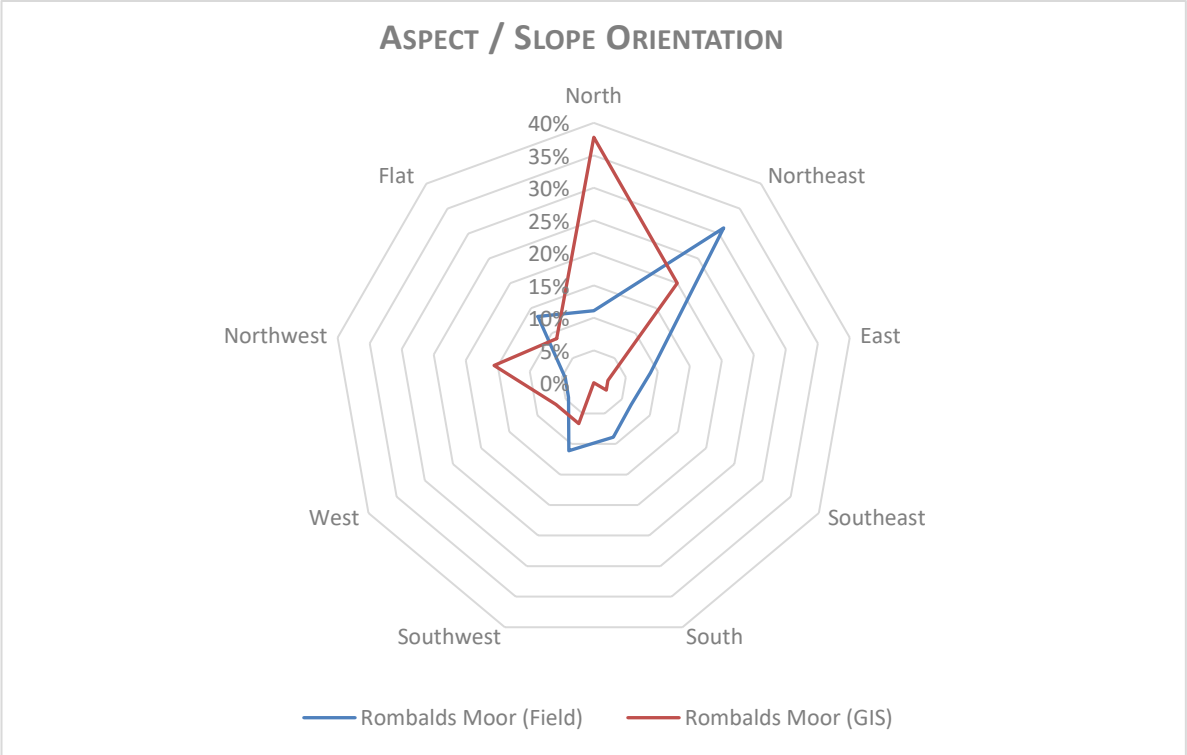
ASPECT / SLOPE ORIENTATION (FIELD OBSERVATIONS)										
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**	**Rock Face**
Baildon Moor 1								1		NW
Low Plain 23				1						SE
Low Plain 08						1				W
Baildon Moor 2							1			Flat
Low Plain 31	1									Flat
Low Plain 06						1				W
Low Plain 02					1					S
Baildon moor					1					Flat
Dobrudden 10			1							SE
Dobrudden 02						1				NW
Dobrudden 04						1				S
Low Plain 19								1		NW
Low Plain 16					1					W
Haystacks		1				1				Flat
Pancake Ridge 03			1							S
Planets Rock	1									Flat
Pancake Ridge 02					1					SW
Cow and Calf 10		1								W
Ilkley Moor 1		1								Flat
Cow and Calf 05	1									NW
Ilkley Moor 2		1								E
Idol Stone 01		1								Flat
Ilkley Moor 3		1								E
Idol Stone 02		1								Flat
Idol Stone 03		1								Flat
Idol Stone 04		1								NE
Ilkley Moor 4			1							Flat
Whaleback Stone		1								W
Ilkley Moor 5		1								Flat
Pancake Stone	1		1				1			N
Hangingstones Rock									1	Flat
Backstone Beck 1									1	SW
Backstone Beck 2				1						Flat
Backstone Beck 3									1	Flat
Pepperpot		1								NE
White Wells 05									1	S

Willy Hall's Wood		1		SE
Barmishaw	1			E
Badger Rock 1	1		1	SW
Badger Rock 2	1		1	NW
Backstone Beck 04				
GreenCrag11				
GreenCrag14				
GreenCrag16				
PancakeRidge07				

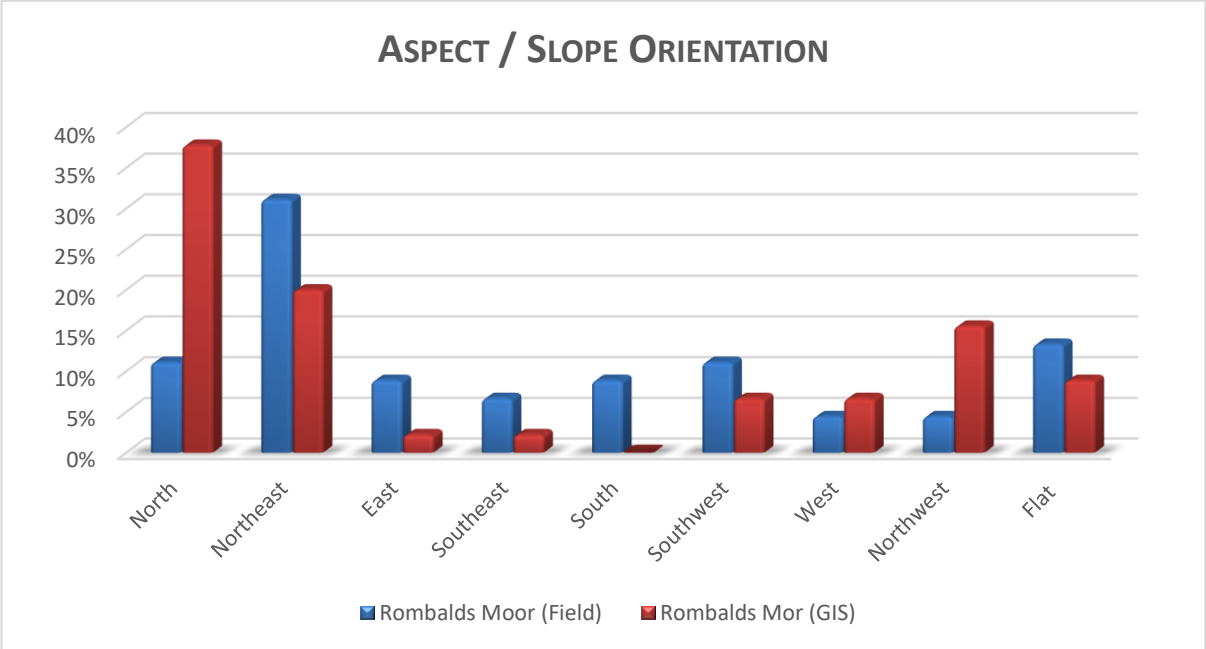
Table 61 Preferential orientation of the terrain in which carved rock is located in Rombalds Moor, according to GIS analysis.

	ASPECT / SLOPE ORIENTATION (GIS)								
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**
Baildon Moor 1	1								
Low Plain 23								1	
Low Plain 08								1	
Baildon Moor 2								1	
Low Plain 31								1	
Low Plain 06							1		
Low Plain 02								1	
Baildon moor						1			
Dobrudden 10									1
Dobrudden 02						1			
Dobrudden 04							1		
Low Plain 19						1			
Low Plain 16									1
Haystacks									1
Pancake Ridge 03							1		
Planets Rock	1								
Pancake Ridge 02	1								
Cow and Calf 10		1							
Ilkley Moor 1			1						
Cow and Calf 05		1							
Ilkley Moor 2		1							
Idol Stone 01	1								
Ilkley Moor 3	1								
Idol Stone 02		1							
Idol Stone 03	1								
Idol Stone 04	1								
Ilkley Moor 4	1								
Whaleback Stone	1								
Ilkley Moor 5		1							
Pancake Stone	1								
Hangingstones Rock	1								
Backstone Beck 1								1	
Backstone Beck 2	1								
Backstone Beck 3	1								
Pepperpot	1								
White Wells 05		1							
Willy Hall's Wood		1							
Barmishaw									1
Badger Rock 1								1	
Badger Rock 2	1								
Backstone Beck 04				1					

GreenCrag11	1	
GreenCrag14	1	
GreenCrag16		1
PancakeRidge07		1



Graphic 53 Rombalds Moor preferential slope orientation.



Graphic 54 Comparison of results between fieldwork experience and GIS in terms of slope orientation.

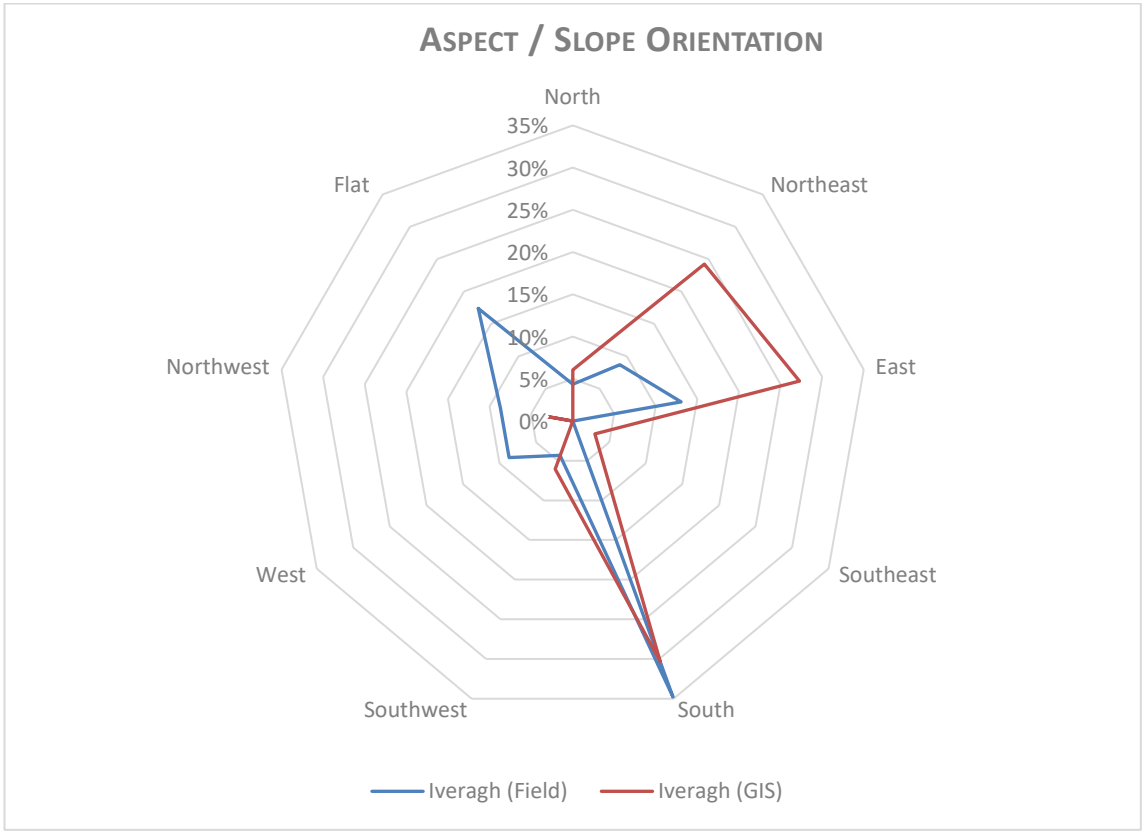
Table 62 Preferential orientation of the terrain in which carved rock is located in Iveragh Peninsula, according to field observations.

ASPECT / SLOPE ORIENTATION (FIELD OBSERVATIONS)										
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**	**Rock Face**
Ballynahow Beg	1									E
Carhoonmeengar East										NE
Coolnaharragill Upper		1								NW
Coomasaharn 2										
Coomasaharn 6										
Coomasaharn 9										
Derreeny 1					1					E
Derrenny 3					1					NE
Derreeny 5					1					S
Derreeny 7					1					E
Derreeny 8					1					W
Derreeny 11					1					E
Derrynablaha 1		1								S
Derrynablaha 3					1					Flat
Derrynablaha 4										
Derrynablaha 7										S
Derrynablaha 8										S
Derrynablaha 10										S
Derrynablaha 11					1					W
Derrynablaha 14										S
Derrynablaha 15									1	SE
Derrynablaha 19										S
Derrynablaha 22			1							NW
Derrynablaha 22A			1							W
Derrynablaha 23			1							Flat
Derrynablaha 24							1			SW
Derrynablaha 25										
Dromtine						1				W
Gortnagulla										
Kealduff Upper 1										
Kealduff Upper 2									1	NW
Kealduff Upper 4										W
Kealduff Upper 5							1			Flat
Kealduff Upper 8										E
Kealduff Upper 9									1	Flat
Kealduff Upper 13										

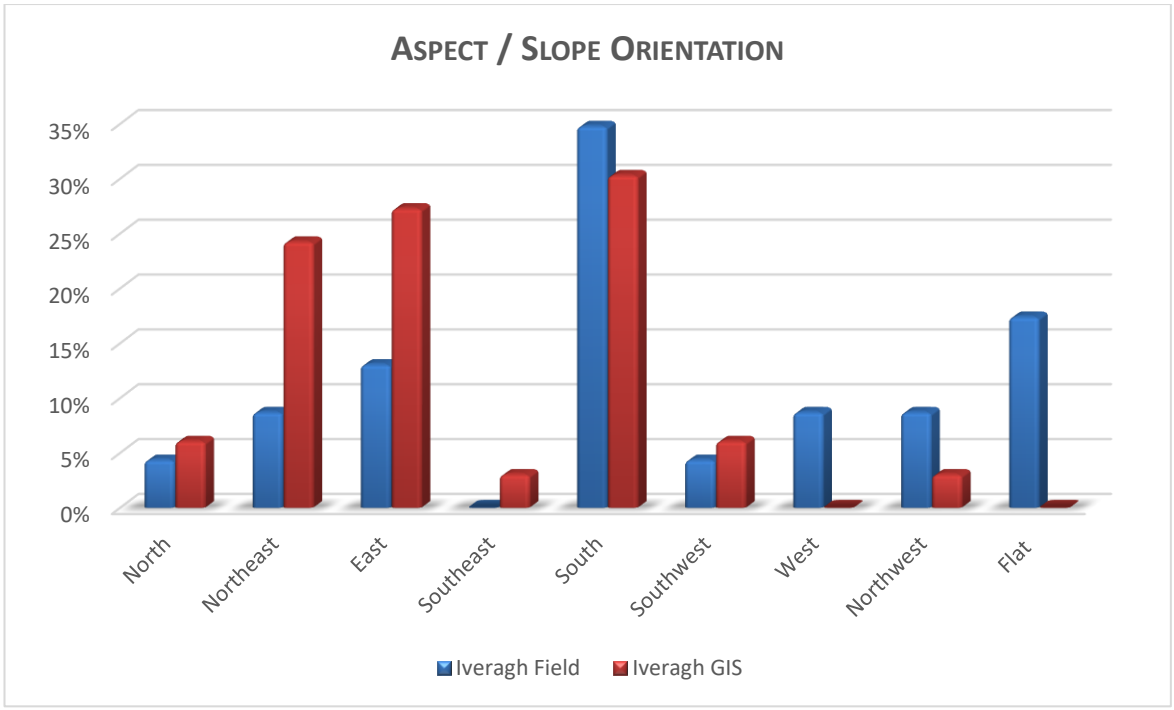
Kealduff Upper 11	1		N
Kealduff Upper 10		1	SW
Kealduff Upper 12			N
Kealduff Upper 14			SW
Liss	1		NW
Rossacoosane			
Tullakeel 1			
Tullakeel 2			
ITullakeel 2B			
Derreeny 10			

Table 63 Preferential orientation of the terrain in which carved rock is located in Iveragh Peninsula, according to GIS analysis.

	ASPECT / SLOPE ORIENTATION (GIS)								
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**
Ballynahow Beg	1								
Coolnaharragill Upper								1	
Derreeny 1					1				
Derrenny 3					1				
Derreeny 7						1			
Derreeny 8					1				
Derreeny 9					1				
Derreeny 10			1						
Derreeny 11				1					
Derrynablaha 1					1				
Derrynablaha 3					1				
Derrynablaha 7						1			
Derrynablaha 8					1				
Derrynablaha 11					1				
Derrynablaha 14			1						
Derrynablaha 15			1						
Derrynablaha 19			1						
Derrynablaha 22			1						
Derrynablaha 22A			1						
Derrynablaha 23			1						
Derrynablaha 24		1							
Derrynablaha 25		1							
Dromtine					1				
Kealduff Upper 2		1							
Kealduff Upper 4			1						
Kealduff Upper 5		1							
Kealduff Upper 8			1						
Kealduff Upper 9	1								
Kealduff Upper 11		1							
Kealduff Upper 10		1							
Kealduff Upper 12		1							
Kealduff Upper 14		1							
Liss					1				



Graphic 55 Graphic representation regarding the preferences in terms of aspect in which the carved rocks are located.



Graphic 56 Graphic representation regarding the preferences in terms of slope in which the carved rocks are located.

Table 64 Preferential orientation of the terrain in which carved rock is located in Barbanza Peninsula, according to field observations.

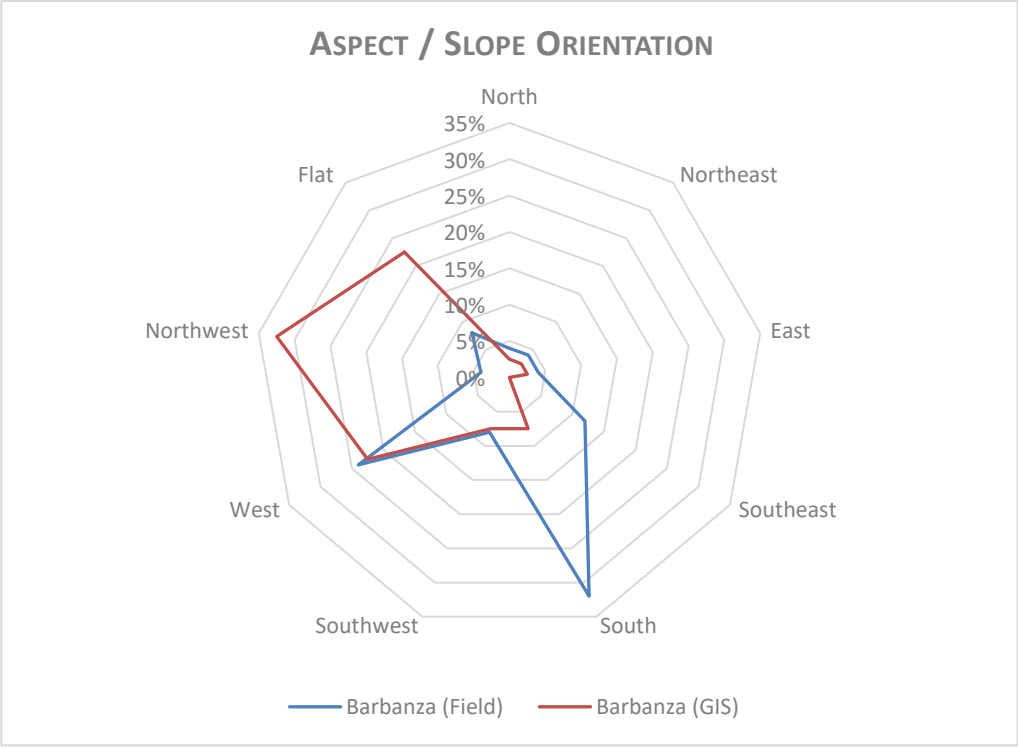
ASPECT / SLOPE ORIENTATION (FIELD OBSERVATIONS)										
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**	**Rock Face**
A Picota							1			W
Outeiro da Malda I								1		NW
Outeiro da Malda II										
A Tarela							1			W
Monte Dordo I										
A Buguinha Grande										Flat
Fontandurin I									1	Flat
Gurita I					1					S
Gurita II					1					Flat
Gurita IV					1				1	S
Igrexa						1				S
Lamatrema			1							E
Lamela I					1					Flat
Pedravila I						1				Flat
Petroglifo de Barona										
Agro das Cartas II										SE
Calderramos I					1					S
Abrigo de Calderramos III					1					S
Abrigo de Calderramos IV										Flat
Cova da Louza I										
Cova da Loza III							1			W
Cova da Louza IVa							1			W

Cova da Loza IVb				1	Flat
Insuela					E
Campo Grande IV					Flat
Espiñaredo II					SE
Espiñaredo V			1		
Feáns VII		1			SE
Laxe da Sartaña			1		W
Légoa Seca V					
Portela de Gourís	1				Flat
Rego do Corzo I		1			
Rego do Corzo III		1			W
Beira da Costa I					W
Beira da Costa IV					W
O Castro I				1	
Castro II					Flat
O Castro IV					
Cacharelas					Flat
A Lagoa II	1				NE
A Lagoa III					
Basoñas					Flat

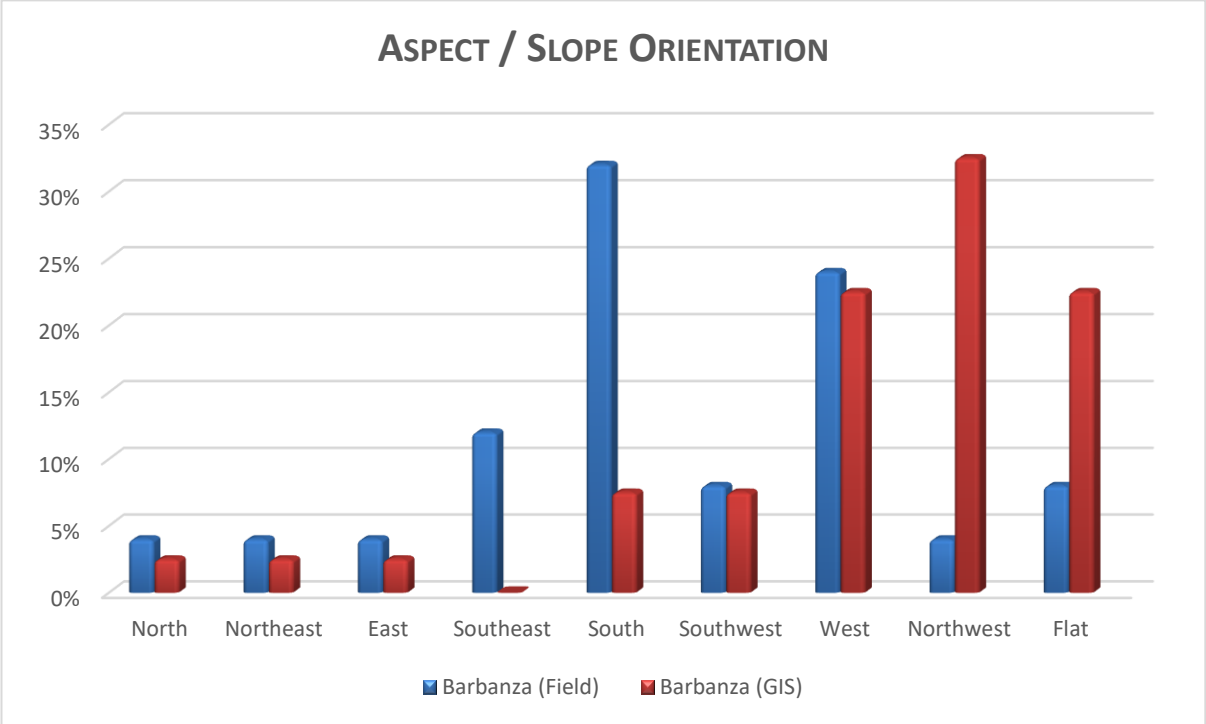
Table 65 Preferential orientation of the terrain in which carved rock is located in Barbanza Peninsula, according to GIS analysis.

	ASPECT / SLOPE ORIENTATION (GIS)								
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**
A Picota				1					
Outeiro da Malda I							1		
Outeiro da Malda II							1		
A Tarela								1	
Monte Dordo I							1		
A Buguinha Grande								1	
Fontandurin I								1	
Gurita I						1			
Gurita II						1			
Gurita IV						1			
Igrexa						1			
Lamatrema				1					
Lamela I				1					
Pedravila I								1	
Petroglifo de Barona									
Agro das Cartas II							1		
Calderramos I						1			
Abrigo de Calderramos III					1				
Abrigo de Calderramos IV					1				
Cova da Louza I								1	
Cova da Loza III							1		
Cova da Louza IVa							1		
Cova da Loza IVb							1		
Insuela								1	
Campo Grande IV							1		
Espiñaredo II							1		

Espiñaredo V	1							
Feáns VII				1				
Laxe da Sartaña							1	
Légoa Seca V							1	
Portela de Gourís		1						
Rego do Corzo I					1			
Rego do Corzo III					1			
Beira da Costa I					1			
Beira da Costa IV				1				
O Castro I					1			
Castro II				1				
O Castro IV				1				
Cacharelas			1					
A Lagoa II								
A Lagoa III								
Basoñas								



Graphic 57 Aspect in Barbanza: field observations VS GIS.



Graphic 58 Contrast between results gathered in the field and calculated with GIS, regarding aspect.

Table 66 Preferential orientation of the terrain in which carved rock is located in Monte Faro, according to field observations.

