Piston coring of debris flows and turbidites west and south of the Canary Islands

Principal Scientist
D G Masson

2002
**TITLE**  

**REFERENCE**  

**ABSTRACT**  
The major cruise objective was to obtain sediment cores at various locations to the west and southwest of the Canary Islands with the aims of:

- Sampling debris flow sediments in the Canary and Saharan debris flows
- Obtaining dateable sediments immediately above and below the debris flow sediments
- Sampling turbidite sediments associated with the debris flows
- Sampling sediments on either flank of a sediment wave west of La Palma

In addition, it was planned to

- obtain seabed video footage, using the SHRIMP towed camera station, at several localities where downslope sediment transport was believed to be active at the present day, and undertake some test deployments of the SOC Scatterometer system

**KEYWORDS**  
Canary Island waters, *Charles Darwin*, cruise 126 2001, debris flow, sediment transport, SHRIMP, turbidites, underwater camera, videotape recording

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LYNCH, P.A.     
DUNCAN, A.S.    
LINK, S.E.M.    
LINK, W.J.T.    

ITINERARY
Scientific party embarked by boat transfer, Funchal, Madeira Sunday, 11th March
Arrived Santa Cruz, Tenerife Tuesday, 20th March

CRUISE OBJECTIVES
The major cruise objective was to obtain sediment cores at various locations to the west and southwest of the Canary Islands with the aims of:

- Sampling debris flow sediments in the Canary and Saharan debris flows
- Obtaining dateable sediments immediately above and below the debris flow sediments
- Sampling turbidite sediments associated with the debris flows
- Sampling sediments on either flank of a sediment wave west of La Palma

In addition, it was planned to

- obtain seabed video footage, using the SHRIMP towed camera station, at several localities where downslope sediment transport was believed to be active at the present day, and
- undertake some test deployments of the SOC Scatterometer system

NARRATIVE (ALL TIMES ARE UTC)

11th March 2001 (Julian Day 070)
0930. Scientific party embarked by boat transfer at Funchal, Madeira. Vessel had been delayed by one day due to the necessity of landing a sick seaman in La Corunna, Spain, while on passage to Madeira
1355-1400. Echosounder and 3.5 kHz fish were deployed
1400-1930. Passage to first coring station
1930. On station at coring station CD126/01
2218. Corer triggered at 31° 27.04’N, 17° 00.43’W

12th March 2001 (Day 071)
0045. Corer on deck. End station CD126/01
0045-0813. Passage to coring station CD126/02
0813. On station CD126/02
1201. Corer triggered at 30° 59.55’N, 18° 01.00’W
1418. Corer on deck. End station CD126/02
1555-2359. Passage to coring station CD126/03

13th March 2001 (Day 072)
0000-0227. Continue passage to coring station CD126/03
0227-0335. 3.5 kHz survey of station CD126/03
0335-2359. Hove to due to bad weather
14th March 2001 (Day 073)
0000-0838. Hove to due to bad weather
0838. Weather improved sufficiently to restart coring operations. On coring station CD126/03
1314. Corer triggered at 29° 05.14'N, 18° 15.81'W
1521. Corer on deck. End station CD126/03
1611-1645. Passage to coring station CD126/04.
1649. On station CD126/04
1929. Corer triggered at 29° 04.65'N, 18° 15.61'W
2112. Corer on deck. End station CD126/04
2209-2359. Passage to station CD126/05

15th March 2001 (Day 074)
0000-0445. Passage to coring station CD126/05
0445-1220. 3.5 kHz survey in vicinity of station CD126/05
1220. On station CD126/05
1448. Corer triggered at 28° 52.55'N, 19° 56.15'W
1645. Corer on deck
1658. End station CD126/05
1658-1913. Passage to coring station CD126/06
1913. On station CD126/06
2132. Corer triggered at 28° 53.46'N, 19° 56.15'W
2321. Corer on deck. End station CD126/06
2321-2309. Passage to camera station CD126/07

16th March 2001 (Day 075)
0000-1019. Passage to camera station CD126/07
1115. SHRIMP camera system deployed
1242-1448. Camera system operation near seabed
1317. Deployed Scatterometer on port side, using crane
1448-1542. Performing tests on camera system. Begin recovery of SHRIMP
1550. Scatterometer inboard
1630. Damage to conducting cable (broken strands on cable armouring) noted during recovery
1730. Shrimp inboard. End station CD126/07
1740-1937. Passage to coring station CD126/08
1942. On station CD126/08
2149. Corer triggered at 27° 18.92'N, 18° 17.95'W
2316. Corer on deck. End station CD126/08
2324-2359. Passage to coring station CD126/09

17th March 2001 (Day 076)
0000-0104. Passage to coring station CD126/09
0104-0236. 3.5 kHz survey in vicinity of station CD126/09
0236. On station CD126/09
0427. Corer triggered at 27° 15.33'N, 18° 38.84’W
0555. Corer inboard. End station CD126/09
0626-0642. Passage to coring station CD126/10
0832. On station CD126/10
1012. Corer triggered at 27° 14.21’N, 18° 39.00’W
1148. Corer inboard. End station CD126/10
1218-1434. 3.5 kHz survey en route to coring station CD126/11
1528. On station CD126/11
1741. Corer triggered at 27° 02.39’N, 18° 29.02’W
1742-2359. Corer stuck in seabed. Manoeuvring around core site at distances of 800-1500 m to free corer.

18th March 2001 (Day 077)
0000-0448. Corer still stuck in seabed. Manoeuvring around core site at distances up to 2000 m to free corer. Corer released with maximum pullout force of 8.2 t.
0642. Corer inboard. End station CD126/11
0645-0945. 3.5 kHz survey en route to coring station 12
1012. On station CD126/12
1210. Corer triggered at 26° 41.97’N, 18° 15.04’W
1342. Corer inboard. End station CD126/12
1345-1650. 3.5 kHz survey en route to coring station CD126/13
1717. On station CD126/13
1912. Corer triggered at 26° 23.80’N, 17° 58.73’W
2048. Corer inboard. End station CD126/13
2052-2359. Passage to coring station CD126/14

19th March 2001 (Day 078)
0000-0048. Continue passage to coring station CD126/14
0048-0224. 3.5 kHz survey in vicinity of coring station CD126/14
0308. On station CD126/14
0520. Corer triggered at 27° 06.83’N, 17° 56.88’W
0700. Corer inboard. End station CD126/14
0710-0936. Passage to scatterometer trial site (CD126/15) in shelter of El Hierro island
1004-1508. On station CD126/15. Scatterometer trial
1645-1845. Passage to coring station CD126/16
1845. On station CD126/16
2036. Corer triggered at 27° 29.71’N, 17° 26.30’W
2201. Corer inboard. End station CD126/16
2215. Begin passage to Tenerife
2303-2318. Hove to recover echosounder and 3.5 kHz fish
2319-2359. Continue passage to Tenerife
20th March 2001 (Day 079)
0000-0900. Passage to Santa Cruz, Tenerife

SUMMARY OF RESULTS
This was a short but successful cruise. Fourteen coring stations were occupied, with core material recovered on every attempt. Cores were not opened on board, but subsequent laboratory work indicates that the recovered sediments should allow most of the cruise objectives to be addressed. Seabed photography and scatterometer tests were limited by the failure of the conducting cable. However, initial tests of the scatterometer were encouraging.
Table 1. CD 126 Station locations

<table>
<thead>
<tr>
<th>Station No</th>
<th>Station type</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Water depth (m)</th>
<th>Pullout (t)</th>
<th>Core length (m)</th>
<