ASPECT / SLOPE ORIENTATION (FIELD OBSERVATIONS)										
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**	**Rock Face**
1. Escaravelhão 5 R1			1							Flat
2. Escaravelhão 5 R2									1	Flat
3. Escaravelhão 5 R3	1									N
4. Escaravelhão 5 R4	1									Flat
5. Escaravelhão 5 R5							1			Flat
6. Escaravelhão 5 R8										
7. Escaravelhão 5 R1									1	Flat
8. Escaravelhão 5 R3									1	NW
9. Escaravelhão 5 R2									1	Flat
10. Escaravelhão 5 R4	1	1								Flat
11. Escaravelhão 5 R5						1				Flat
12. Escaravelhão 5-R6						1				
13. Escaravelhão 5 R7						1				
14. Monte dos Fortes 1 - R1						1				SW
15. Monte dos Fortes 1 - R2						1				SW
16. Monte dos Fortes 1- R3						1	1			W
17. Monte dos Fortes 1- R4						1				SW
18. Monte dos Fortes 2 - R1						1				SW
19. Monte dos Fortes 2 - R6									1	Flat
20. Monte dos Fortes 2 - R7									1	Flat

21. Monte dos Fortes 2 Field Num 18				1	Flat
22. Monte dos Fortes 2 - R13				1	N
23. Monte dos Fortes 2 - Field Num 22				1	Flat
24. Monte dos Fortes 2 - R5					
25. Monte dos Fortes 2 - R12 (LBA)					
26. Escaravelhão 1 R1		1			S
27. Escaravelhão 1 R2		1			S
28. Escaravelhão 1 R3				1	Flat
29. Escaravelhão 1 R4		1			E
30. Escaravelhão 1 Field Num 28			1		Flat
31. Escaravelhão 1 Field Num 29			1		SW
32. Fonte Formosa R3				1	
33. Fonte Formosa R4	1		1		
34. Fonte Formosa R5					
35. Fonte Volide R3					
36. Fonte Volide R4					
37. Pinhal do Rei R2					
38. Pinhal do Rei R3					
39. Pinhal do Rei R9					
40. Pinhal do Rei R10					
41. São Tomé R1					
42. São Tomé R3					

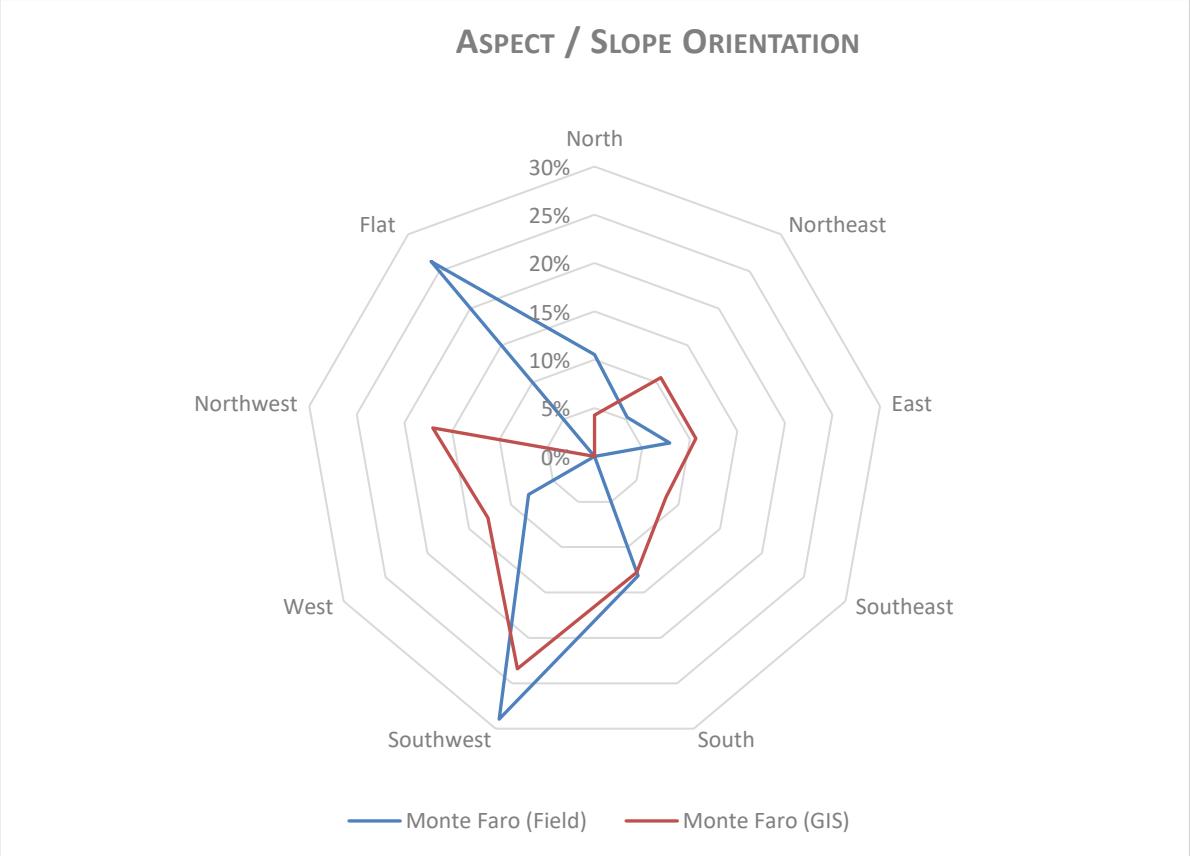
43. Monte da Laje			
44. Santo Ovídio R3			
45. Santo Ovídio R2B		1	1
46. Fonte Volide - R1	1		
47. Tapada do Ozão		1	1

Table 67 Preferential orientation of the terrain in which carved rock is located in Monte Faro, according to GIS analysis.

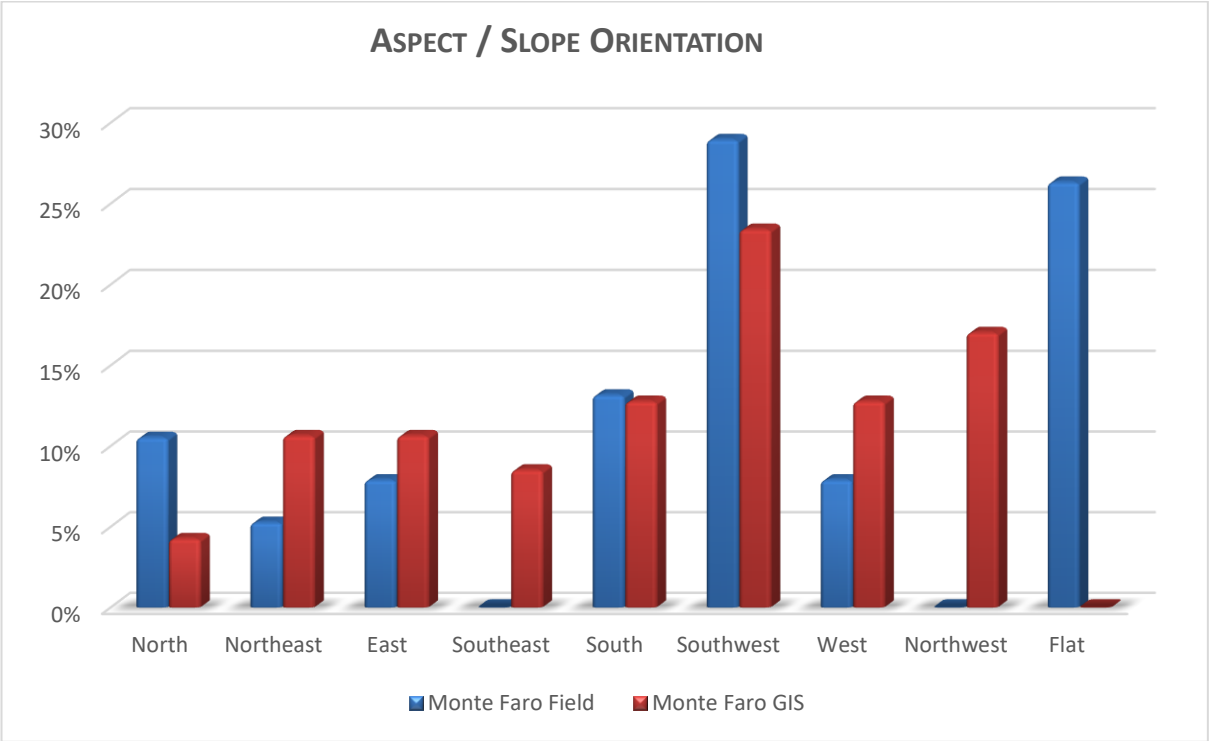
	ASPECT / SLOPE ORIENTATION (GIS)								
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Flat**
1. Escaravelhão 5 R1							1		
2. Escaravelhão 5 R2							1		
3. Escaravelhão 5 R3								1	
4. Escaravelhão 5 R4								1	
5. Escaravelhão 5 R5	1								
6. Escaravelhão 5 R8		1							
7. Escaravelhão 5 R1								1	
8. Escaravelhão 5 R3								1	
9. Escaravelhão 5 R2								1	
10. Escaravelhão 5 R4								1	
11. Escaravelhão 5 R5							1		
12. Escaravelhão 5- R6							1		
13. Escaravelhão 5 R7							1		
14. Monte dos Fortes 1 - R1						1			
15. Monte dos Fortes 1 - R2						1			
16. Monte dos Fortes 1- R3						1			
17. Monte dos Fortes 1- R4						1			
18. Monte dos Fortes 2 - R1						1			

19. Monte dos Fortes 2 - R6						1		
20. Monte dos Fortes 2 - R7						1		
21. Monte dos Fortes 2 Field Num 18						1		
22. Monte dos Fortes 2 - R13						1		
23. Monte dos Fortes 2 - Field Num 22					1			
24. Monte dos Fortes 2 - R5						1		
25. Monte dos Fortes 2 - R12 (LBA)					1			
26. Escaravelhão 1 R1				1				
27. Escaravelhão 1 R2				1				
28. Escaravelhão 1 R3				1				
29. Escaravelhão 1 R4				1				
30. Escaravelhão 1 Field Num 28			1					
31. Escaravelhão 1 Field Num 29			1					
32. Fonte Formosa R3			1					
33. Fonte Formosa R4		1						
34. Fonte Formosa R5			1					
35. Fonte Volide R3								1
36. Fonte Volide R4	1							
37. Pinhal do Rei R2					1			
38. Pinhal do Rei R3					1			
39. Pinhal do Rei R9					1			

40. Pinhal do Rei R10				1				
41. São Tomé R1	1							
42. São Tomé R3		1						
43. Monte da Laje						1		
44. Santo Ovídio R3	1							
45. Santo Ovídio R2B	1							
46. Fonte Volide - R1							1	
47. Tapada do Ozão					1			

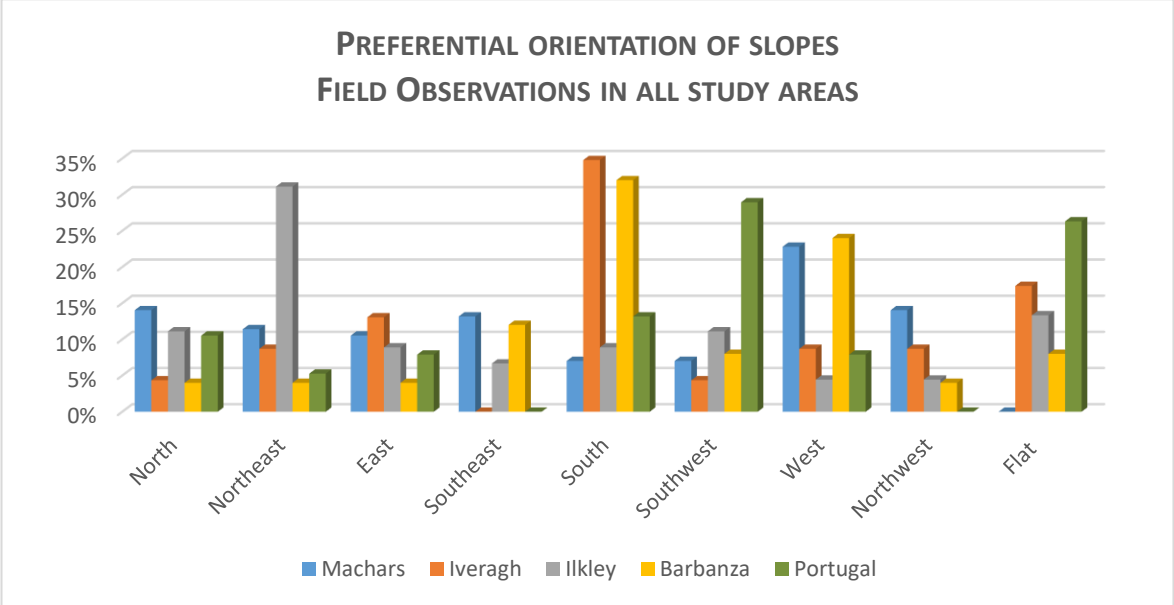


Graphic 59 Field observations VS GIS regarding aspect analysis.

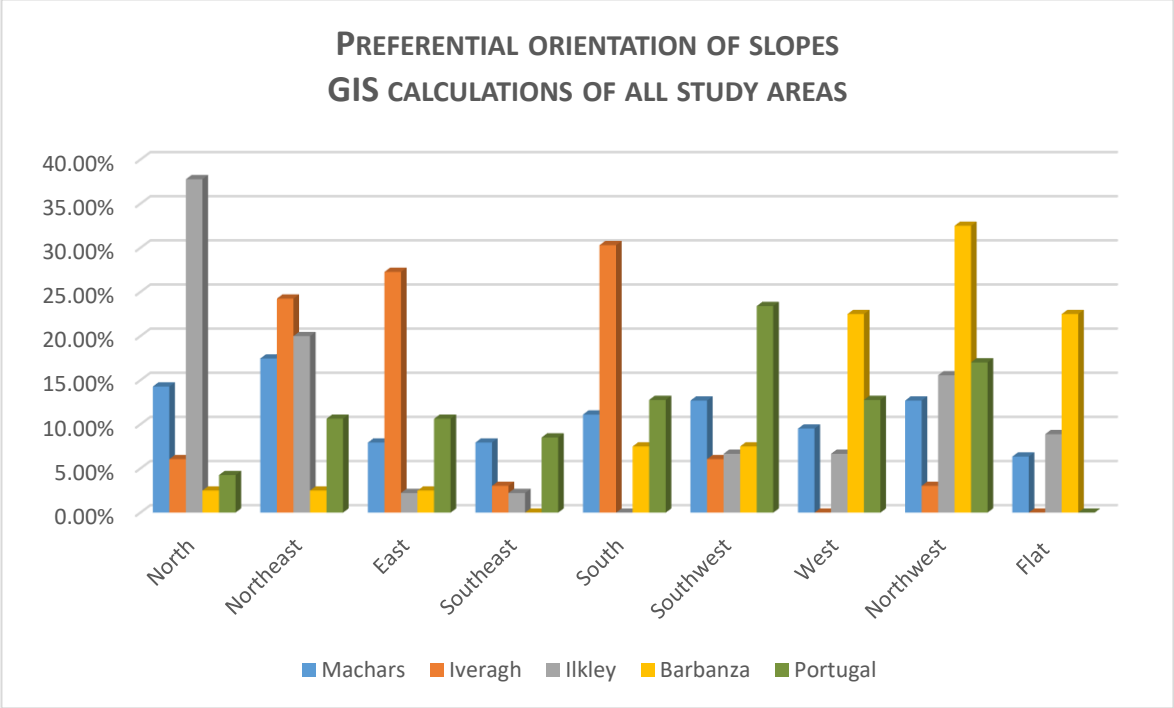


Graphic 60 Field observations VS GIS regarding aspect analysis.

Aspect Comparisons through results obtained during fieldwork



Graphic 61 Results of fieldwork observations regarding the preferential orientation of slopes in which the carved rocks are located.



Graphic 62 Results of fieldwork observations regarding the preferential orientation of slopes in which the carved rocks are located.

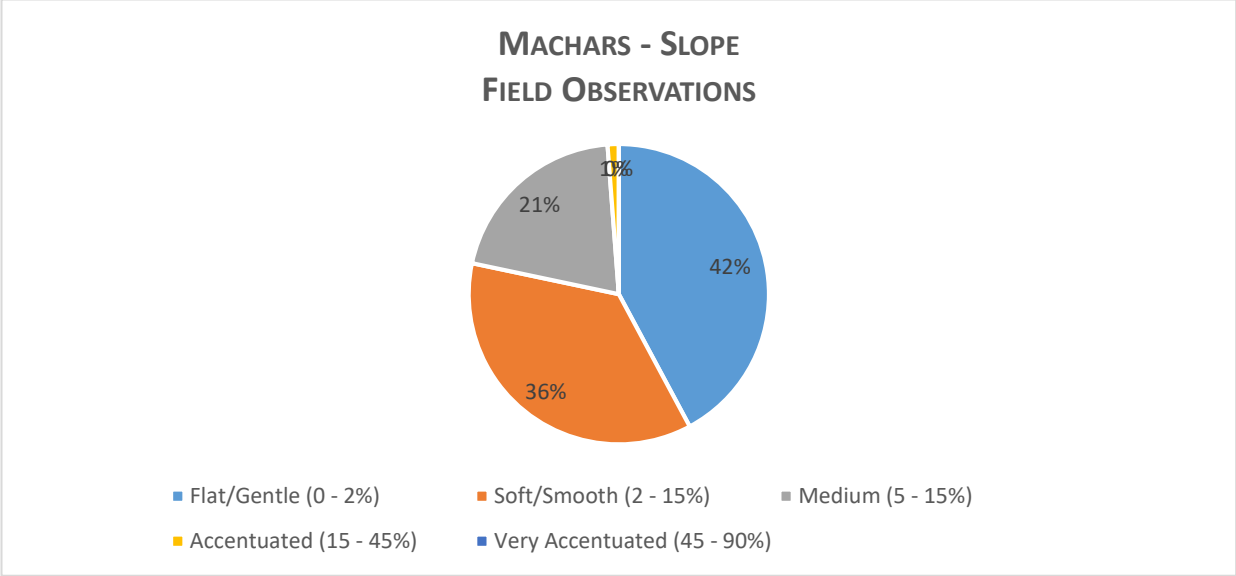
SLOPE ANALYSIS

Machars Peninsula: Slope (Field Observations)

Table 68 Slope results according to field observations.

SLOPE (FIELD OBSERVATIONS)					
	FLAT/GENTLE (0 - 2%)	SOFT/SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENTUATED (15 - 45%)	VERY ACCENTUATED (45 - 90%)
Boyach Farm		1			
Gallows Outon 1		1			
Gallows Outon 2		1			
Drummoral				1	
Glasserton Mains A			1		
Glasserton Mains B			1		
Glasserton Mains C			1		
Glasserton Mains D			1		
Glasserton Mains New			1		
Knock 1A		1			
Knock 1B		1			
Knock 2B		1			
Knock 3A			1		
Knock 3B			1		
Knock 3C			1		
Knock 3D			1		
Knock 3F			1		
Knock 4	1				
Knock 5			1		
Blairbuy 1		1			
Blairbuy 2		1			
Blairbuy 3		1			
Blairbuy 4AB		1			
Blairbuy 4C		1			
Blairbuy 5		1			
Blairbuy 6A			1		
Blairbuy 6B			1		
Blairbuy 7A		1			
Blairbuy 7B		1			
Big Balcraig 1		1			
Big Balcraig 2		1			
Big Balcraig 3ABC		1			
Big Balcraig 4B		1			
Big Balcraig 5 JVT		1			
Drumtroddan 1.1	1				
Drumtroddan 1.2	1				
Drumtroddan 1.3	1				

Drumtroddan 1.4	1		
Drumtroddan 1.5	1		
Drumtroddan 1.6	1		
Drumtroddan 1.6A	1		
Drumtroddan 1.7	1		
Drumtroddan 1.8	1		
Drumtroddan 1.9	1		
Drumtroddan 1.10	1		
Drumtroddan 1.11	1		
Drumtroddan 1.12	1		
Drumtroddan 2A	1		
Drumtroddan 2B	1		
Drumtroddan 2C	1		
Drumtroddan 2D	1		
Drumtroddan 3A	1		
Drumtroddan 3B	1		
Drumtroddan 3C	1		
Drumtroddan 3D	1		
Drumtroddan 4	1		
Drumtroddan 5	1		
Penkiln 1A		1	
Penkiln 1B		1	
Penkiln 2A		1	
Penkiln 2B		1	
Penkiln 4A		1	
Penkiln 4B		1	
Culscadden 1A	1		
Culscadden 1B	1		
North Balfern			1
Broughton Mains 1A		1	
Brouhgton Mains 1B		1	
Broughton Mains 1C		1	
Broughton Mains 2A		1	
Broughton Mains 2B		1	
Claunch 1 (A & B)	1		
Claunch 2	1		
Claunch 3	1		
Claunch 4	1		
Claunch 5	1		
Claunch 6	1		
Claunch 7 JVT	1		
Claunch 8 JVT	1		
Claunch 10 JVT	1		
Culnoag 1A			1
Culnoag 1B			1
Culnoag 1C			1



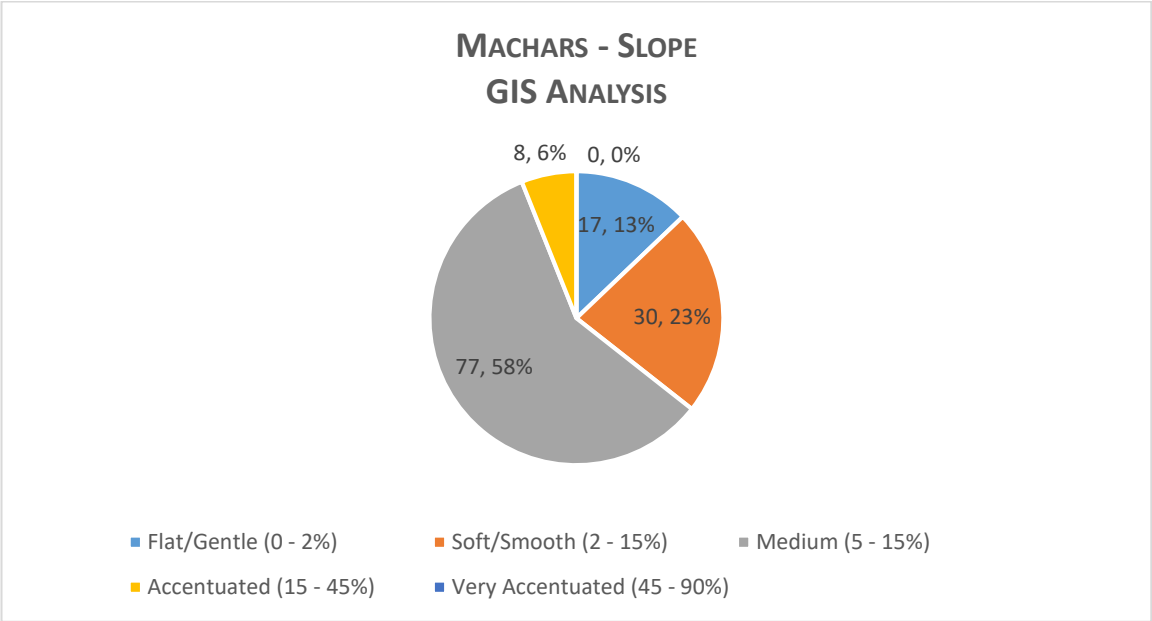
Graphic 63 Summary of Slope preferences in the Machars, according to field observations.

Table 69 Slope results according to GIS analysis.

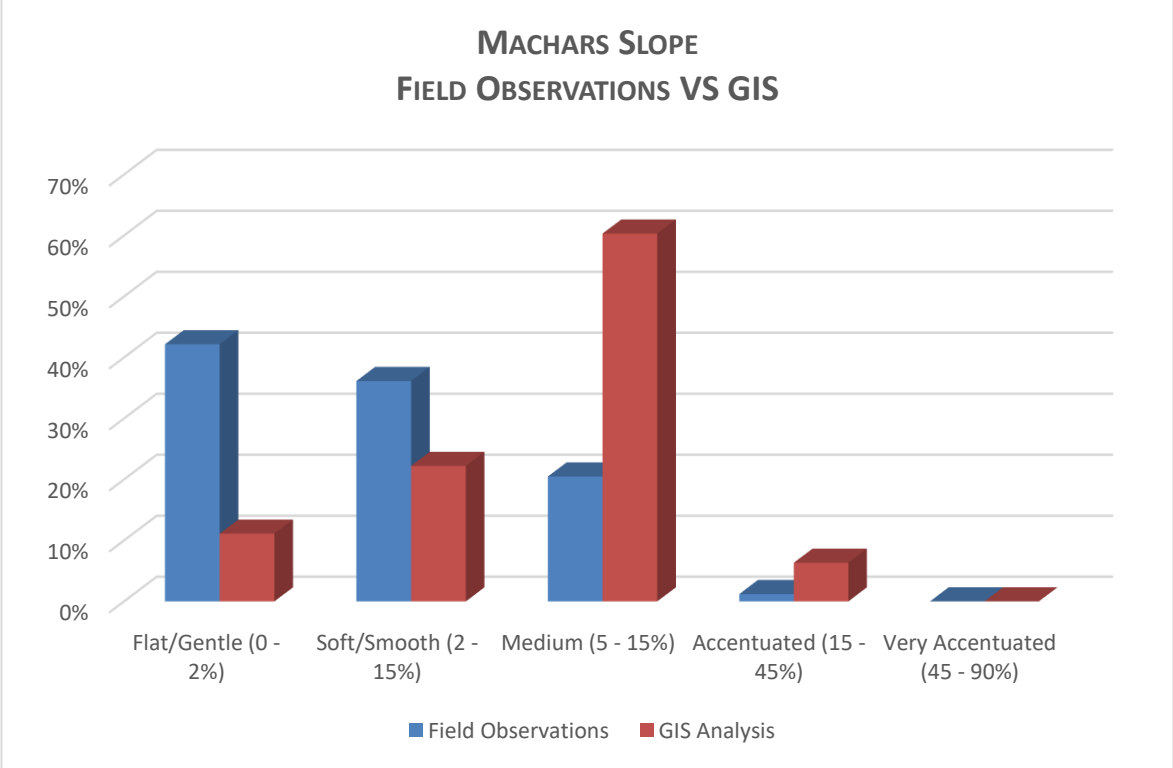
SLOPE (GIS ANALYSIS)					
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENT. (15 - 45%)	VERY ACCENTUAT. (45 - 90%)
Boyach Farm		1			
Gallows Outon 1			1		
Gallows Outon 2			1		
Drummoral				1	
Glasserton Mains A			1		
Glasserton Mains B			1		
Glasserton Mains C				1	
Glasserton Mains D			1		
Glasserton Mains New	1				
Knock 1A			1		
Knock 1B			1		
Knock 2B		1			
Knock 3A			1		
Knock 3B			1		
Knock 3C			1		
Knock 3D			1		
Knock 3F			1		
Knock 4			1		
Knock 5			1		
Blairbuy 1			1		
Blairbuy 2				1	
Blairbuy 3			1		
Blairbuy 4AB			1		
Blairbuy 4C			1		
Blairbuy 5				1	
Blairbuy 6A		1			
Blairbuy 6B			1		

Blairbuy 7A		1	
Blairbuy 7B			1
Big Balcraig 1			1
Big Balcraig 2		1	
Big Balcraig 3ABC			1
Big Balcraig 4B			1
Big Balcraig 5			1
Drumtroddan 1.1			1
Drumtroddan 1.2			1
Drumtroddan 1.3			1
Drumtroddan 1.4			1
Drumtroddan 1.5		1	
Drumtroddan 1.6		1	
Drumtroddan 1.6A			1
Drumtroddan 1.7			1
Drumtroddan 1.8	1		
Drumtroddan 1.9	1		
Drumtroddan 1.10	1		
Drumtroddan 1.11			1
Drumtroddan 1.12	1		
Drumtroddan 2A			1
Drumtroddan 2B		1	
Drumtroddan 2C		1	
Drumtroddan 2D			1
Drumtroddan 3A	1		
Drumtroddan 3B			1
Drumtroddan 3C			1
Drumtroddan 3D	1		
Drumtroddan 4			1
Drumtroddan 5		1	
Penkiln 1A		1	
Penkiln 1B			1
Penkiln 2A		1	

Penkiln 2B			1		
Penkiln 4A		1			
Penkiln 4B		1			
Culscadden 1A		1			
Culscadden 1B			1		
North Balfern			1		
Broughton Mains 1A				1	
Brouhgton Mains 1B			1		
Broughton Mains 1C			1		
Broughton Mains 2A				1	
Broughton Mains 2B			1		
Claunch 1 (A & B)	1				
Claunch 2			1		
Claunch 3			1		
Claunch 4		1			
Claunch 5			1		
Claunch 6			1		
Claunch 7			1		
Claunch 8			1		
Claunch 10			1		
Culnoag 1A			1		
Culnoag 1B			1		
Culnoag 1C			1		



Graphic 64 Summary of slope preferences in the Machars according to the GIS analysis.



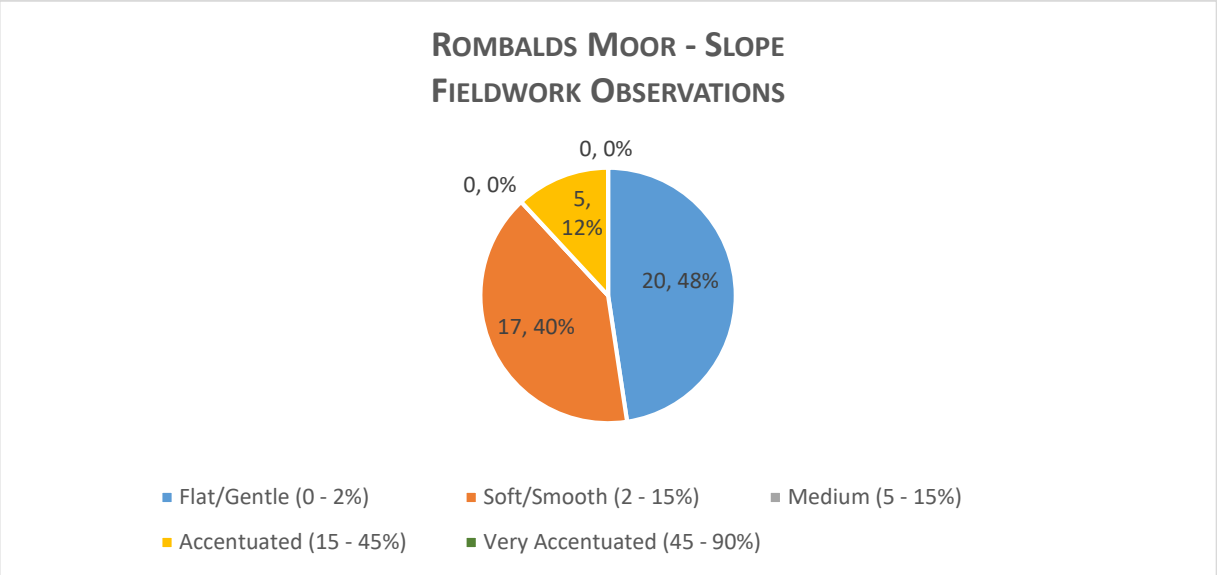
Graphic 65 Contrasting field observations and GIS in the Machars.

Rombalds Moor: Slope (Field Observations)

Table 70 Results of slope analysis in Rombalds Moor according to field observations.

	SLOPE (FIELD OBSERVATIONS)				
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENT. (15 - 45%)	VERY ACCENT. (45 - 90%)
Baildon Moor 1	1				
Low Plain 23	1				
Low Plain 08			1		
Baildon Moor 2	1				
Low Plain 31	1				
Low Plain 06		1			
Low Plain 02	1				
Baildon moor	1				
Dobrudden 10	1				
Dobrudden 02			1		
Dobrudden 04			1		
Low Plain 19	1				
Low Plain 16	1				
Haystacks	1				
Pancake Ridge 03	1				
Planets Rock	1			1	
Pancake Ridge 02	1				
Cow and Calf 10		1			
Ilkley Moor 1		1			
Cow and Calf 05			1		
Ilkley Moor 2			1		
Idol Stone 01			1		
Ilkley Moor 3			1		
Idol Stone 02			1		
Idol Stone 03			1		
Idol Stone 04		1			
Ilkley Moor 4	1				
Whaleback Stone				1	
Ilkley Moor 5			1		
Pancake Stone	1				
Hangingstones Rock	1			1	
Backstone Beck 1	1				
Backstone Beck 2	1				
Backstone Beck 3	1				
Pepperpot				1	
White Wells 05				1	
Willy Hall's Wood		1			
Barmishaw		1			
Badger Rock 1		1			
Badger Rock 2		1			
Backstone Beck 04					
GreenCrag11					

GreenCrag14						
GreenCrag16						
PancakeRidge07						
Baildon Moor 1		1				
Low Plain 23		1				
Low Plain 08			1			
Baildon Moor 2		1				
Low Plain 31		1				
Low Plain 06			1			
Low Plain 02		1				
Baildon moor		1				
Dobrudden 10		1				
Dobrudden 02			1			
Dobrudden 04			1			
Low Plain 19		1				
Low Plain 16	1					
Haystacks	1					
Pancake Ridge 03	1					
Planets Rock	1					1
Pancake Ridge 02	1					
Cow and Calf 10				1		
Ilkley Moor 1			1			
Cow and Calf 05			1			
Ilkley Moor 2			1			
Idol Stone 01				1		
Ilkley Moor 3				1		
Idol Stone 02				1		



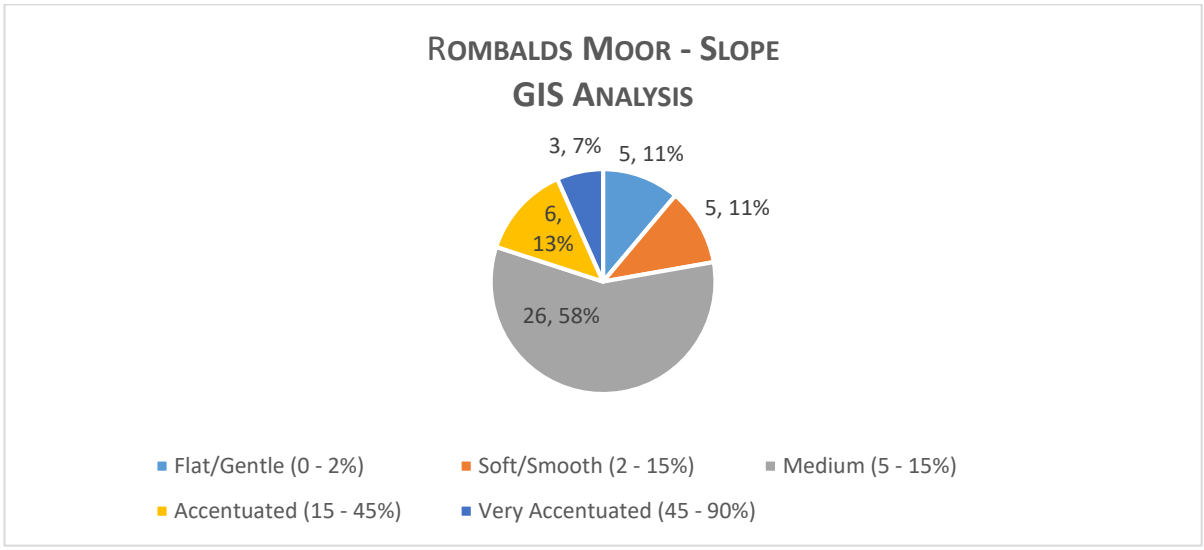
Graphic 66 Summary of slope pereferences in Rombalds Moorm according to fieldwork observations.

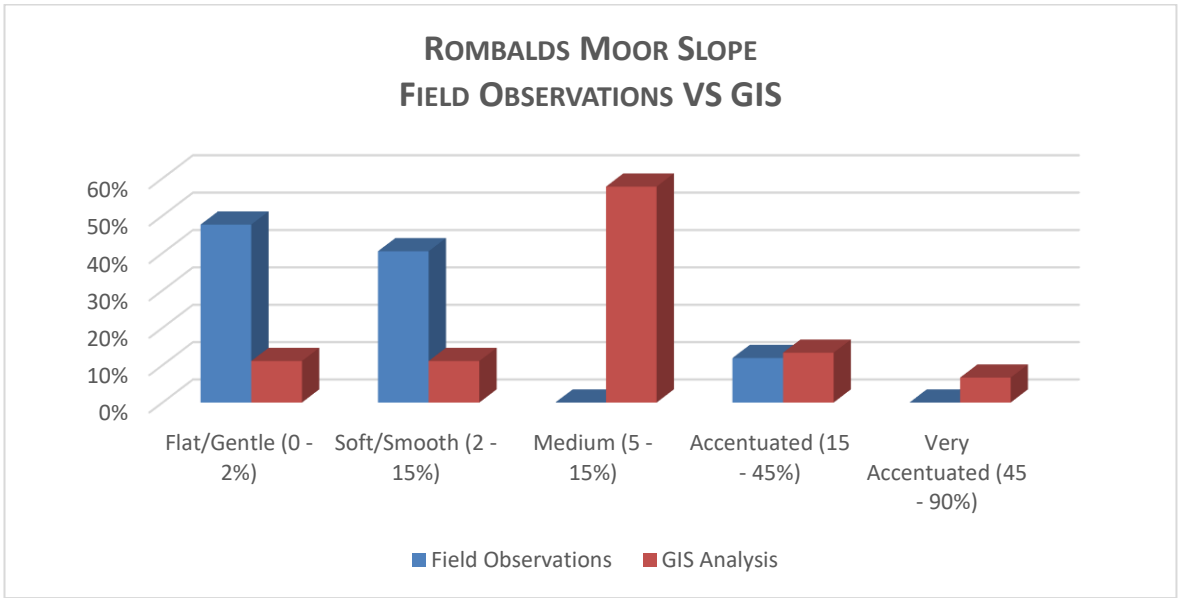
Rombalds Moor: Slope (GIS Analysis)

Table 71 Slope analysis in Rombalds Moor. Results according to GIS analysis.

SLOPE (GIS ANALYSIS)					
	FLAT/GENTLE (0 - 2%)	SOFT/SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENTUATED (15 - 45%)	VERY ACCENTUATED (45 - 90%)
Baildon Moor 1			1		
Low Plain 23			1		
Low Plain 08			1		
Baildon Moor 2		1			
Low Plain 31		1			
Low Plain 06			1		
Low Plain 02			1		
Baildon moor			1		
Dobrudden 10	1				
Dobrudden 02			1		
Dobrudden 04			1		
Low Plain 19		1			
Low Plain 16	1				
Haystacks	1				
Pancake Ridge 03			1		
Planets Rock				1	
Pancake Ridge 02				1	
Cow and Calf 10				1	
Ilkley Moor 1			1		
Cow and Calf 05			1		
Ilkley Moor 2			1		
Idol Stone 01			1		
Ilkley Moor 3			1		
Idol Stone 02		1			
Idol Stone 03			1		
Idol Stone 04				1	
Ilkley Moor 4			1		
Whaleback Stone				1	
Ilkley Moor 5			1		
Pancake Stone					1
Hangingstones Rock					1
Backstone Beck 1			1		
Backstone Beck 2			1		
Backstone Beck 3	1				
Pepperpot					1
White Wells 05			1		
Willy Hall's Wood			1		

Barmishaw	1			
Badger Rock 1		1		
Badger Rock 2			1	
Backstone Beck 04				1
GreenCrag11			1	
GreenCrag14			1	
GreenCrag16			1	
PancakeRidge07			1	





Graphic 67 Contrasting field observations and GIS in Rombalds Moor

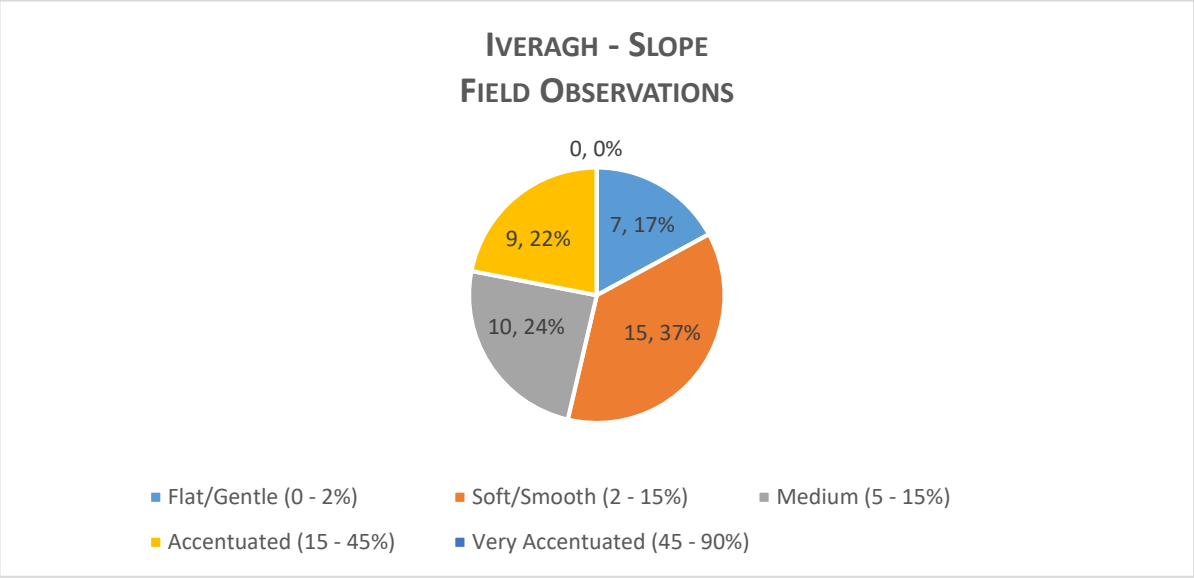
Iveragh Peninsula: Slope (Field Observations)

Table 72 Iveragh's slope analysis and results according to field observations.

SLOPE (FIELD OBSERVATIONS)					
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENT. (15 - 45%)	VERY ACCENTUAT. (45 - 90%)
Ballynahow Beg (262)					
Carhoonmeengar East (364-2009)					
Coolnaharragill Upper (268)				1	
Coomasaharn 2 (270)					
Coomasaharn 6 (274)					
Coomasaharn 9 (277)					
Derreeny 1 (285)		1			
Derrenny 3 (285 A)		1			
Derreeny 5 (391-2009)			1		
Derreeny 7 (288)		1			
Derreeny 8 (394-2009)		1			
Derreeny 11 (395-2009)			1		
Derrynablaha 1 (297)			1		
Derrynablaha 3 (299)			1		
Derrynablaha 4 (302)			1		
Derrynablaha 7 (303)			1		
Derrynablaha 8 (304)			1		
Derrynablaha 10 (306)				1	
Derrynablaha 11 (307)				1	
Derrynablaha 14 (310)			1		
Derrynablaha 15 (311)	1				
Derrynablaha 19 (314)		1			
Derrynablaha 22 (317)				1	
Derrynablaha 22A (318)				1	

Derrynablaha 23 (319)				1
Derrynablaha 24 (320)				1
Derrynablaha 25 (321)				1
Dromtine (323)			1	
Gortnagulla (329)		1		
Kealduff Upper 1 (330)		1		
Kealduff Upper 2 (331)	1			
Kealduff Upper 4 (333)		1		
Kealduff Upper 5 (334)		1		
Kealduff Upper 8 (337)		1		
Kealduff Upper 9 (338)	1			
Kealduff Upper 13 (342)		1		
Kealduff Upper 11 (KE071)	1			
Kealduff Upper 10 (339)	1			
Kealduff Upper 12 (336)	1			
Kealduff Upper 14 (346)	1			
Liss (353)		1		
Rossacoosane (358)				1
Tullakeel 1 (375)		1		
Tullakeel 2 (376)		1		
Tullakeel 2B (377)		1		
Derreeny 10 (KW - F)			1	
Ballynahow Beg (262)				
Carhoonmeengar East (364-2009)				
Coolnaharragill Upper (268)				1
Coomasaharn 2 (270)				
Coomasaharn 6 (274)				
Coomasaharn 9 (277)				

Derreeny 1 (285)	1		
Derrenny 3 (285 A)	1		
Derreeny 5 (391-2009)		1	
Derreeny 7 (288)	1		
Derreeny 8 (394-2009)	1		
Derreeny 11 (395-2009)		1	
Derrynablaha 1 (297)		1	
Derrynablaha 3 (299)		1	
Derrynablaha 4 (302)		1	
Derrynablaha 7 (303)		1	
Derrynablaha 8 (304)		1	
Derrynablaha 10 (306)			1
Derrynablaha 11 (307)			1



Graphic 68 Slope preferences in Iveragh, according to field observations.

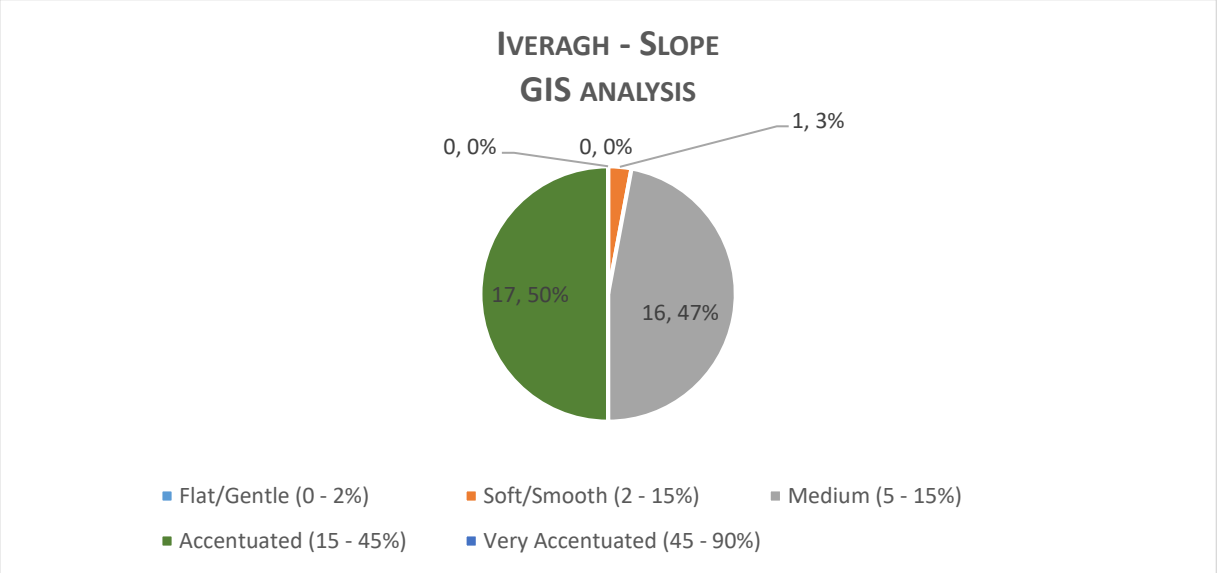
Iveragh Peninsula: Slope (GIS Analysis)

Table 73 Iveragh's slope analysis according to GIS.

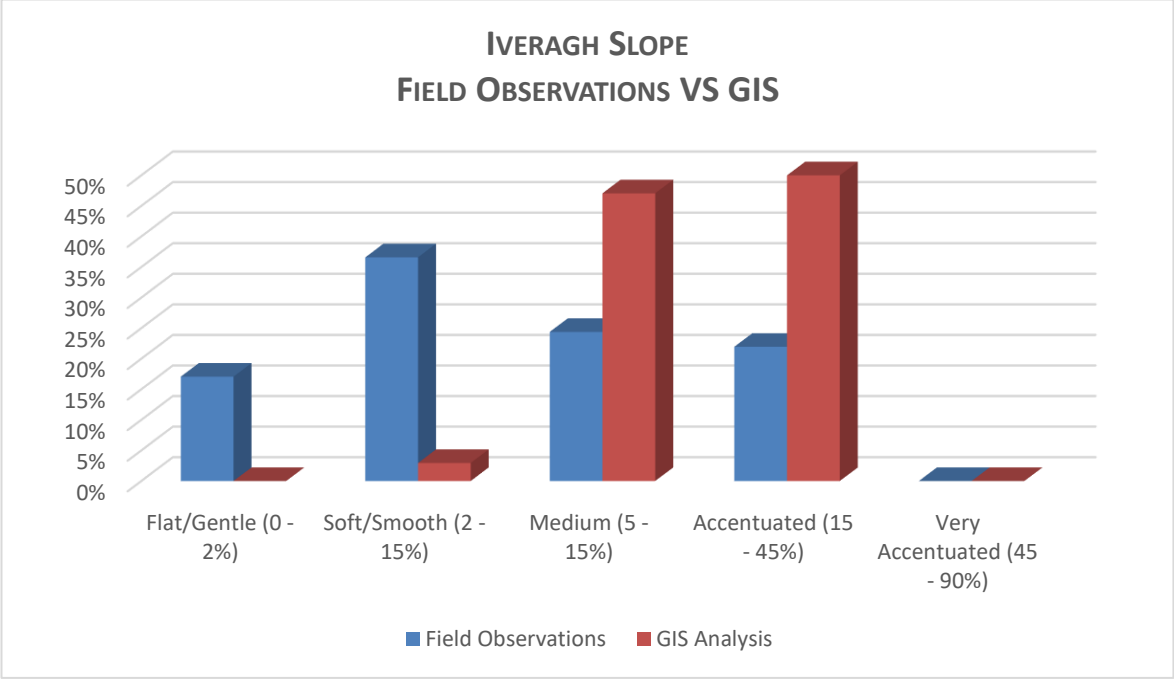
SLOPE (GIS ANALYSIS)					
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENTUAT. (15 - 45%)	VERY ACCENTUAT. (45 - 90%)
Ballynahow Beg (262)			1		
Carhoonmeengar East (364-2009)			1		
Coolnaharragill Upper (268)			1		
Coomasaharn 2 (270)			1		
Coomasaharn 6 (274)				1	
Coomasaharn 9 (277)			1		
Derreeny 1 (285)				1	
Derrenny 3 (285 A)				1	
Derreeny 5 (391-2009)				1	
Derreeny 7 (288)			1		
Derreeny 8 (394-2009)				1	
Derreeny 11 (395-2009)				1	
Derrynablaha 1 (297)				1	
Derrynablaha 3 (299)				1	
Derrynablaha 4 (302)				1	
Derrynablaha 7 (303)				1	
Derrynablaha 8 (304)			1		
Derrynablaha 10 (306)				1	
Derrynablaha 11 (307)				1	
Derrynablaha 14 (310)				1	
Derrynablaha 15 (311)				1	
Derrynablaha 19 (314)				1	
Derrynablaha 22 (317)				1	
Derrynablaha 22A (318)			1		

Derrynablaha 23 (319)		1	
Derrynablaha 24 (320)		1	
Derrynablaha 25 (321)		1	
Dromtine (323)			1
Gortnagulla (329)		1	
Kealduff Upper 1 (330)		1	
Kealduff Upper 2 (331)		1	
Kealduff Upper 4 (333)		1	
Kealduff Upper 5 (334)		1	
Kealduff Upper 8 (337)	1		
Kealduff Upper 9 (338)		1	
Kealduff Upper 13 (342)		1	
Kealduff Upper 11 (KE071)		1	
Kealduff Upper 10 (339)		1	
Kealduff Upper 12 (336)			1
Kealduff Upper 14 (346)		1	
Liss (353)			1
Rossacoosane (358)			1
Tullakeel 1 (375)			1
Tullakeel 2 (376)		1	
Tullakeel 2B (377)			1
Derreeny 10 (KW - F)			1
Ballynahow Beg (262)			1
Carhoonmeengar East (364-2009)			1
Coolnaharragill Upper (268)			1
Coomasaharn 2 (270)			1
Coomasaharn 6 (274)		1	
Coomasaharn 9 (277)			1

Derreeny 1 (285)		1
Derrenny 3 (285 A)		1
Derreeny 5 (391-2009)		1
Derreeny 7 (288)		1
Derreeny 8 (394-2009)		1
Derreeny 11 (395-2009)	1	
Derrynablaha 1 (297)	1	
Derrynablaha 3 (299)	1	
Derrynablaha 4 (302)	1	
Derrynablaha 7 (303)		1
Derrynablaha 8 (304)	1	
Derrynablaha 10 (306)	1	
Derrynablaha 11 (307)	1	



Graphic 69 Slope preferences for Iveragh according to GIS analysis.



Graphic 70 Contrasting field observations and GIS results in Iveragh.

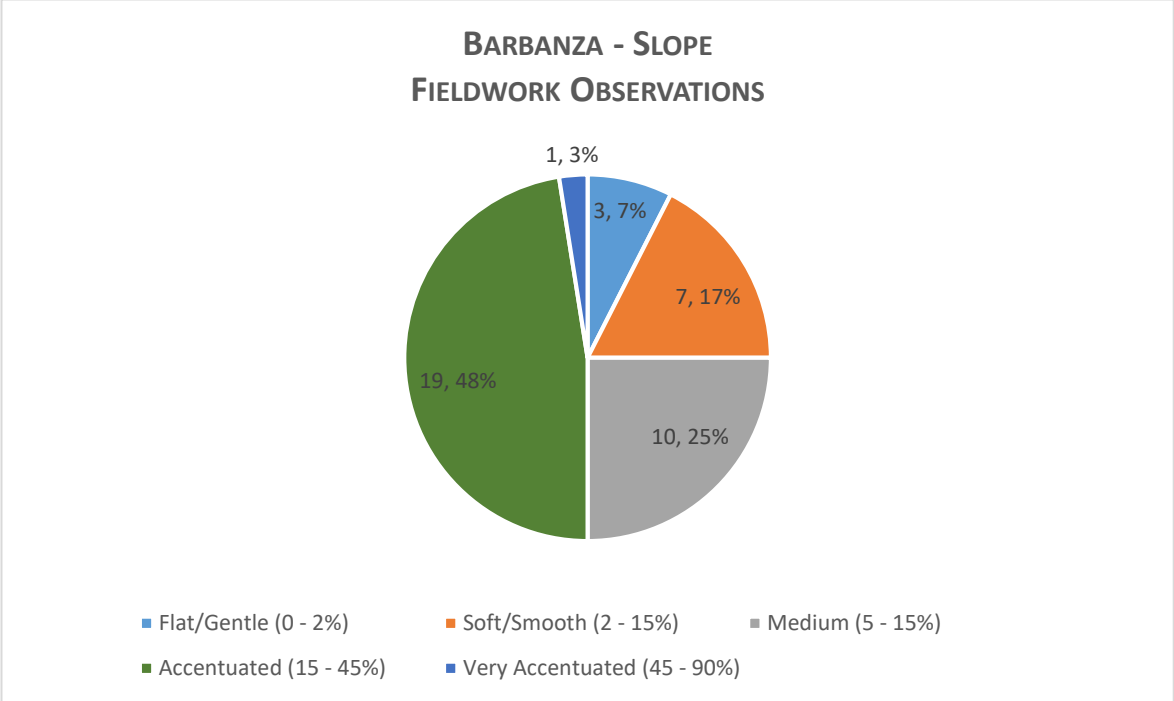
Barbanza Peninsula: Slope (Field Observations)

Table 74 Results of field observations regarding slope in Barbanza peninsula.

SLOPE (FIELD OBSERVATIONS)					
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENT. (15 - 45%)	VERY ACCENT. (45 - 90%)
Area I - A Picota			1		
Area I - Outeiro da Malda I				1	
Area I - Outeiro da Malda II				1	
Area V - A Tarela					
Area VI- Monte Dordo I				1	
Area VI - A Buguinha Grande				1	
Area VII - Fontandurin I		1			
Area VII – Gurita I					
Area VII - Gurita II		1			
Area VII - Gurita IV		1			
ES Area VII - Igrexa				1	
Area VII - Lamatrema		1			
Area VII - Lamela I		1			
Area VII - Pedravila I		1			
Area VII - Petroglifo de Barona		1			
Area VIII - Agro das Cartas II			1		
Area VIII - Calderramos I			1		

Area VIII - Abrigo de Calderramos III			1	
Area VIII - Abrigo de Calderramos IV			1	
Area IX - Cova da Louza I			1	
Area IX - Cova da Louza IVa			1	
Area IX - Cova da Loza IVb			1	
Area IX - Insuela		1		
Area X - Campo Grande IV		1		
Area X - Espiñaredo II			1	
Area X - Espiñaredo V		1		
Area - Feáns VII				1
Area X - Laxe da Sartaña			1	
Area X - Légoa Seca V			1	
Area X - Portela de Gourís			1	
Area X - Rego do Corzo I			1	
Area X - Rego do Corzo III			1	
Area XI - Beira da Costa I			1	
Area XI - Beira da Costa IV			1	
Area XI - O Castro I		1		
Area XI - O Castro II		1		
Area XI - O Castro IV		1		
Area XII - Cacharelas		1		
Area XII - A Lagoa II	1			

Area XII - A Lagoa III	1			
Basoñas	1			
Area I - A Picota			1	
Area I - Outeiro da Malda I				1
Area I - Outeiro da Malda II				1
Area V - A Tarela				
Area VI- Monte Dordo I				1
Area VI - A Buguinha Grande				1
Area VII - Fontandurin I		1		
Area VII - Gurita I		0		1
Area VII - Gurita II		1		
Area VII - Gurita IV		1		
Area VII - Igrexa				1
Area VII - Lamatrema		1		
Area VII - Lamela I		1		
Area VII - Pedravila I		1		



Graphic 71 Preferences regarding slope location of the rocks in Barbanza Peninsula.

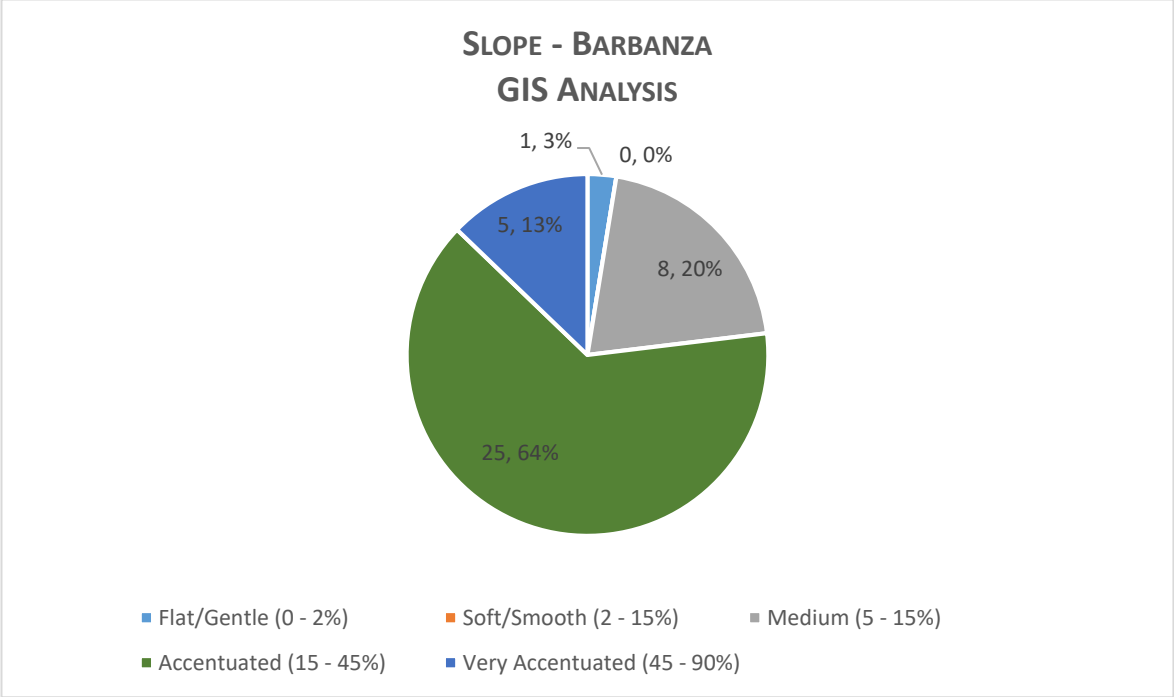
Barbanza Peninsula: Slope (GIS Analysis)

Table 75 Results of GIS calculations regarding slope analysis.

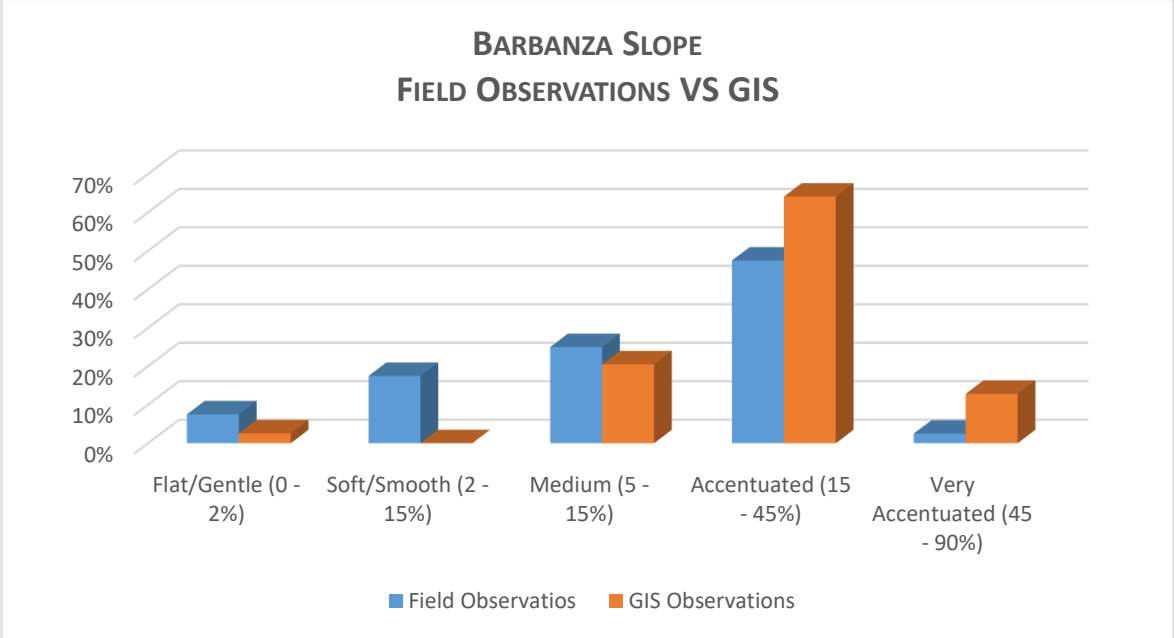
SLOPE (FIELD OBSERVATIONS)					
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENTUATED (15 - 45%)	VERY ACCENTUATED (45 - 90%)
Area I - A Picota			1		
Area I - Outeiro da Malda I				1	
Area I - Outeiro da Malda II				1	
Area V - A Tarela				1	
Area VI- Monte Dordo I					1
Area VI - A Buguinha Grande				1	
Area VII - Fontandurin I			1		
Area VII – Gurita I					1
Area VII - Gurita II				1	
Area VII - Gurita IV					1
ES Area VII - Igrexa					1
Area VII - Lamatrema				1	
Area VII - Lamela I				1	
Area VII - Pedravila I				1	
Area VII - Petroglifo de Barona	1				
Area VIII - Agro das Cartas II			1		
Area VIII - Calderramos I				1	
Area VIII - Abrigo de Calderramos III				1	

Area VIII - Abrigo de Calderramos IV		1	
Area IX - Cova da Louza I		1	
Area IX - Cova da Louza IVa		1	
Area IX - Cova da Loza IVb		1	
Area IX - Insuela	1		
Area X - Campo Grande IV		1	
Area X - Espiñaredo II		1	
Area X - Espiñaredo V		1	
Area - Feáns VII			1
Area X - Laxe da Sartaña		1	
Area X - Légoa Seca V		1	
Area X - Portela de Gourís	1		
Area X - Rego do Corzo I		1	
Area X - Rego do Corzo III	1		
Area XI - Beira da Costa I		1	
Area XI - Beira da Costa IV		1	
Area XI - O Castro I	1		
Area XI - O Castro II		1	
Area XI - O Castro IV		1	
Area XII - Cacharelas		1	
Area XII - A Lagoa II			
Area XII - A Lagoa III			

Basoñas	1		
Area I - A Picota	1		
Area I - Outeiro da Malda I		1	
Area I - Outeiro da Malda II		1	
Area V - A Tarela		1	
Area VI- Monte Dordo I			1
Area VI - A Buguinha Grande		1	
Area VII - Fontandurin I	1		
Area VII - Gurita I			1
Area VII - Gurita II		1	
Area VII - Gurita IV			1
Area VII - Igrexa			1
Area VII - Lamatrema		1	
Area VII - Lamela I		1	
Area VII - Pedravila I		1	



Graphic 72 GIS results for the assessment of slope patterns in Barbanza.



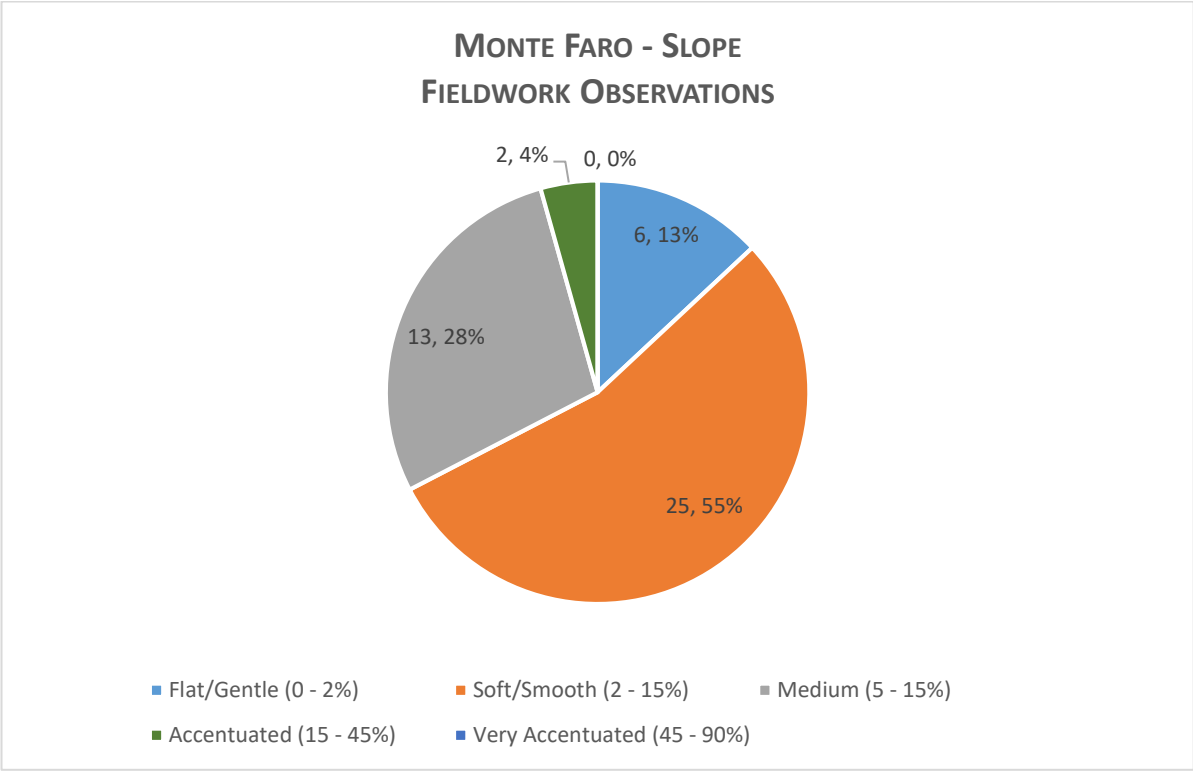
Graphic 73 Contrasting field observations and GIS analysis in Barbanza.

Monte Faro: Slope (Field Observations)

Table 76 Field observations regarding the location of the rocks on particular parts of the slope.

	SLOPE (FIELD OBSERVATIONS)				
Esc.1.Rock 1	**FLAT/ GENTLE (0 - 2%)**	**SOFT/ SMOOTH (2 - 15%)**	**MEDIUM (5 - 15%)**	**ACCENT. (15 - 45%)**	**V. ACCENT. (45 - 90%)**
Esc.1.Rock2		1			
Esc.1.Rock 3		1			
Esc.1 – Rock 4	1				
Esc.1. Rock 5			1		
Esc.1.Rock 6			1		
Esc.5.Rock 1		1			
Esc.5.Rock 2			1		
Esc.5. Rock 3			1		
Esc.5. Rock 4			1		
Esc.5. Rock 5			1		
Esc.5.Rock 6			1		
Esc.6.Rock 1			1		
Esc.6.Rock 2		1			
Esc.6.Rock 3		1			
Esc.6.Rock 4		1			
Esc.6.Rock 5		1			
Esc.6.Rock 6		1			
Esc.6.Rock 7		1			
FF. Rock 1		1			
FF. Rock 2		1			
FF. Rock 3		1			
FV. Rock 1		1			
FV. Rock 2	1				
FV. Rock 3	1				
Monte da Laje	1				
MdF1. Rock 1			1		

MdF1. Rock 2				1
MdF1. Rock 3				1
MdF1. Rock 4			1	
MdF2. Rock 1			1	
MdF2. Rock 2		1		
MdF2. Rock 4		1		
MdF2. Rock 5		1		
MdF2. Rock 6		1		
MdF2. Rock 7		1		
MdF2. Rock 8		1		
MdF2. Rock 9		1		
PR. Rock 1		1		
PR. Rock 2		1		
PR. Rock 3		1		
PR. Rock 10		1		
SO. Rock 1		1		
SO. Rock 2	1			
ST. Rock 1	1			
ST. Rock 2			1	
Tapada do Ouzão			1	

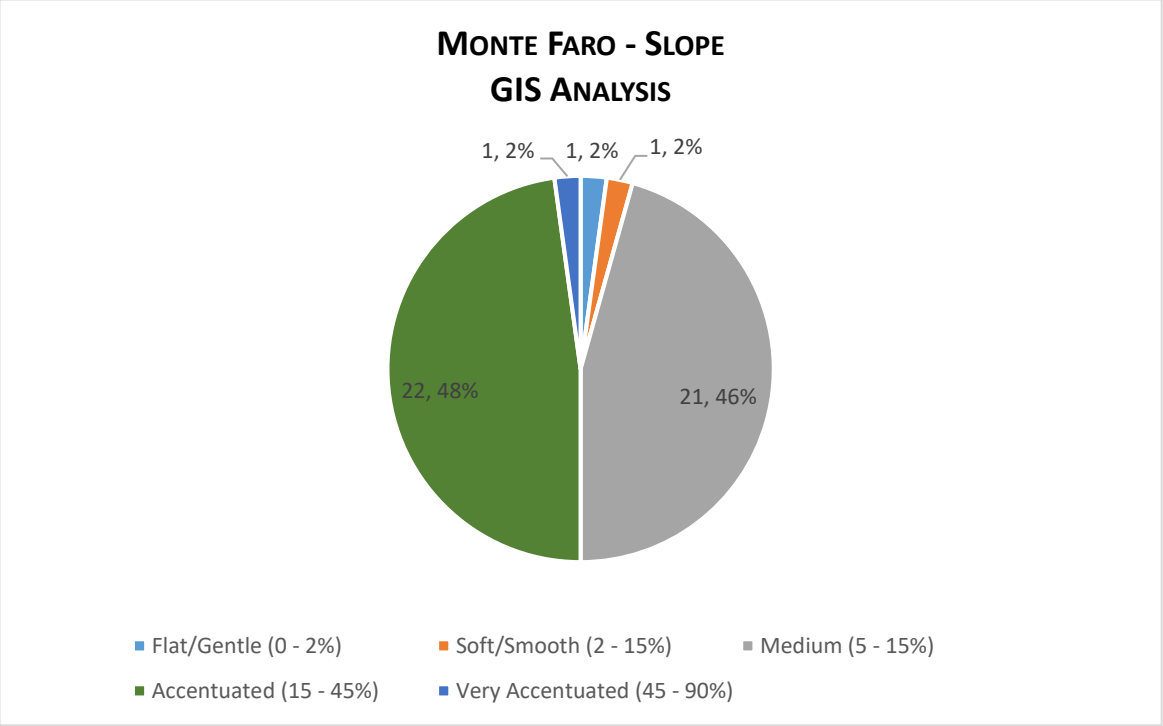


Graphic 74 Summary of slope preferences for Monte Faro, according to fieldwork observations.

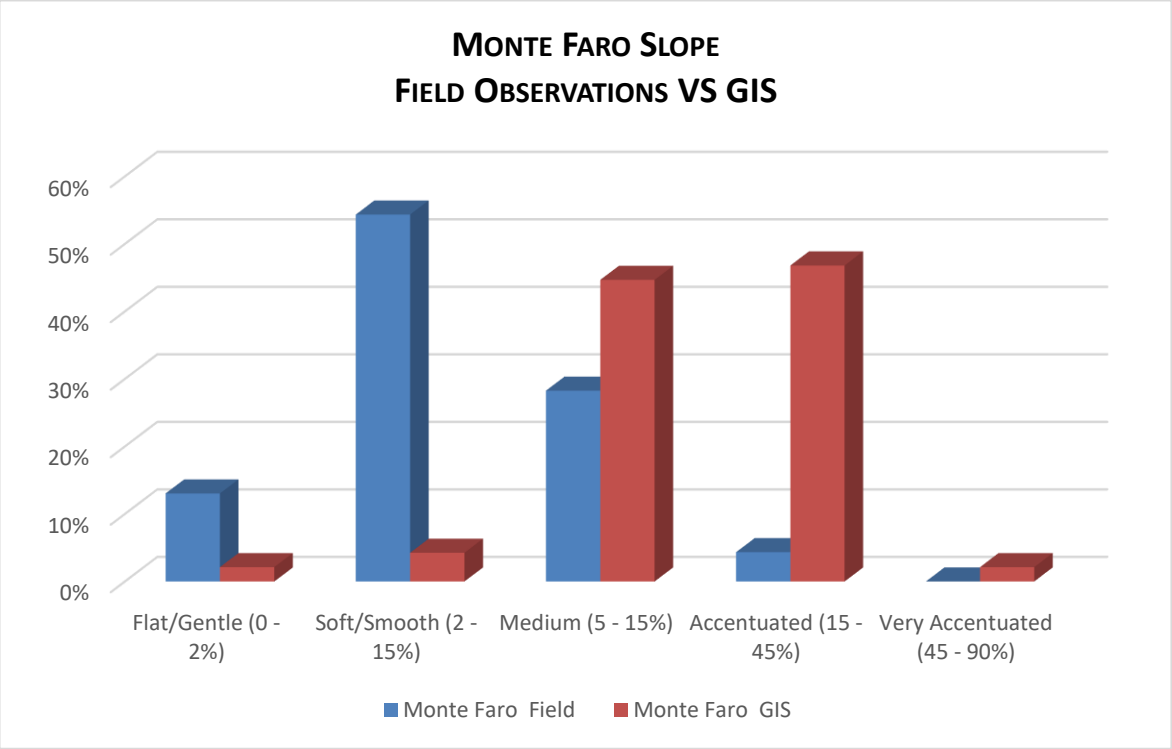
Table 77 Slope analysis with GIS.

	SLOPE (FIELD OBSERVATIONS)				
	FLAT/ GENTLE (0 - 2%)	SOFT/ SMOOTH (2 - 15%)	MEDIUM (5 - 15%)	ACCENT. (15 - 45%)	V. ACCENT. (45 - 90%)
Esc.1.Rock 1				1	
Esc.1.Rock2				1	
Esc.1.Rock 3				1	
Esc.1 – Rock 4				1	
Esc.1. Rock 5				1	
Esc.1.Rock 6				1	
Esc.5.Rock 1				1	
Esc.5.Rock 2				1	
Esc.5. Rock 3				1	
Esc.5. Rock 4			1		
Esc.5. Rock 5				1	
Esc.5.Rock 6			1		
Esc.6.Rock 1				1	
Esc.6.Rock 2				1	
Esc.6.Rock 3				1	
Esc.6.Rock 4				1	
Esc.6.Rock 5			1		
Esc.6.Rock 6			1		
Esc.6.Rock 7			1		
FF. Rock 1			1		
FF. Rock 2			1		
FF. Rock 3			1		
FV. Rock 1			1		
FV. Rock 2			1		
FV. Rock 3			1		
Monte da Laje				1	

MdF1. Rock 1				1	
MdF1. Rock 2				1	
MdF1. Rock 3					1
MdF1. Rock 4				1	
MdF2. Rock 1				1	
MdF2. Rock 2				1	
MdF2. Rock 4			1		
MdF2. Rock 5					
MdF2. Rock 6		1			
MdF2. Rock 7			1		
MdF2. Rock 8			1		
MdF2. Rock 9			1		
PR. Rock 1			1		
PR. Rock 2			1		
PR. Rock 3				1	
PR. Rock 10			1		
SO. Rock 1				1	
SO. Rock 2			1		
ST. Rock 1			1		
ST. Rock 2	1				
Tapada do Ozão					

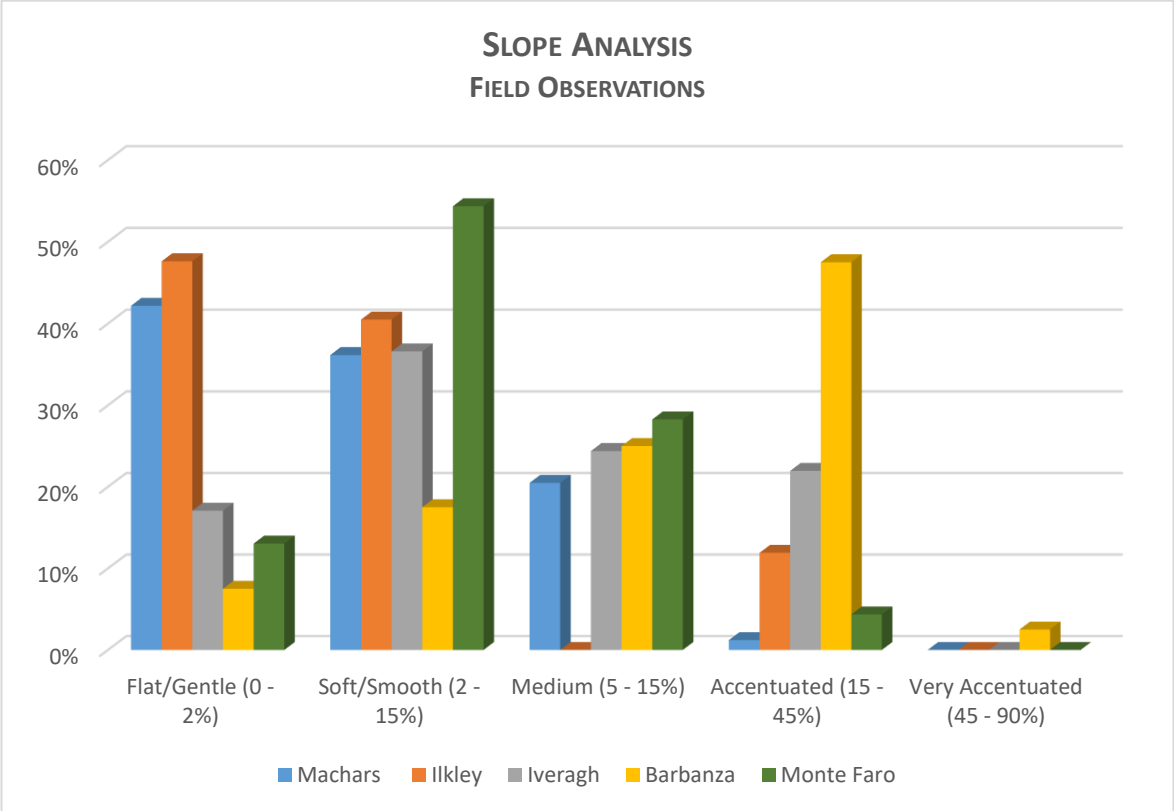


Graphic 75 Summary of slope preferences in Monte Faro according to GIS analysis.

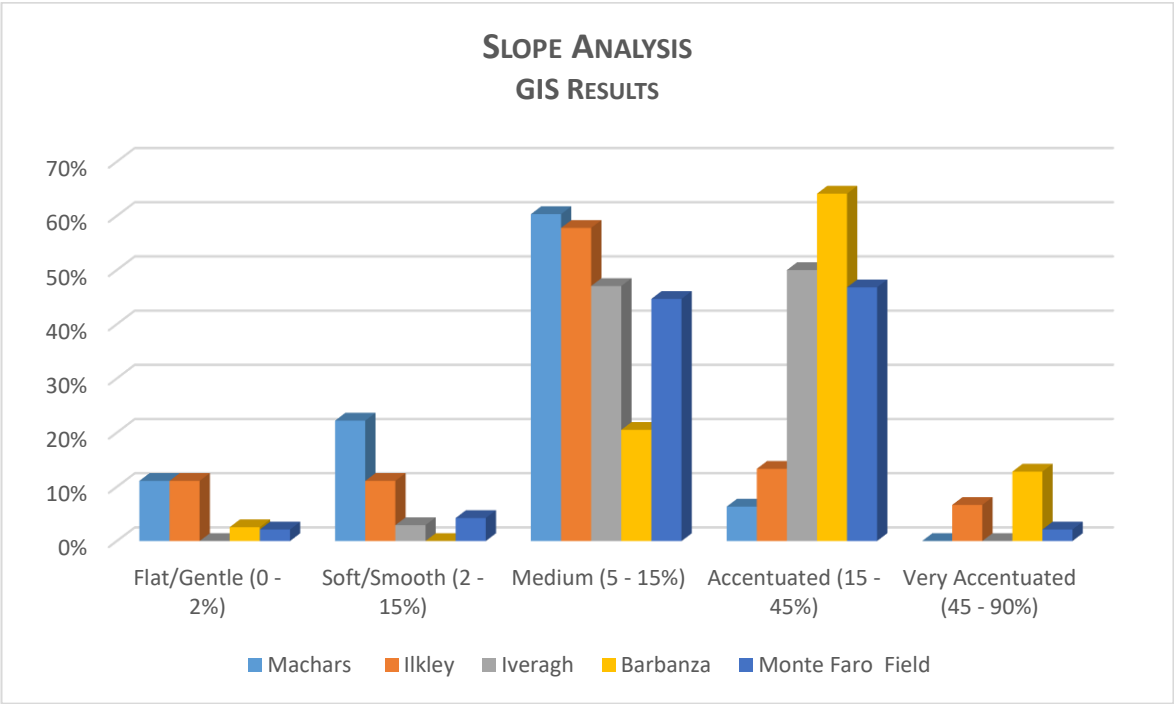


Graphic 76 Contrasting field observations with GIS in Monte Faro.

Slope Comparisons



Graphic 77 Comparison of results from field observations in all study areas.



Graphic 78 Comparison of results between regions, obtained through GIS.

The Machars (Scotland)

Table 78 Results of fieldwork observations regarding visibility patterns from carved rocks in the Machars.

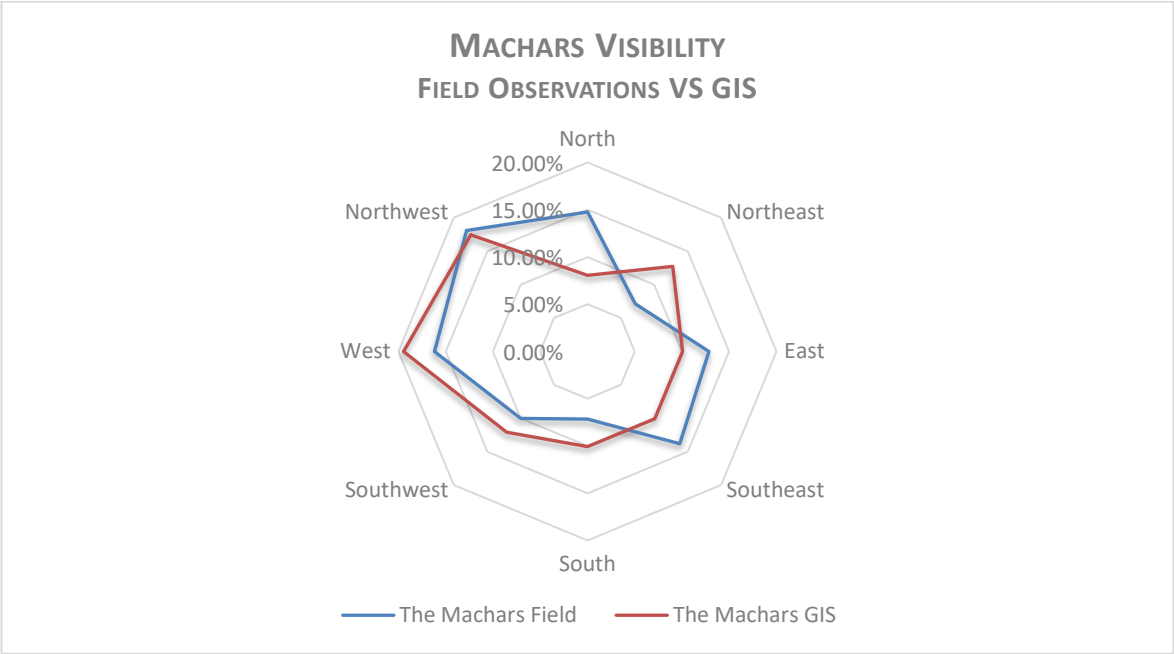
	VISIBILITY (FIELDWORK)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Boyach Farm		1	1					
Gallows Outon 1	1				1			
Gallows Outon 2						1		
Drummoral	1	1					1	
Glasserton Mains 1						1	1	
Glasserton Mains 2						1		
Knock 1A							1	1
Knock 1B							1	1
Knock 2B								1
Knock 3A					1			1
Knock 3B								1
Knock 3C								1
Knock 3D								1
Knock 3F								1
Knock 4							1	1
Knock 5								1
Blairbuy 1								1
Blairbuy 2							1	1
Blairbuy 3			1					
Blairbuy 4AB							1	
Blairbuy 4C							1	
Blairbuy 5					1		1	
Blairbuy 6A							1	1
Blairbuy 6B								1
Blairbuy 7A								1
Blairbuy 7B								1
Big Balcraig 1	1	1						
Big Balcraig 2		1			1			
Big Balcraig 3ABC								1
Big Balcraig 4B								1
Big Balcraig 5 JVT							1	
Drumtroddan 1.1	1		1	1		1		1
Drumtroddan 1.2	1		1	1		1		1
Drumtroddan 1.3	1		1	1		1		1
Drumtroddan 1.4	1		1	1		1		1
Drumtroddan 1.5	1		1	1		1		1
Drumtroddan 1.6	1		1	1		1		1
Drumtroddan 1.6A	1		1	1		1		1

Drumtroddan 1.7	1		1	1		1		1
Drumtroddan 1.8	1		1	1		1		1
Drumtroddan 1.9	1		1	1		1		1
Drumtroddan 1.10	1		1	1		1		1
Drumtroddan 1.11	1		1	1		1		1
Drumtroddan 1.12	1		1	1		1		1
Drumtroddan 2A	1			1			1	
Drumtroddan 2B	1			1			1	
Drumtroddan 2C	1			1			1	
Drumtroddan 2D	1			1			1	
Drumtroddan 3A	1			1			1	
Drumtroddan 3B	1			1			1	
Drumtroddan 3C	1			1			1	
Drumtroddan 3D	1			1			1	
Drumtroddan 4	1			1	1			
Drumtroddan 5	1			1			1	
Penkiln 1A					1		1	1
Penkiln 1B					1		1	1
Penkiln 2A					1		1	1
Penkiln 2B					1		1	1
Penkiln 4A	1				1		1	
Penkiln 4B	1				1		1	
Culscadden 1A					1		1	
Culscadden 1B					1		1	
North Balfern		1	1					
Broughton Mains 1A		1		1				1
Brouhgton Mains 1B		1		1				1
Broughton Mains 1C		1		1				1
Broughton Mains 2A		1			1	1		
Broughton Mains 2B		1			1	1		
Claunch 1 (A & B)		1	1					
Claunch 2		1						
Claunch 3			1					
Claunch 4		1	1					
Claunch 5		1	1					
Claunch 6		1	1					
Claunch 7 JVT			1	1				
Claunch 8 JVT			1	1				
Claunch 10 JVT			1	1				
Culnoag 1A	1		1				1	
Culnoag 1B	1		1				1	
Culnoag 1C	1		1				1	

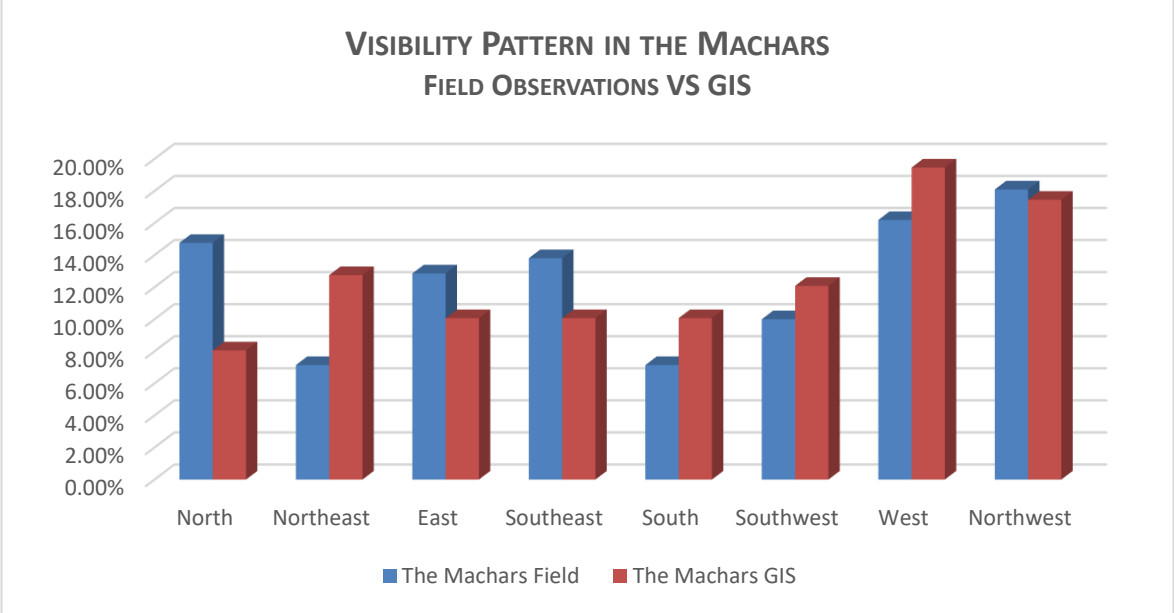
Table 79 Results of GIS calculations regarding visibility patterns in the Machars.

	VISIBILITY (GIS)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Boyach Farm		1	1	1				
Gallows Outon 1	1		1		1			
Gallows Outon 2						1		
Drummoral					1			
Glasserton Mains 1		1				1		
Sc Glasserton Mains 2		1		1				
Sc Knock 1A						1	1	
Sc Knock 1B						1	1	
Sc Knock 2B		1					1	
Sc Knock 3A		1						
Sc Knock 3B		1					1	
Sc Knock 3C		1					1	
Sc Knock 3D		1					1	
Sc Knock 3F		1					1	
Sc Knock 4		1					1	
Sc Knock 5								
Sc Blairbuy 1						1		
Sc Blairbuy 2						1		
Sc Blairbuy 3	1		1	1				
Sc Blairbuy 4AB							1	1
Sc Blairbuy 4C					1		1	1
Sc Blairbuy 5			1	1	1		1	
Sc Blairbuy 6A	1		1				1	
Sc Blairbuy 6B								
Sc Blairbuy 7A	1						1	1
Sc Blairbuy 7B				1	1		1	1
Sc Big Balcraig 1	1					1	1	1
Sc Big Balcraig 2					1		1	
Sc Big Balcraig 3ABC					1		1	
Sc Big Balcraig 4B		1			1		1	
Sc Big Balcraig 5		1			1		1	
Sc Drumtroddan 1				1				1
Sc Drumtroddan 2				1				1
Sc Drumtroddan 3				1				1
Sc Drumtroddan 4				1				1
Sc Drumtroddan 5				1				1
Sc Penkiln 1A								
Sc Penkiln 1B								
Sc Penkiln 2A					1	1	1	
Sc Penkiln 2B								
Sc Penkiln 3	1						1	1

Sc Penkiln 4A						1	1	1
Sc Penkiln 5	1	1	1					
Sc Penkiln 6	1	1	1					
Sc Penkiln 7	1	1	1					
Sc Culscadden 1A								1
Sc Culscadden 1B								1
Sc North Balfern	1		1	1				
Sc Broughton Mains 1A				1				
Sc Broughton Mains 2A								
Sc Broughton Mains 2B								
Sc Claunch 1			1					
Sc Claunch 1A					1		1	1
Sc Claunch 2		1			1	1		1
Sc Claunch 3			1	1				1
Sc Claunch 4			1	1				1
Sc Claunch 5			1	1				1
Sc Claunch 6			1			1	1	
Sc Claunch 7					1	1		
Sc Claunch 8		1				1		1
Sc Claunch 10		1				1		1
Sc Culnoag		1	1					
Eggerness 1						1	1	1
Eggerness 2						1	1	1
Eggerness 4	1				1		1	
Eggerness 5	1				1	1	1	1
Eggerness 6								1
Eggerness 7						1	1	1



Graphic 79 Graphic illustrating the visibility patterns from the carved rocks assessed through GIS analysis and compared to fieldwork observations.



Graphic 80 Visibility patterns from the carved rocks assessed through GIS analysis and compared to fieldwork observations.

Rombalds Moor (England)

Table 80 Results of fieldwork observations regarding visibility patterns in Rombalds Moor.

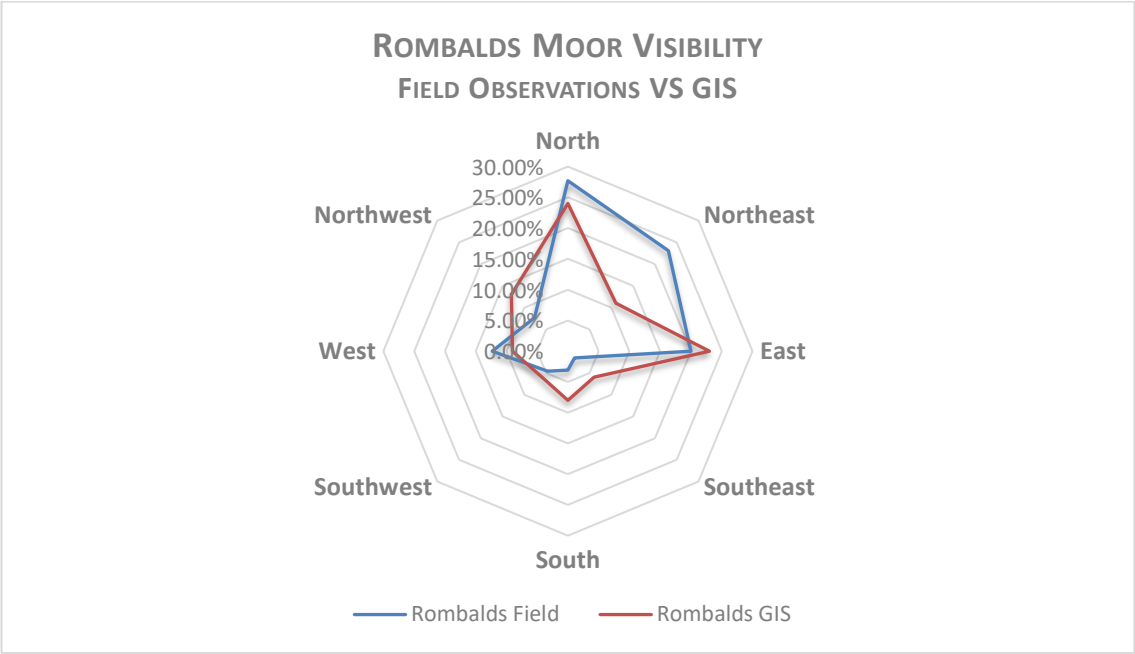
	VISIBILITY (FIELDWORK)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
1.Baildon Moor								1
2.Low Plain 23							1	
3.Low Plain 08	1						1	
4. Baildon Moor 2							1	
5.Low Plain 31	1							
6.Low Plain 06							1	
7.Low Plain 02			1		1			
8.Baildon moor						1		
9.Dobrudden 10						1		
10.Dobrudden 02						1	1	
11.Dobrudden 04	1				1			
12.Low Plain 19							1	
13.Low Plain 16							1	
14. Haystacks	1							
15.Pancake Ridge 03							1	1
16. Planets Rock	1	1						1
17.Pancake Ridge 02	1		1					
18.Cow and Calf 10	1	1	1					
19.Ilkley Moor 1			1					
20.Cow and Calf 05			1					
21. Ilkley Moor 2			1					
22.Idol Stone 01		1						
23.Ilkley Moor 3		1						
24.Idol Stone 02		1						
25.Idol Stone 03			1					
26.Idol Stono4	1	1						
27. Ilkley Moor 4	1							

28. Whaleback Stone	1					
29. Ilkley Moor 5		1				
30.Pancake Stone			1			
31.Hangingstones Rock	1					
32.Backstone Beck 1	1					
33.Backstone Beck 2			1			
34.Backstone Beck 3		1				
35. Pepperpot		1				
36.White Wells 05		1				
37.Willy Hall's Wood	1					
38.Barmishaw	1					
39.Badger Rock 1		1				1
40.Badger Rock 2	1					1
41.Backstone Beck 04		1	1			
42.GreenCrag11	1	1	1			
43.GreenCrag14	1	1	1			
44.GreenCrag16		1	1	1		
45.PancakeRidge07	1					

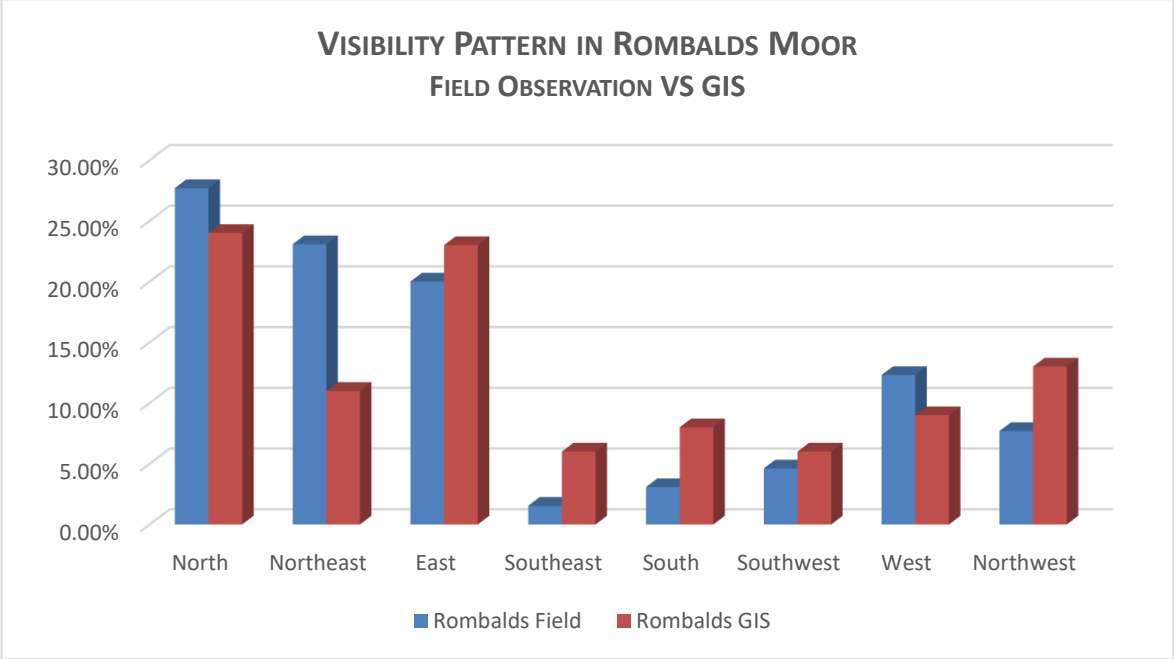
Table 81 Results of fieldwork observations regarding visibility patterns in Rombalds Moor.

	VISIBILITY (GIS)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
1.Baildon Moor	1						1	1
2.Low Plain 23	1							1
3.Low Plain 08				1				
4. Baildon Moor 2				1	1			
5.Low Plain 31				1	1			
6.Low Plain 06	1		1			1	1	1
7.Low Plain 02			1		1	1		
8.Baildon moor			1		1			
9.Dobrudden 10			1		1			
10.Dobrudden 02			1				1	
11.Dobrudden 04			1				1	
12.Low Plain 19				1			1	1
13.Low Plain 16				1			1	1
14. Haystacks	1					1		
15.Pancake Ridge 03	1					1		
16. Planets Rock	1							
17.Pancake Ridge 02	1		1					
18.Cow and Calf 10	1	1	1					
19.Ilkley Moor 1		1			1			
20.Cow and Calf 05		1			1			
21. Ilkley Moor 2		1			1			
22.Idol Stone 01	1		1					
23.Ilkley Moor 3	1		1					
24.Idol Stone 02	1		1					
25.Idol Stone 03	1		1					
26.Idol Stono4	1		1					
27. Ilkley Moor 4	1		1					
28. Whaleback Stone	1		1					
29. Ilkley Moor 5	1		1					

30.Pancake Stone	1	1					
31.Hangingstones Rock	1	1	1			1	1
32.Backstone Beck 1							1
33.Backstone Beck 2							1
34.Backstone Beck 3							1
35. Pepperpot	1	1	1			1	1
36.White Wells 05	1	1	1			1	1
37.Willy Hall's Wood	1	1					1
38.Barmishaw		1	1				
39.Badger Rock 1					1		
40.Badger Rock 2			1				
41.Backstone Beck 04			1				
42.GreenCrag11	1						
43.GreenCrag14	1						
44.GreenCrag16	1	1	1	1			1
45.PancakeRidge07					1		



Graphic 81 Visibility patterns in Rombalds Moor, assessed during fieldwork.



Graphic 82 Comparison between visibility analysis results obtained through fieldwork and GIS analysis of data.

Iveragh Peninsula (Ireland)

Table 82 Results of fieldwork observations regarding visibility patterns from the carved rocks in Iveragh.

	VISIBILITY (FIELDWORK)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
IR Ballynahow Beg (262)								1
IR Carhoonmeengar East (364-2009)								
IR Coolnaharragill Upper (268)								1
IR Coomasaharn 2 (270)	1	1						1
IR Coomasaharn 6 (274)	1	1	1	1				1
IR Coomasaharn 9 (277)		1				1		
IR Derreeny 1 (285)					1			
IR Derrenny 3 (285 A)					1			
IR Derreeny 5 (391-2009)					1			
IR Derreeny 7 (288)					1			
IR Derreeny 8 (394-2009)					1			
IR Derreeny 11 (395-2009)					1			
IR Derrynablaha 1 (297)				1				
IR Derrynablaha 3 (299)				1				
IR Derrynablaha 4 (302)				1				
IR Derrynablaha 7 (303)				1				
IR Derrynablaha 8 (304)				1				
IR Derrynablaha 10 (306)				1				
IR Derrynablaha 11 (307)			1		1			
IR Derrynablaha 14 (310)								
IR Derrynablaha 15 (311)				1				1

IR Derrynablaha 19 (314)						
IR Derrynablaha 22 (317)	1					
IR Derrynablaha 22A (318)	1					
IR Derrynablaha 23 (319)	1					
IR Derrynablaha 24 (320)	1					
IR Derrynablaha 25 (321)						
IR Dromtine (323)		1				
IR Gortnagulla (329)			1			
IR Kealduff Upper 1 (330)						
IR Kealduff Upper 2 (331)	1			1		
IR Kealduff Upper 4 (333)						
IR Kealduff Upper 5 (334)						
IR Kealduff Upper 8 (337)						
IR Kealduff Upper 9 (338)				1		
IR Kealduff Upper 13 (342)						
IR Kealduff Upper 11 (KE071)				1		
IR Kealduff Upper 10 (339)				1		
IR Kealduff Upper 12 (336)						
IR Kealduff Upper 14 (346)						
IR Liss (353)				1	1	
IR Rossacoosane (358)		1				
IR Tullakeel 1 (375)		1				
IR Tullakeel 2 (376)		1				
IR Tullakeel 2B (377)		1				
IR Derreeny 10						
IR Kealduff Upper 13 (342)						

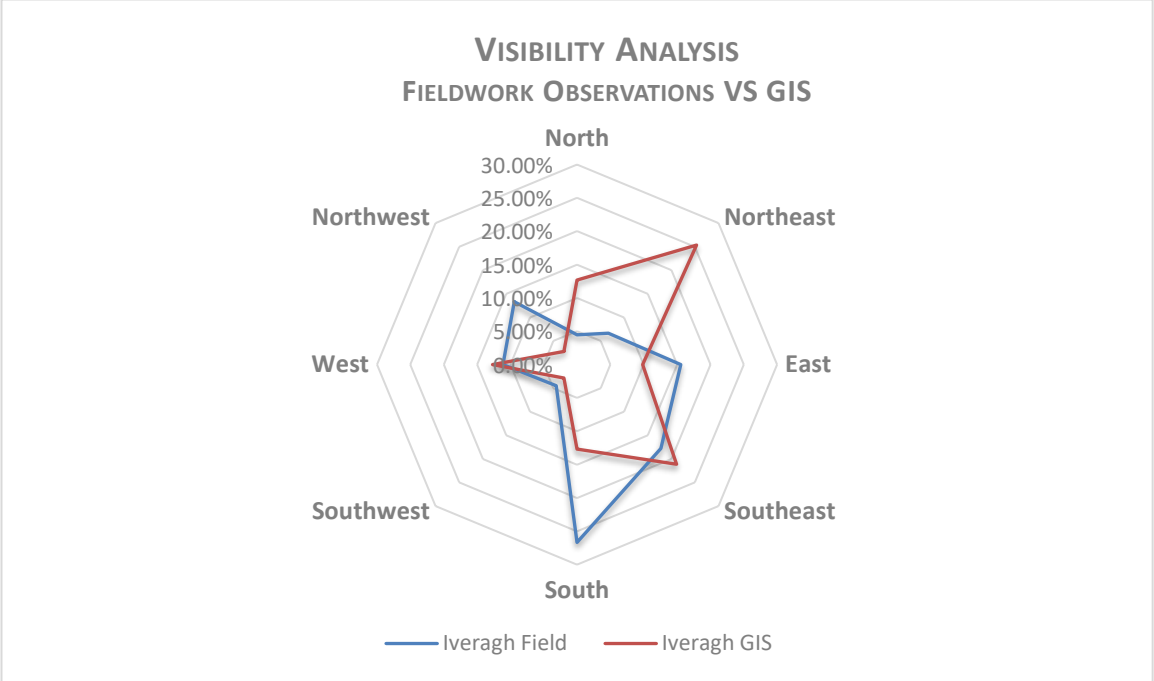
IR Kealduff Upper 11 (KE071)			1	
IR Kealduff Upper 10 (339)			1	
IR Kealduff Upper 12 (336)				
IR Kealduff Upper 14 (346)				
IR Liss (353)			1	1
IR Rossacoosane (358)	1			
IR Tullakeel 1 (375)	1			
IR Tullakeel 2 (376)	1			
IR Tullakeel 2B (377)	1			
IR Derreeny 10 (KW - F)				
IR Kealduff Upper 13 (342)				
IR Kealduff Upper 11 (KE071)			1	
IR Kealduff Upper 10 (339)			1	

Table 83 GIS results regarding visibility patterns from the carved rocks in Iveragh Peninsula.

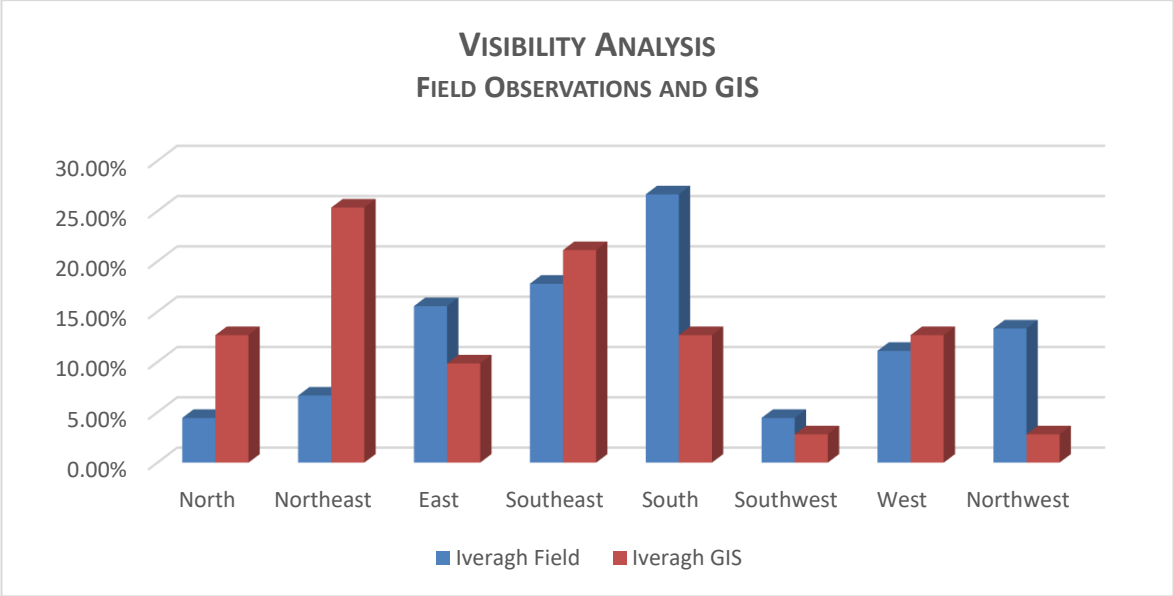
	VISIBILITY (GIS)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
IR Ballynahow Beg (262)				1				1
IR Carhoonmeengar East (364-2009)						1		
IR Coolnaharragill Upper (268)								
IR Coomasaharn 2 (270)								
IR Coomasaharn 6 (274)								
IR Coomasaharn 9 (277)								
IR Derreeny 1 (285)					1			
IR Derrenny 3 (285 A)					1			
IR Derreeny 5 (391-2009)								
IR Derreeny 7 (288)					1			
IR Derreeny 8 (394-2009)				1	1		1	
IR Derreeny 9				1	1		1	
IR Derreeny 11 (395-2009)				1	1		1	
IR Derrynablaha 1 (297)		1		1				
IR Derrynablaha 3 (299)		1		1				
IR Derrynablaha 4 (302)								
IR Derrynablaha 7 (303)					1			

IR Derrynablaha 8 (304)								
IR Derrynablaha 10 (306)								
IR Derrynablaha 11 (307)				1		1		
IR Derrynablaha 14 (310)			1	1				
IR Derrynablaha 15 (311)	1	1						1
IR Derrynablaha 19 (314)			1	1				
IR Derrynablaha 22 (317)	1	1	1	1			1	
IR Derrynablaha 22A (318)	1	1	1	1			1	
IR Derrynablaha 23 (319)	1	1	1	1			1	
IR Derrynablaha 24 (320)	1	1	1	1			1	
IR Derrynablaha 25 (321)	1	1	1	1			1	
IR Dromtine (323)	1	1						
IR Gortnagulla (329)								
IR Kealduff Upper 1 (330)								
IR Kealduff Upper 2 (331)		1						
IR Kealduff Upper 4 (333)		1						
IR Kealduff Upper 5 (334)		1						
IR Kealduff Upper 8 (337)		1						

IR Kealduff Upper 9 (338)		1								
IR Kealduff Upper 13 (342)										
IR Kealduff Upper 11 (KE071)		1								
IR Kealduff Upper 10 (339)		1								
IR Kealduff Upper 12 (336)		1								
IR Kealduff Upper 14 (346)		1								
IR Liss (353)	1					1				
IR Rossacoosane (358)										
IR Tullakeel 1 (375)	1									
IR Tullakeel 2 (376)										
IR Tullakeel 2B (377)										
IR Derreeny 10 (KW - F)				1		1		1		



Graphic 83 Contrasting results of fieldwork observations and GIS analysis regarding visibility patterns from carved rocks in Iveragh Peninsula.



Graphic 84 Graphic showing the contrast between *r*esults of fieldwork observations and GIS analysis regarding visibility patterns from carved rocks in Iveragh Peninsula.

Table 84 Results of fieldwork observations regarding visibility patterns from carved rocks in Barbanza.

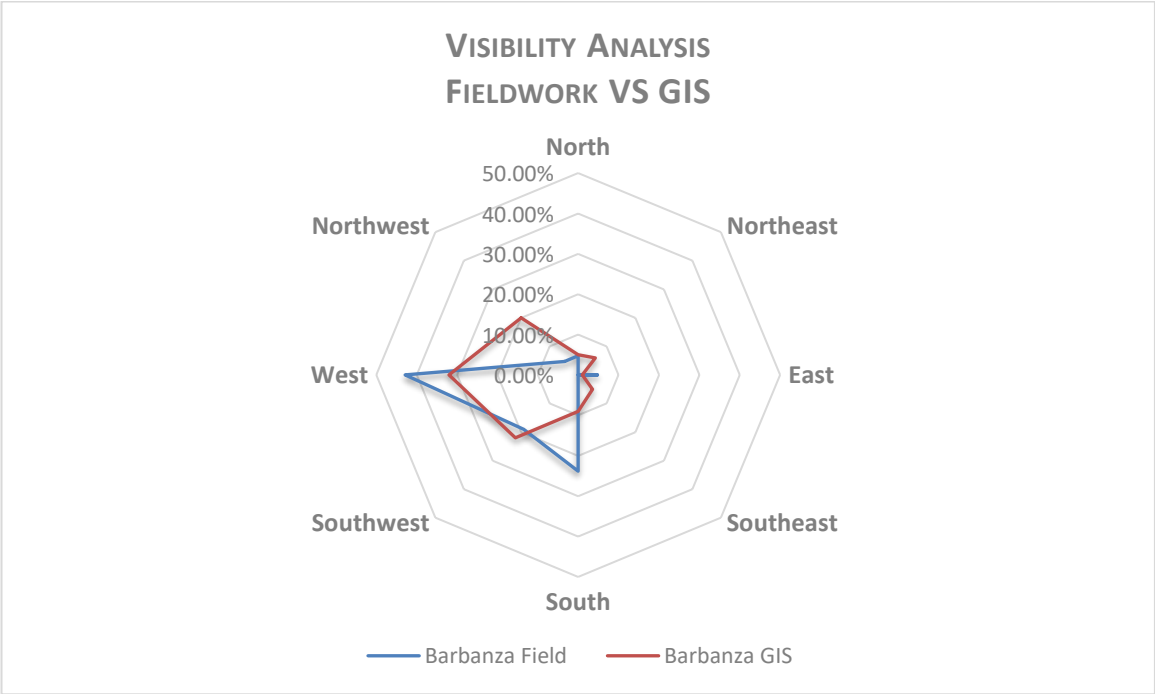
	VISIBILITY (FIELDWORK)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Area I - A Picota						1	1	
Area I - Outeiro da Malda I								
Area I - Outeiro da Malda II								
Area V - A Tarela								
Area VI- Monte Dordo I								
Area VI - A Buguinha Grande								
Area VII - Fontandurin I						1	1	1
Area VII - Gurita I					1	1	1	
Area VII - Gurita II								
Area VII - Gurita IV					1			
Area VII - Igrexa								
Area VII - Lamatrema			1					
Area VII - Lamela I					1	1	1	
Area VII - Pedravila I								
Area VII - Petroglifo de Barona								
Area VIII - Agro das Cartas II								
Area VIII - Calderramos I					1			
Area VIII - Abrigo de Calderramos III					1		1	

EArea VIII - Abrigo de Calderramos IV		
Area IX - Cova da Louza I		
Area IX - Cova da Louza IVa		1
Area IX - Cova da Loza IVb		1
Area IX - Insuela		
Area X - Campo Grande IV		
Area X - Espiñaredo II		
Area X - Espiñaredo V		
Area - Feáns VII		
Area X - Laxe da Sartaña		1
Area X - Légoa Seca V		
Area X - Portela de Gourís		
Area X - Rego do Corzo I		
Area X - Rego do Corzo III		
Area XI - Beira da Costa I		
Area XI - Beira da Costa IV		
Area XI - O Castro I		
Area XI - O Castro II		
Area XI - O Castro IV		
Area XII - Cacharelas		
Area XII - A Lagoa II	1	1
Area XII - A Lagoa III		
Basoñas		

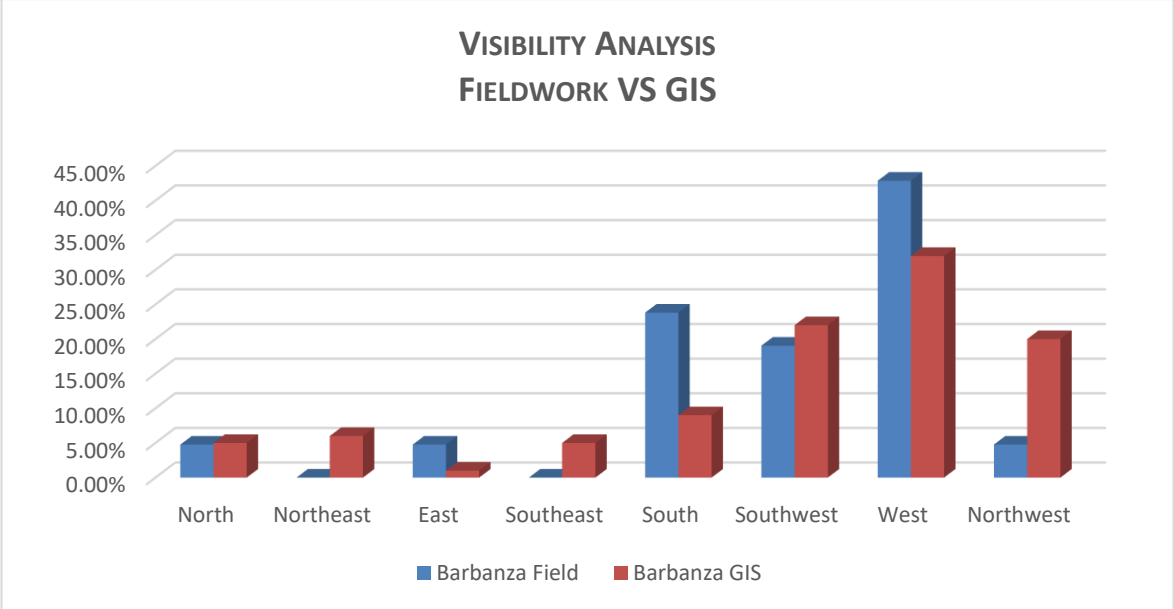
Table 85 Results of GIS analysis regarding visibility patterns from carved rocks in Barbanza.

	VISIBILITY (GIS)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Area I - A Picota					1		1	1
Area I - Outeiro da Malda I					1		1	1
Area I - Outeiro da Malda II					1		1	1
Area V - A Tarela								1
Area VI- Monte Dordo I					1		1	
Area VI - A Buguinha Grande	1	1					1	
Area VII - Fontandurin I								1
Area VII - Gurita I						1	1	1
Area VII - Gurita II						1	1	1
Area VII - Gurita IV								
Area VII - Igrexa				1		1	1	1
Area VII - Lamatrema	1	1	1	1				
Area VII - Lamela I				1		1	1	
Area VII - Pedravila I						1	1	
Area VII - Petroglifo de Baroña								
Area VIII - Agro das Cartas II			1		1		1	
Area VIII - Calderramos I			1				1	1
Area VIII - Abrigo de Calderramos III							1	1
EArea VIII - Abrigo de Calderramos IV								1
Area IX - Cova da Louza I							1	

Area IX – Cova da Louza III				1	1	1
Area IX - Cova da Louza IVa				1	1	1
Area IX - Cova da Loza IVb				1	1	1
Area IX - Insuela				1	1	1
Area X - Campo Grande IV			1		1	
Area X - Espiñaredo II	1				1	
Area X - Espiñaredo V				1	1	1
Area - Feáns VII			1	1	1	
Area X - Laxe da Sartaña				1	1	1
Area X - Légoa Seca V			1		1	
Area X - Portela de Gourís	1				1	
Area X - Rego do Corzo I				1	1	1
Area X - Rego do Corzo III			1	1	1	
Area XI - Beira da Costa I				1	1	1
Area XI - Beira da Costa IV	1			1	1	1
Area XI - O Castro I	1	1				
Area XI - O Castro II					1	
Area XI - O Castro IV				1	1	
Area XII - Cacharelas			1	1	1	
Area XII - A Lagoa II			1	1	1	
Area XII - A Lagoa III				1	1	1
Basoñas				1	1	1



Graphic 85 Contrasting results of fieldwork observations and GIS analysis regarding visibility patterns from carved rocks in Iveragh Peninsula.



Graphic 86 Graphic illustrating the contrast between results of fieldwork observations and GIS analysis regarding visibility patterns from carved rocks in Iveragh Peninsula.

Table 86 Results of fieldwork observations regarding visibility patterns from carved rocks in Monte Faro.

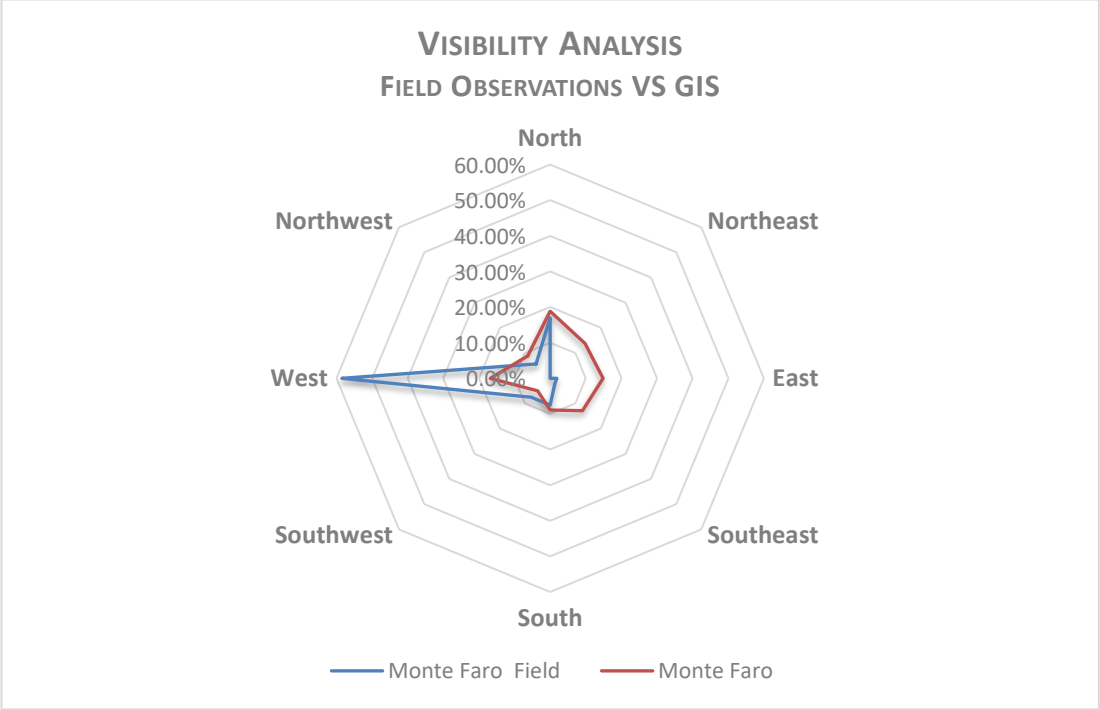
	VISIBILITY (FIELDWORK)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Esc.1.Rock 1					1		1	
Esc.1.Rock2				1				
Esc.1.Rock 3					1		1	
Esc.1 – Rock 4			1		1			
Esc.1. Rock 5						1		
Esc.1.Rock 6					1		1	
Esc.5.Rock 1	1							
Esc.5.Rock 2	1							
Esc.5. Rock 3	1							1
Esc.5. Rock 4	1							
Esc.5. Rock 5							1	
Esc.5.Rock 6							1	
Esc.6.Rock 1							1	
Esc.6.Rock 2							1	
Esc.6.Rock 3							1	
Esc.6.Rock 4							1	
Esc.6.Rock 5							1	
Esc.6.Rock 6							1	
Esc.6.Rock 7							1	
FF. Rock 1	1							
FF. Rock 2	1							
FF. Rock 3	1							
FV. Rock 1							1	

FV. Rock 2				1	
FV. Rock 3				1	
Monte da Laje					
MdF1. Rock 1			1	1	
MdF1. Rock 2			1	1	
MdF1. Rock 3				1	
MdF1. Rock 4			1	1	
MdF2. Rock 1				1	
MdF2. Rock 2				1	
MdF2. Rock 4				1	
MdF2. Rock 5				1	
MdF2. Rock 6				1	
MdF2. Rock 7				1	
MdF2. Rock 8				1	
MdF2. Rock 9				1	
PR. Rock 1				1	
PR. Rock 2				1	
PR. Rock 3				1	
PR. Rock 10				1	
SO. Rock 1	1				1
SO. Rock 2	1				1
ST. Rock 1					
ST. Rock 2					
Tapada do Ouzão					

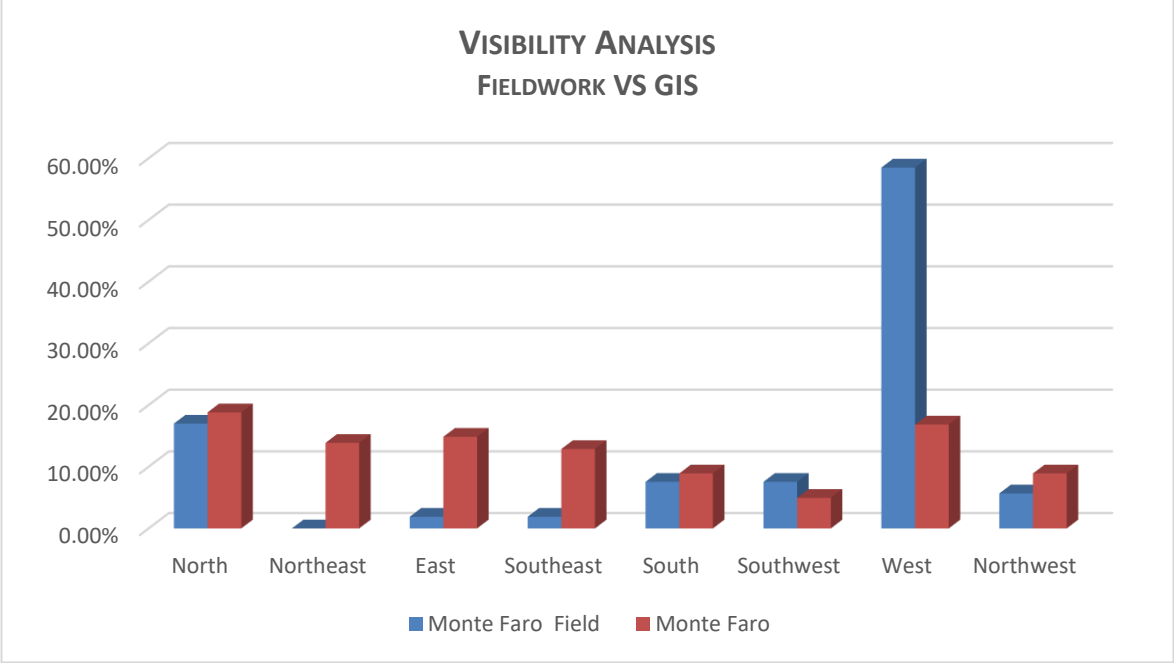
Table 87 Results of GIS analysis regarding visibility patterns from carved rocks in Monte Faro.

	VISIBILITY (FIELDWORK)							
	N	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Esc.1.Rock 1				1				
Esc.1.Rock2				1				
Esc.1.Rock 3				1				
Esc.1 – Rock 4				1				
Esc.1. Rock 5				1				
Esc.1.Rock 6				1				1
Esc.5.Rock 1	1		1				1	
Esc.5.Rock 2	1		1				1	
Esc.5. Rock 3	1		1				1	
Esc.5. Rock 4	1		1				1	
Esc.5. Rock 5	1	1	1				1	
Esc.5.Rock 6	1	1						1
Esc.6.Rock 1	1		1				1	
Esc.6.Rock 2	1		1				1	
Esc.6.Rock 3	1		1				1	
Esc.6.Rock 4	1		1				1	
Esc.6.Rock 5			1					
Esc.6.Rock 6			1					
Esc.6.Rock 7			1					
FF. Rock 1		1						
FF. Rock 2		1						
FF. Rock 3		1						
FV. Rock 1							1	
FV. Rock 2								1

FV. Rock 3									1
Monte da Laje									
MdF1. Rock 1						1		1	1
MdF1. Rock 2						1		1	1
MdF1. Rock 3						1		1	1
MdF1. Rock 4						1		1	1
MdF2. Rock 1		1		1					
MdF2. Rock 2		1		1					
MdF2. Rock 4									
MdF2. Rock 5		1		1					
MdF2. Rock 6		1		1					
MdF2. Rock 7		1	1	1					
MdF2. Rock 8				1		1		1	
MdF2. Rock 9				1		1		1	
PR. Rock 1	1					1	1		
PR. Rock 2	1					1	1		
PR. Rock 3	1					1	1		
PR. Rock 10	1	1							
SO. Rock 1	1		1						
SO. Rock 2	1		1						
ST. Rock 1	1	1					1		
ST. Rock 2	1	1					1		
Tapada do Ouzão								1	

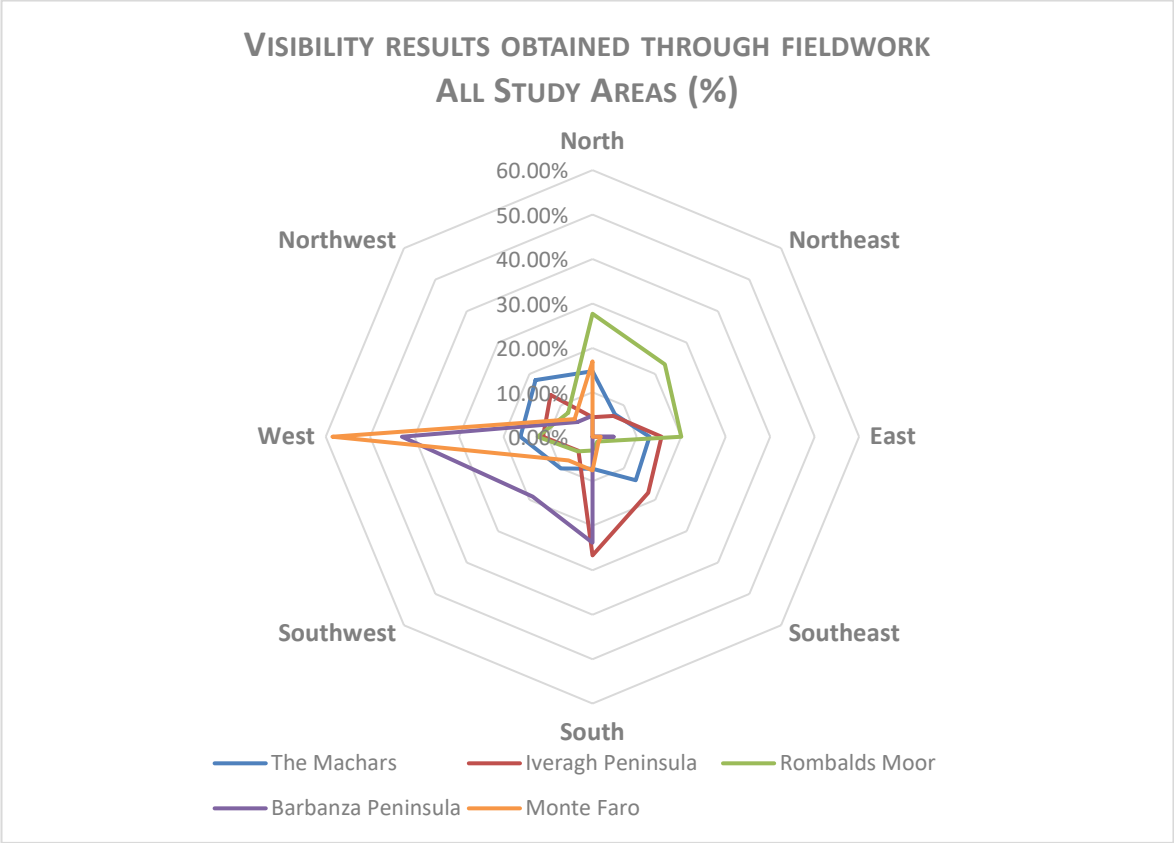


Graphic 87 Contrasting results of fieldwork observations and GIS analysis regarding visibility patterns from carved rocks in Iveragh Peninsula.

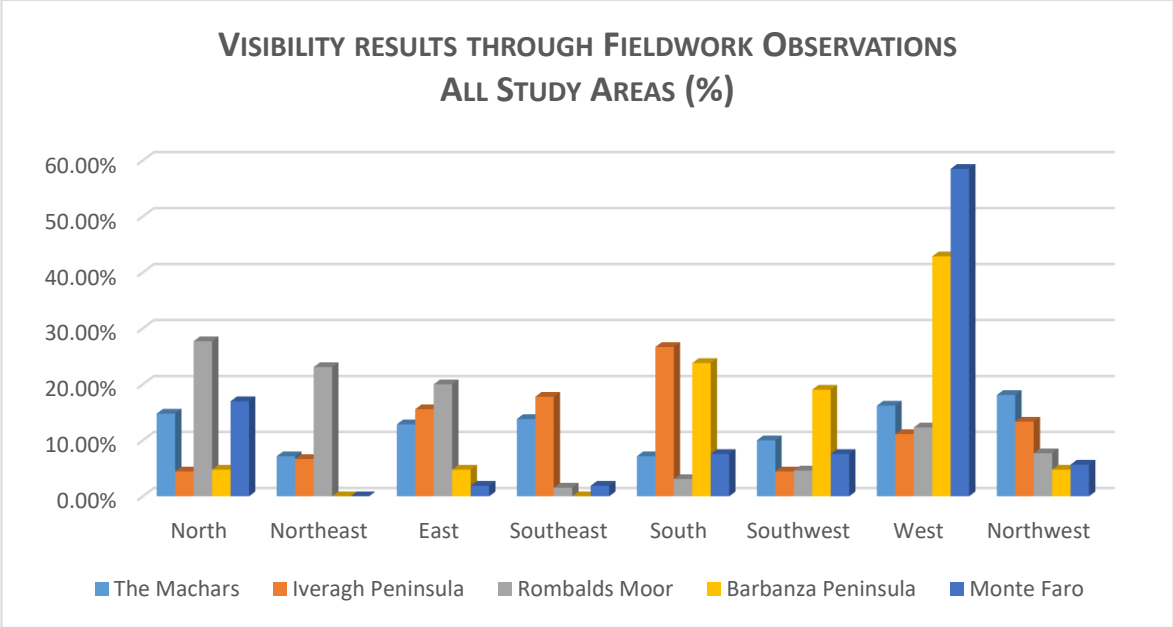


Graphic 88 Contrast between results of fieldwork observations and GIS analysis regarding visibility patterns from carved rocks in Iveragh Peninsula.

Visibility Comparisons between Field Observations in all study areas

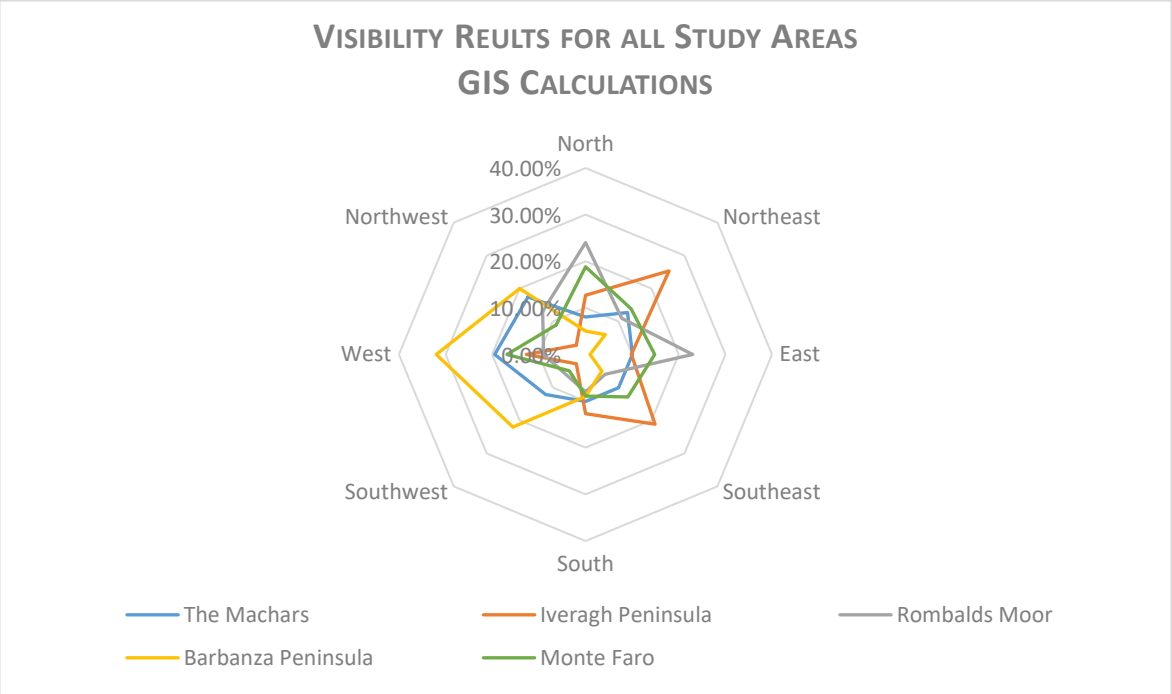


Graphic 89 Comparison of visibility observations of all study areas obtained during fieldwork.

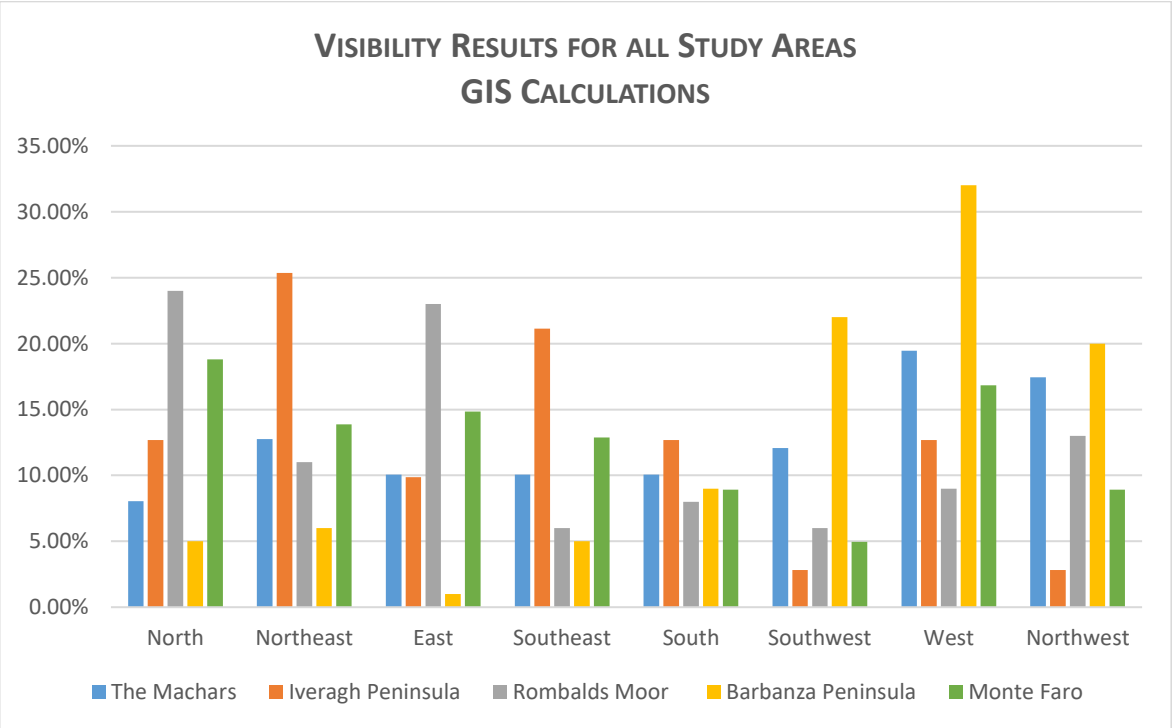


Graphic 90 Comparison between results of fieldwork observations regarding visibility patterns from carved rocks.

Visibility Comparisons calculated with GIS



Graphic 91 Comparison of visibility observations of all study areas calculated through GIS analysis.



Graphic 92 Comparison of visibility patterns from carved rocks calculated with GIS analysis.

APPENDIX 9

STATISTICAL TESTS: CHI-SQUARE (ASPECT)

Chi-Square statistical tests of significance (level of probability or 'critical value' at which the null hypothesis[30] should be rejected) were carried out to examine the results of GIS Aspect analysis. Chi-Square is a goodness of fit test, which assesses data measured in nominal scales, that is, categorical variables (Shennan 1997:104). These are not measured on continuous scales and therefore cannot be summarized in terms of means and medians. Categories are instead summarized as frequencies. The chi-square test provides a method to assess the probability in which observed and expected (driven by chance) frequencies differ. It can be used with more than one variable, but in this case a one-sample chi-square test was used to evaluate how the rock art sites aspect results differed from the expected values, and how significant this difference is.

To perform this test, mutually-exclusive categories were defined: the main population corresponding to the aspect values originated in the GIS analysis for a specific area (the anticipated distribution), and that of the specific rocks (distribution of observations). These were then correlated under a null hypothesis theoretical expectation, which reads as followed:

H_o = *The carved rocks are randomly distributed with respect to the natural orientation of the slopes.*

The chi-square is then calculated based on the sum of the differences noted, between the two distributions for each category. It follows the formula below, in which *O* is the observed number of cases in a category, *E* is the expected number of cases in a category and χ^2 is the Greek letter chi representing the chi-square result (Shennan 1997:106):

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E}$$

[30] The expression defines a state of non-significance, in which there is no difference between two samples being tested. This means that they probably belong to the same population.

The exercise begins with the construction of a table recording the counts of observations against the data categories (Conolly and Lake 2006:123).

Once the chi-square is calculated it needs to be tested for statistical significance, through comparison with tabulated values (e.g. Table F in appendix, Shennan 1997). The chi-square result for each study area was compared against those in the 0.05 ($\alpha = 0.05$[31]) level of significance, defined at the beginning of the calculations. Furthermore, a degree of freedom was also taken into account. This is because "*the form of the theoretical chi-squared distribution, which is tabulated in the chi-squared table, varies according to the number of categories into which the observations are divided. The greater the number of categories, the larger the value of the chi-squared statistic obtained from the data needs to be, or order to reach a given level of significance. In the case of the 1-sample test (…) the number of degrees of freedom is not equal to the number of categories but to the number of categories minus one*" (*Ibid*.:107). The formula $\nu = \kappa - 1$ represents the degrees of freedom, where ν is the number of degrees of freedom and κ is the number of categories. In this study $\nu = 9$[32] $- 1$ and therefore $\nu = 8$. At $\alpha = 0.05$, the critical value of $\chi^2\text{-}1 = 15.5073$ for $\nu = 8$ degrees of freedom.

[31] It is accepted that we may be wrong once in every 20 occurrences.

[32] The calculation contemplates 9 categories: N, NE, E, SE, S, SW, W, NW and the additional Flat.

The Machars (Scotland)

MAIN DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.297172	21.09919	6	10.80542
2. North	0.077336	5.490824	11	5.527588
3. Northeast	0.087927	6.242787	13	7.314028
4. East	0.094763	6.728202	6	0.078814
5. Southeast	0.115892	8.228332	6	0.60346
6. South	0.079228	5.625197	7	0.336003
7. Southwest	0.076082	5.401851	8	1.249641
8. West	0.072791	5.168147	7	0.649301
9. Northwest	0.098809	7.015467	7	3.41E-05
TOTALS	1	71	71	**26.56429**

COMPREHENSIVE DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.297172	27.3398	11	9.76558
2. North	0.077336	7.114871	14	6.662805
3. Northeast	0.087927	8.089246	13	2.981181
4. East	0.094763	8.718233	7	0.338638
5. Southeast	0.115892	10.66206	7	1.257797
6. South	0.079228	7.288988	13	4.474648
7. Southwest	0.076082	6.999582	14	7.001254
8. West	0.072791	6.696754	8	0.253623
9. Northwest	0.098809	9.090464	5	1.840599
	1	92	92	34.57613

H_{01} and H_{02} = The carved rocks are evenly distributed regarding the natural orientation of the slopes.

H_1 and H_2 = The carved rocks are <u>not evenly</u> distributed regarding the natural orientation of the slopes.

Rombalds Moor (England)

MAIN DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
Flat	0.260801	11.73604409	10	0.256803
North	0.184471	8.301187425	22	22.6061
East	0.192194	8.64871663	2	5.111213
South	0.270136	12.15613419	1	10.2384
West	0.092398	4.157917664	10	8.208418
	1	45	45	46.42093

COMPREHENSIVE DATASET (ERA)

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.212084	16.33043799	8	4.2495
2. North	0.103213	7.947386197	17	10.31154
3. Northeast	0.14663	11.2905418	24	14.30669
4. East	0.069914	5.383389539	3	1.055199
5. Southeast	0.12196	9.390921486	5	2.053067
6. South	0.133044	10.24437473	5	2.684738
7. Southwest	0.129158	9.945203807	4	3.55402
8. West	0.041158	3.169174186	3	0.009031
9. Northwest	0.042839	3.298570264	8	6.700916
	1	77	77	**44.92471**

H_o = The carved rocks are evenly distributed with respect to the natural orientation of the slopes.

H_1 = The carved rocks are <u>not evenly</u> distributed with respect to the natural orientation of the slopes.

Iveragh Peninsula (Spain)

MAIN DATASET (WHOLE AREA)

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.011727	0.386987	0	0.386987
2. North	0.118654	3.915584	2	0.937143
3. Northeast	0.077651	2.56247	8	11.53837
4. East	0.09501	3.135331	8	7.547851
5. Southeast	0.164885	5.4412	3	1.095247
6. South	0.157114	5.184761	8	1.528628
7. Southwest	0.110445	3.644681	2	0.74217
8. West	0.112147	3.700856	0	3.700856
9. Northwest	0.152368	5.028132	2	1.823656
	1	33	33	**29.30091**

COMPREHENSIVE DATASET (WHOLE AREA)

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.011727	1.36032	0	1.36032
2. North	0.118654	13.76387	11	0.555002
3. Northeast	0.077651	9.007471	22	18.74065
4. East	0.09501	11.02116	23	13.01973
5. Southeast	0.164885	19.12664	25	1.803576
6. South	0.157114	18.22522	14	0.979548
7. Southwest	0.110445	12.8116	8	1.807076
8. West	0.112147	13.00907	9	1.235494
9. Northwest	0.152368	17.67464	4	10.5799
	1	116	116	**50.08129**

Other results for Iveragh Peninsula, include the calculation of chi-square for sites organized in smaller areas (north and south), both with the main dataset and that published in the 2009 catalogue:

	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
Northern Area (Main dataset)	11	11	**38.9772**
Northern Area (comprehensive dataset)	55	55	**62.0087**
Southern Area (Main dataset	22	22	**34.46709**
Southern Area (comprehensive dataset)	60	60	**31.23718**

In all cases the null hypothesis and the alternate hypothesis are as follows, meaning that the former was rejected.

H_0 = The carved rocks are evenly distributed with respect to the natural orientation of the slopes.

H_1 = The carved rocks are <u>not evenly</u> distributed with respect to the natural orientation of the slopes.

Barbanza Peninsula

MAIN DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.3493	13.97199	1	12.04356
2. North	0.069123	2.764913	1	1.126588
3. Northeast	0.07197	2.878801	1	1.226168
4. East	0.062832	2.513266	0	2.513266
5. Southeast	0.050571	2.022845	3	0.472024
6. South	0.044693	1.787737	3	0.822035
7. Southwest	0.094548	3.781923	9	7.199601
8. West	0.14423	5.769189	13	9.062733
9. Northwest	0.112733	4.509336	9	4.472071
	1	40	40	**38.93805**

COMPREHENSIVE DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.3493	57.28516	2	53.35499
2. North	0.069123	11.33614	7	1.658602
3. Northeast	0.07197	11.80308	3	6.565597
4. East	0.062832	10.30439	4	3.857128
5. Southeast	0.050571	8.293664	3	3.378829
6. South	0.044693	7.32972	18	15.53332
7. Southwest	0.094548	15.50588	53	90.66294
8. West	0.14423	23.65368	45	19.26405
9. Northwest	0.112733	18.48828	29	5.976563
	1	164	164	**200.252**

H_0 = The carved rocks are randomly distributed with respect to the natural orientation of the slopes.

H_1 = The carved rocks are <u>not evenly</u> distributed with respect to the natural orientation of the slopes.

Monte Faro (Portugal)

MAIN DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	χ^2
1. Flat	0.012321	0.579072	0	0.579072
2. North	0.149549	7.028785	2	3.597873
3. Northeast	0.137923	6.482362	5	0.338981
4. East	0.088424	4.155944	5	0.171425
5. Southeast	0.045581	2.142307	4	1.61089
6. South	0.056175	2.640247	4	0.700286
7. Southwest	0.159761	7.508762	12	2.686357
8. West	0.200752	9.435357	7	0.628589
9. Northwest	0.149514	7.027164	8	0.134679
	1	47	47	**10.44815**

H_0 = The carved rocks are randomly distributed with respect to the natural orientation of the slopes.

H_1 = The carved rocks are <u>evenly</u> distributed with respect to the natural orientation of the slopes.

COMPREHENSIVE DATASET

ASPECT ORIENTATIONS	AREA %	EXPECTED NO. ROCKS	OBSERVED NO. ROCKS	X2
1. Flat	0.012321	1.540086	3	1.383916
2. North	0.149549	18.69358	9	5.026616
3. Northeast	0.137923	17.24032	9	3.938611
4. East	0.088424	11.05304	13	0.342951
5. Southeast	0.045581	5.697626	11	4.93454
6. South	0.056175	7.021933	12	3.529106
7. Southwest	0.159761	19.97011	29	4.083045
8. West	0.200752	25.09403	26	0.032708
9. Northwest	0.149514	18.68927	13	1.73189
	1	125	125	25.00338

H_0 = The carved rocks are randomly distributed with respect to the natural orientation of the slopes.

H_1 = The carved rocks are <u>not evenly</u> distributed with respect to the natural orientation of the slopes.

APPENDIX 10

NETWORK ANALYSIS

CO-PRESENCE OF ATTRIBUTES

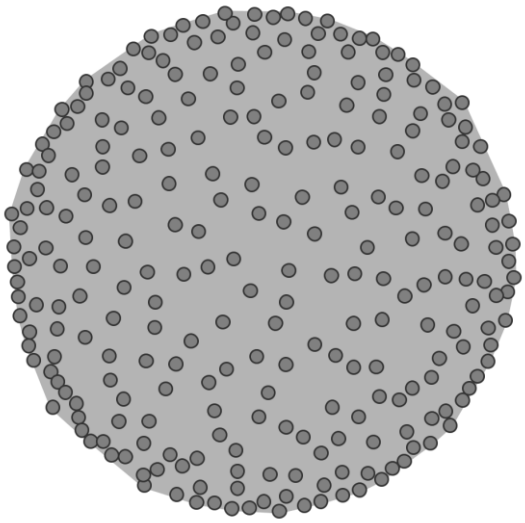


Figure 25 This 'fur-ball' demonstrates the dense network resulting from the categorical system used to study Atlantic Rock Art. All sites are connected to all attributes, at least once. In this image, the dark spheres are the nodes, that is, the sites.

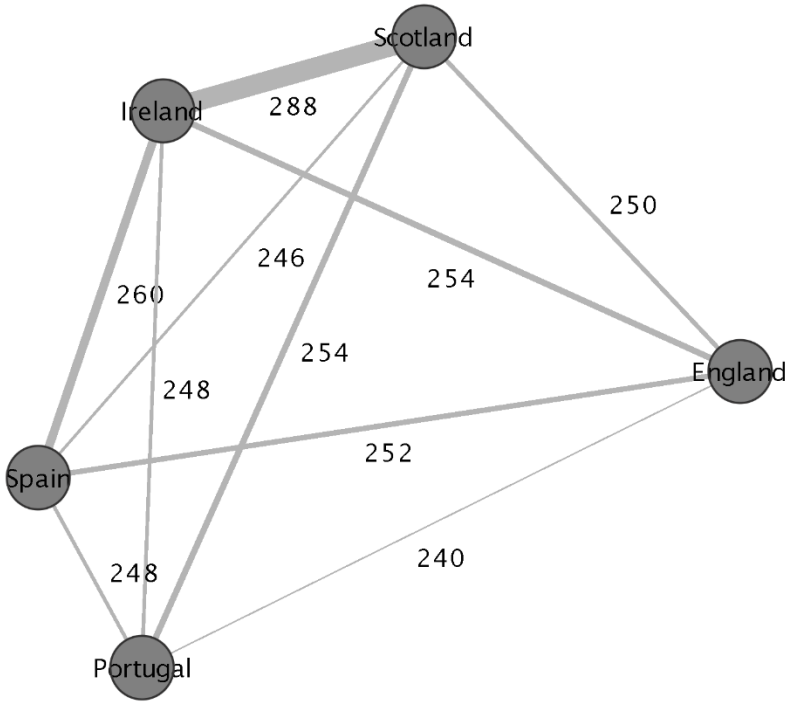


Figure 26 Representation of the co-presence of attributes in the entire dataset, related to each study area. This means that, for example, Portugal and England share 240 attributes of the total that composes the categorical scheme, Scotland and Ireland share 288 attributes, etc.

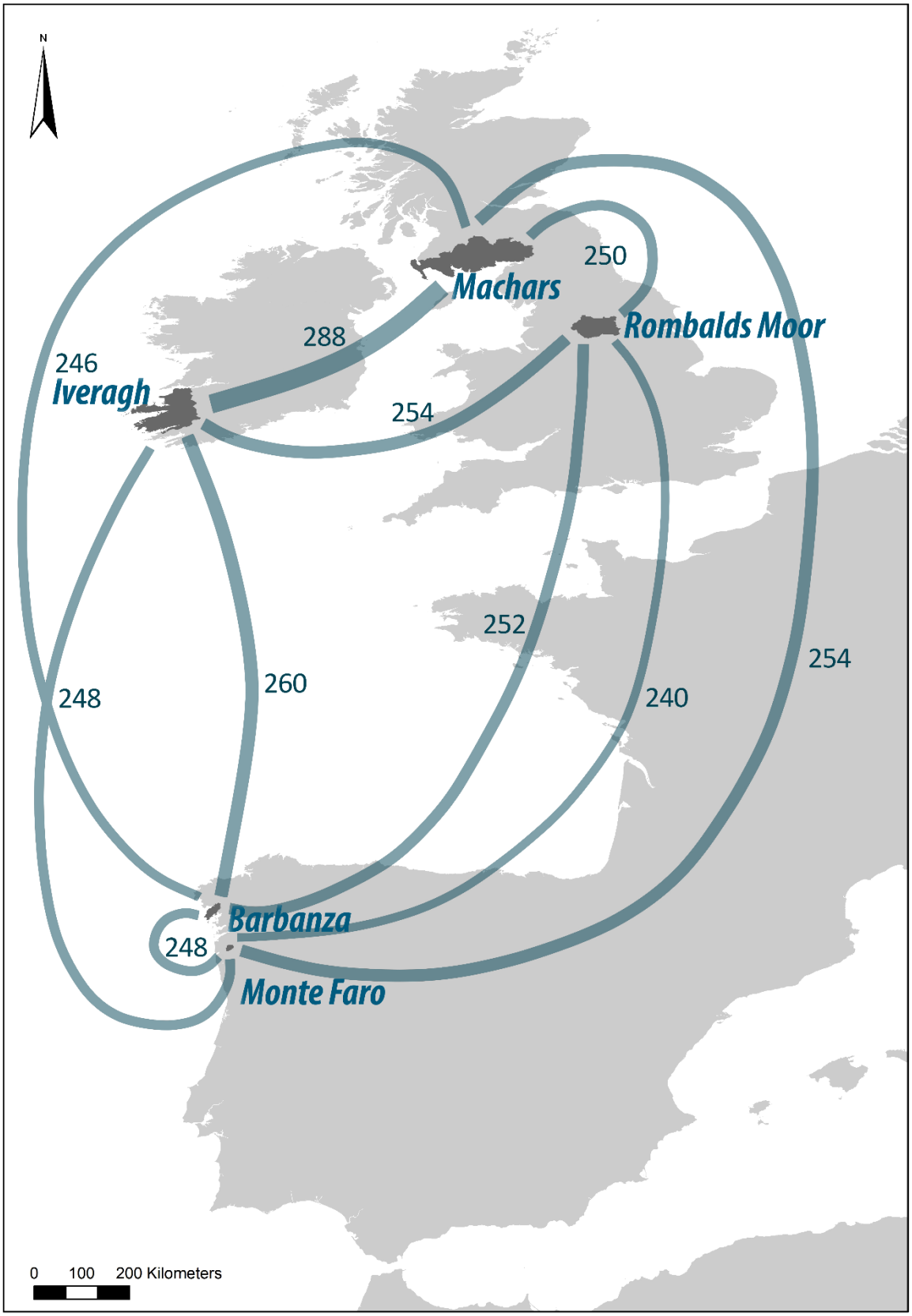


Figure 27 Map representing the study areas and their relationships based on the co-presence of attributes. This images translates the previous diagrams.

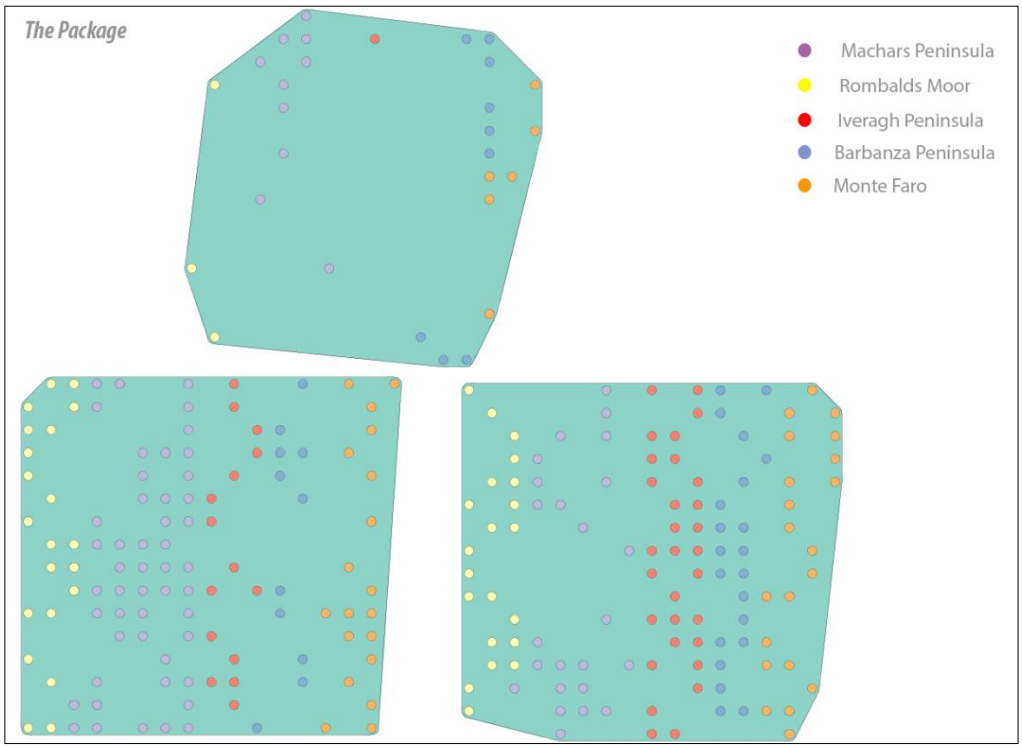


Figure 28 Groupings of rock art defined according the Louvain community detection algorithm (Blondel *et al.* 2008), according to the attributes defined in the theoretically derived 'package'. The analysis demonstrated a striking similarity between the study areas.

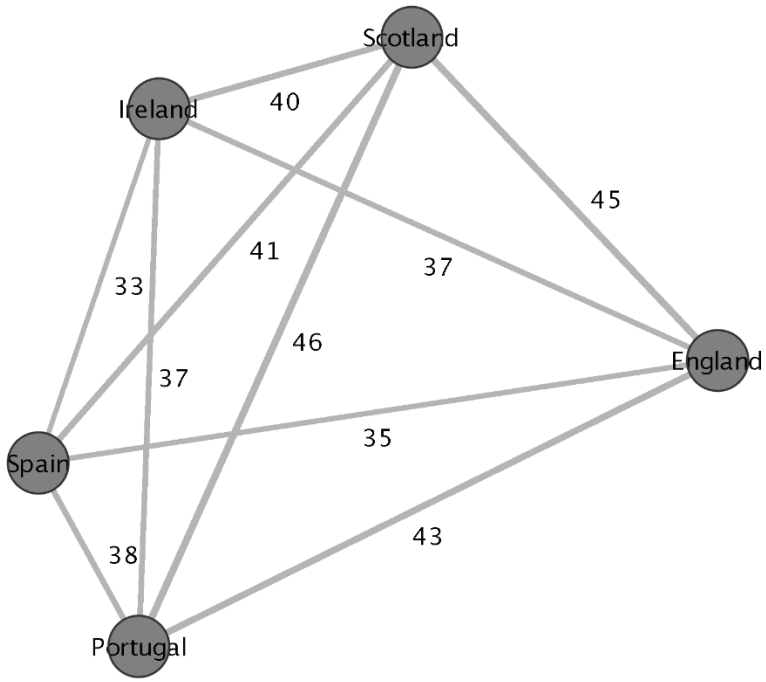


Figure 29 Representation of the Louvain modularity applied to the study areas in light of 'the package'. This scheme is the same representation as the above, and reinforces the similarities between the study areas.

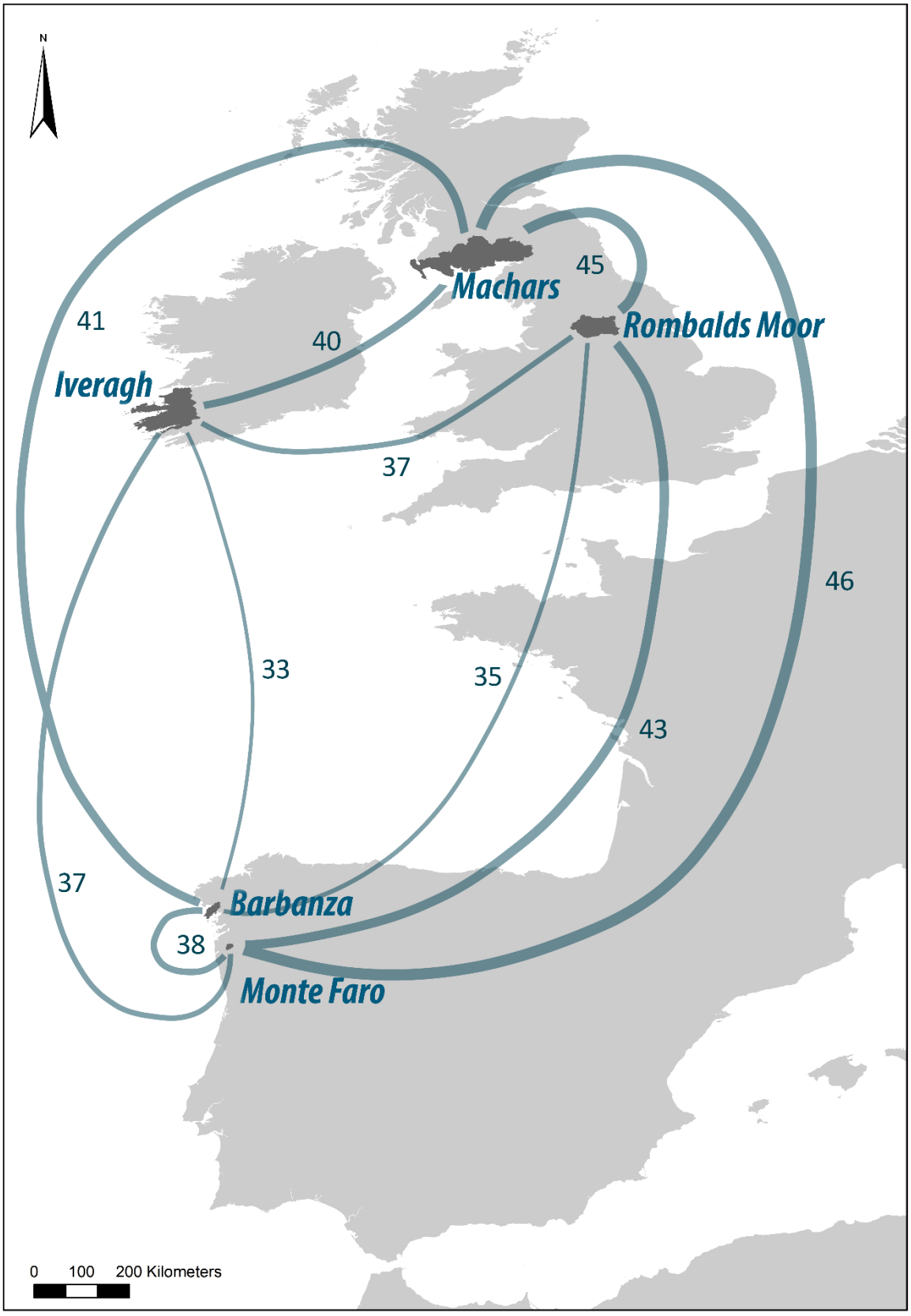


Figure 30 Map representing the previous diagrams and the similarities between the regions according to the Louvain algorithm, taking into account the attributes defined for the package.

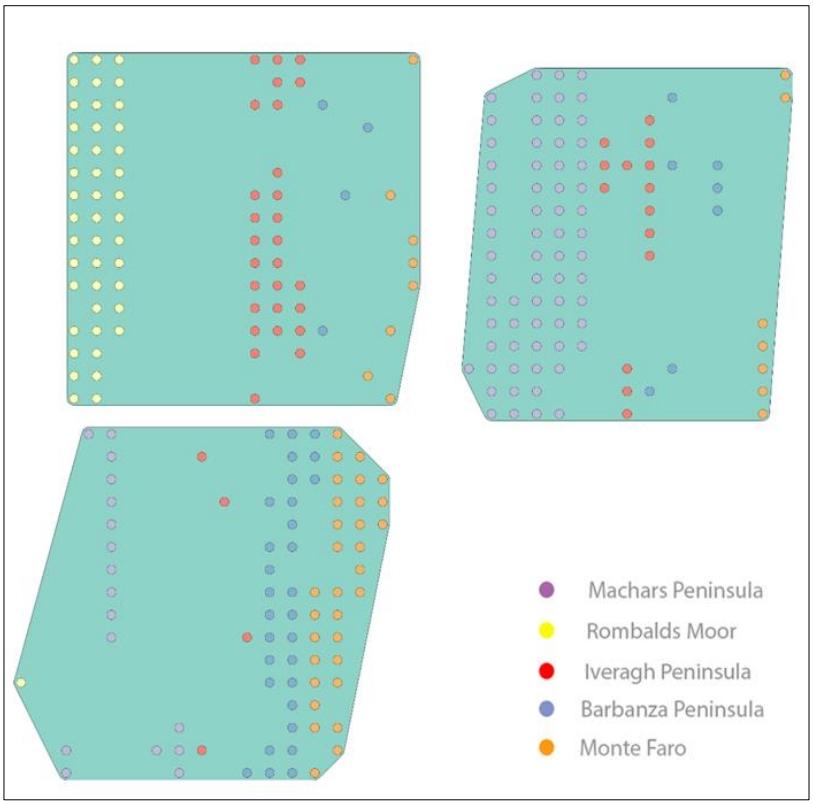


Figure 31 Some regional logic begins to emerge with the Louvain clustering algorithm applied to the first approach of analysis. All the main categories are present, but in general terms, not considering its particularities (e.g. cup-and-rings are present, but not discriminating the number of concentric circles).

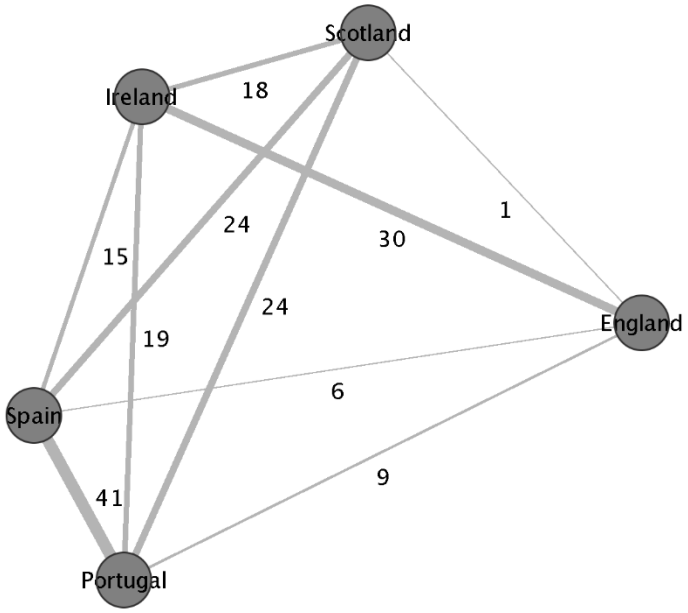


Figure 32 This network represents the results above, but maintaining the edges (lines) with their weight. In this approach a pattern is beginning to be identifies, with a stronger connection between Ireland and England, and another between Spain and Portugal.

Second Approach

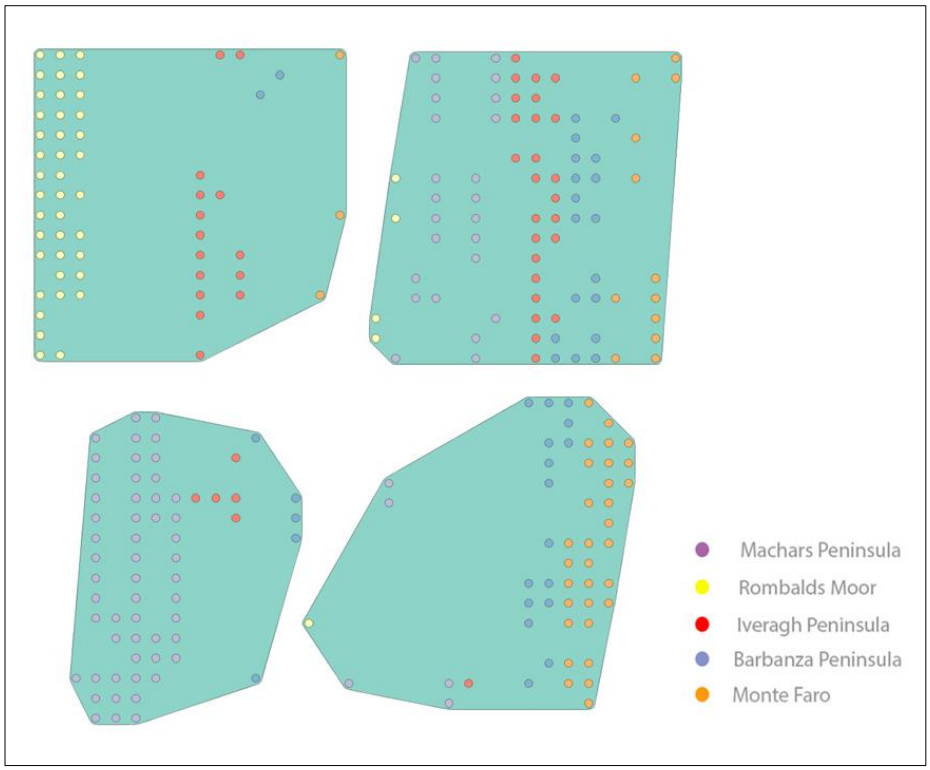


Figure 33 The second approach included more detail than the previous. Some groups, such as the Machars are beginning to stand out.

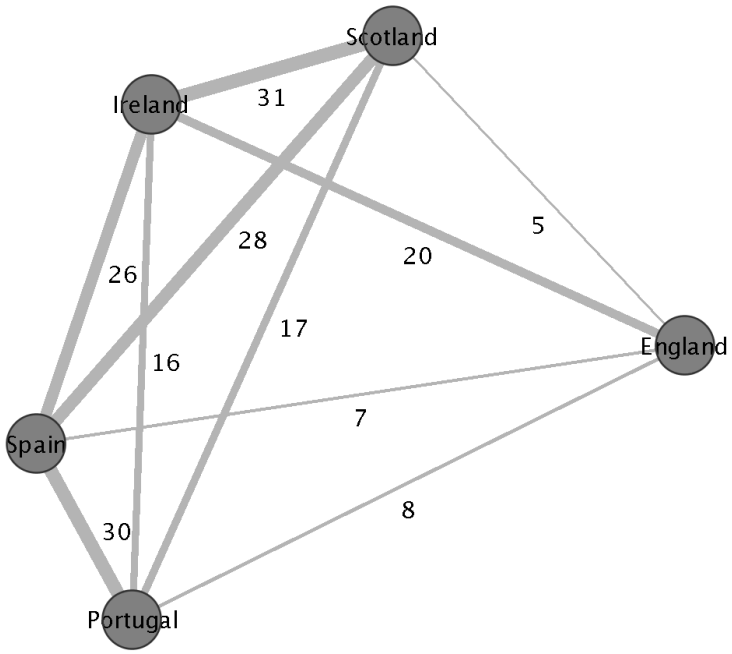


Figure 34 Network representing the second approach, where some of the categories were unfolded and more detail was added.

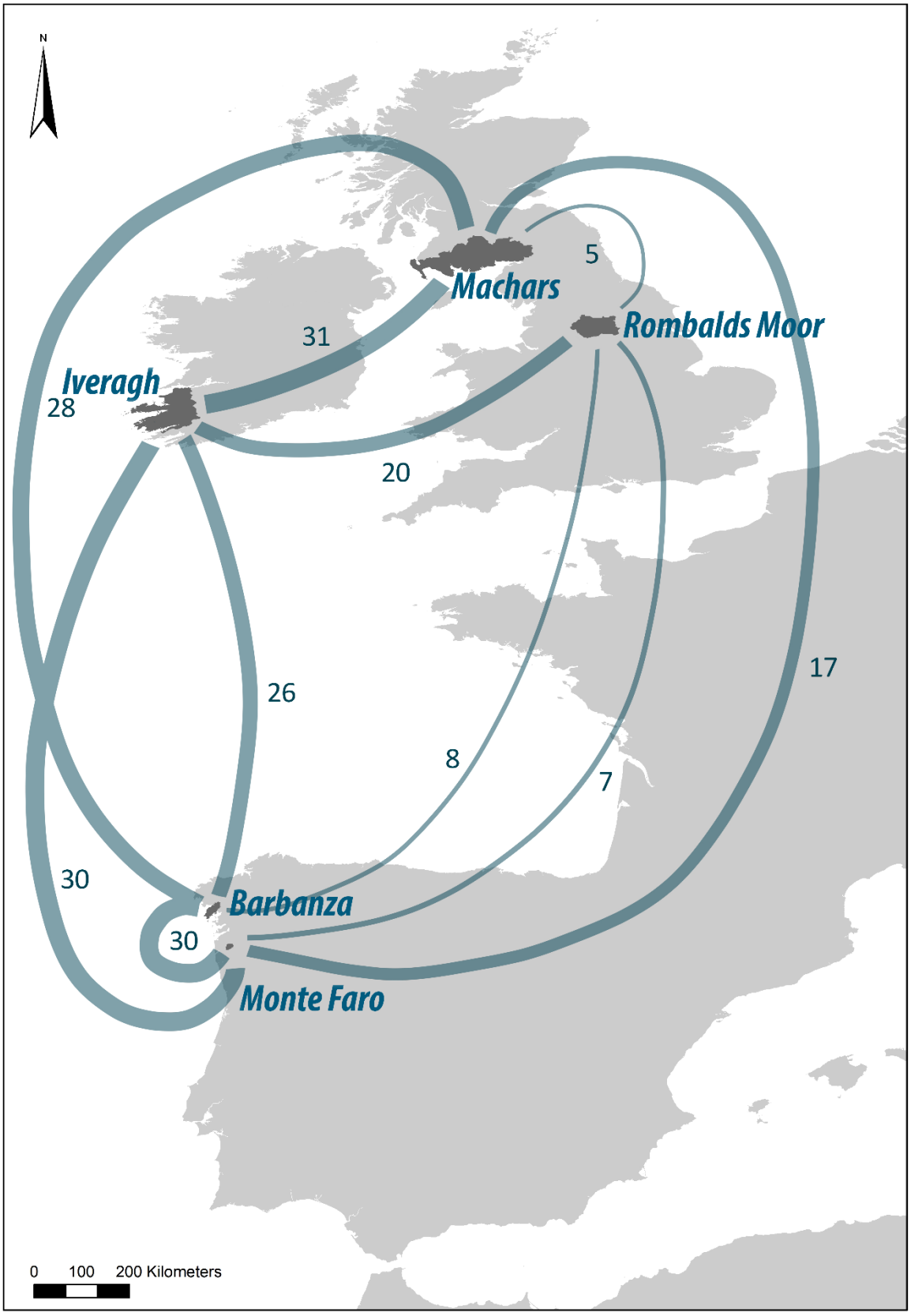


Figure 35 Spatial representation of the relationships established in the second approach, where a pattern of similarities and differences is now stronger.

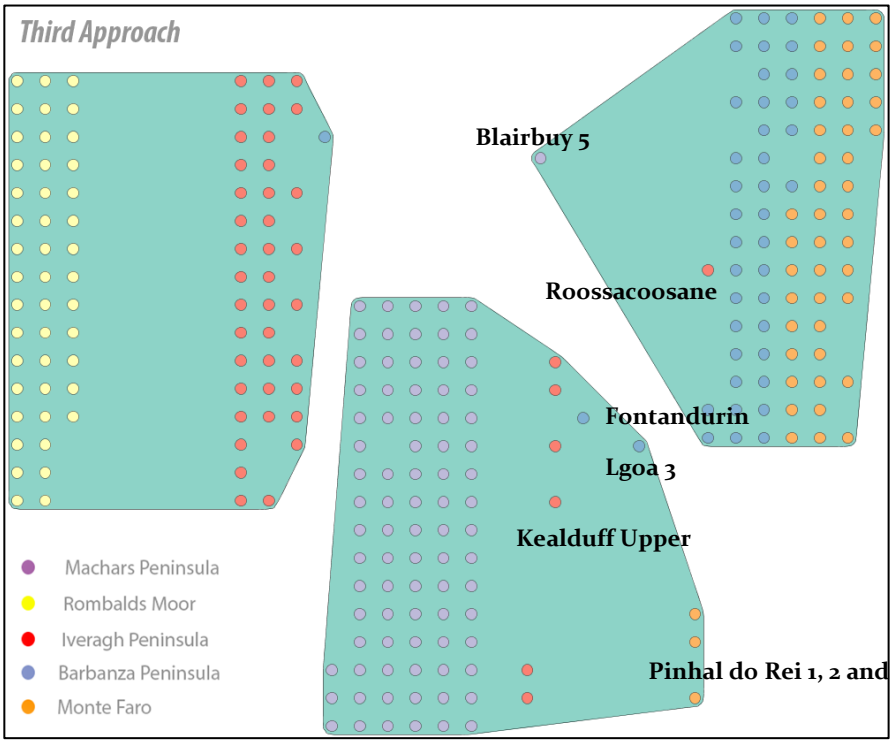


Figure 36 Representation of the third order of analysis representing the clusters defined with Louvain modularity. The whole categorical scheme was included in this analysis, from the motifs' details to the landscape location and visibility affordances. A clear pattern emerged, here represented without the edges, in order to display the communities more clearly.

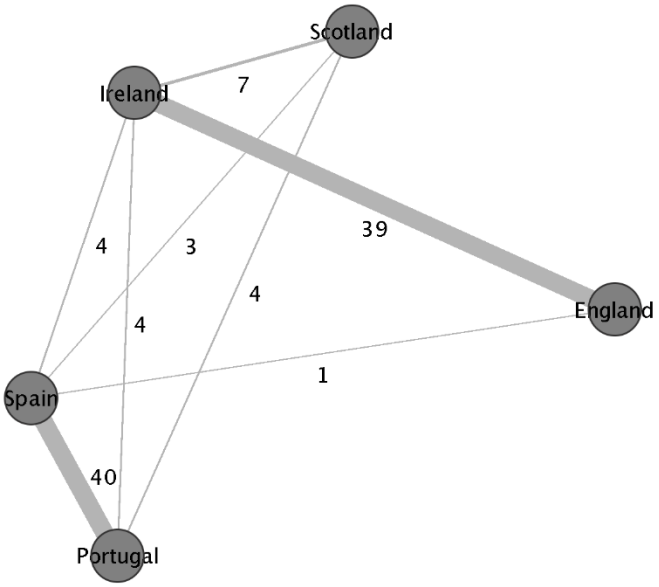


Figure 37 Representation of the third and final approach with nodes (carved panels) and edges (relationships between them). There is a clear pattern emerging and interesting connections between some of the study areas.

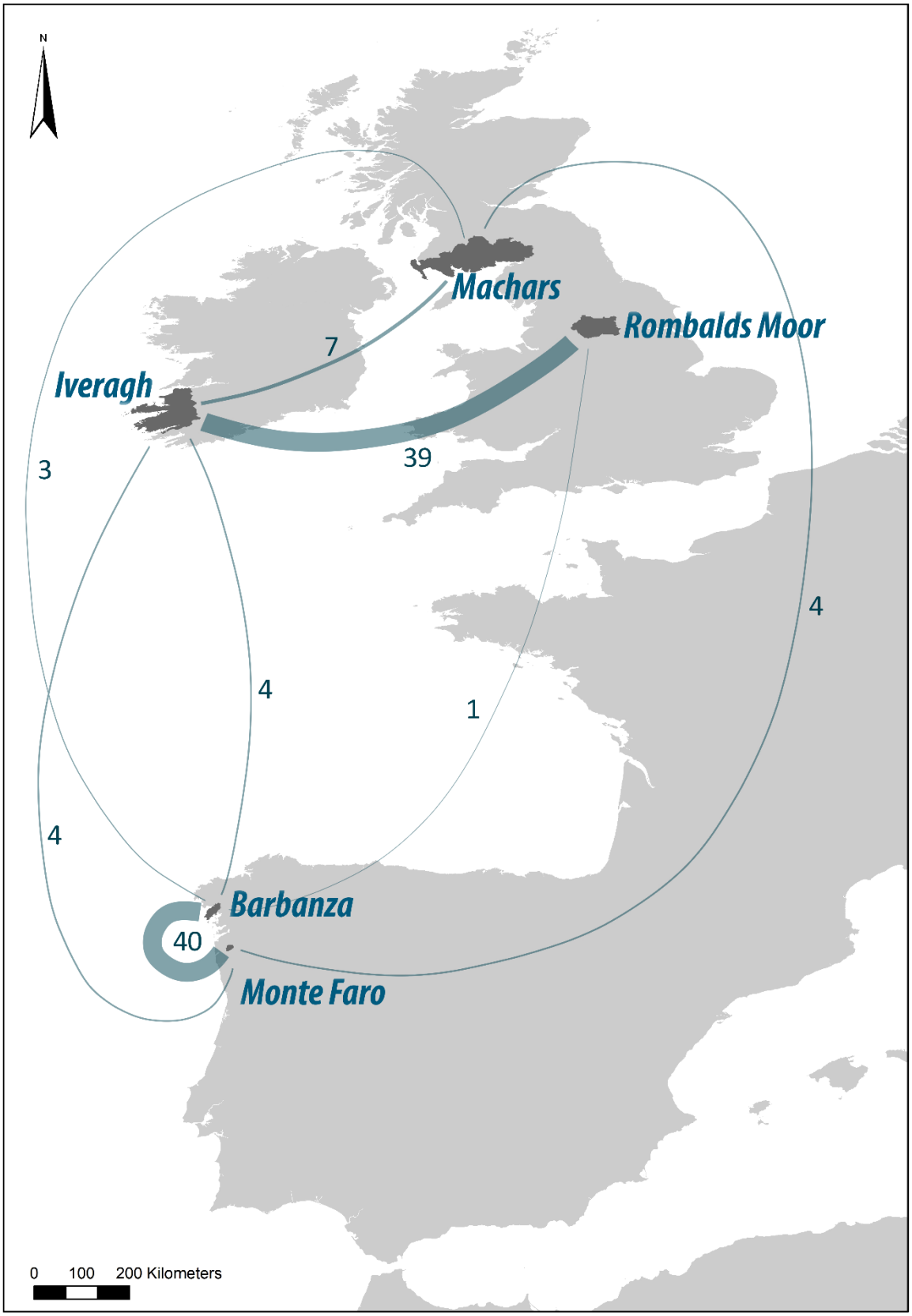


Figure 38 Spatial representation of the third and final approach explored in the SNA with the Louvain modularity. It is obvious that all study areas are connected, although similarities between some regions are stronger than others. This shows that despite the similarities, the study areas have strong regional characters.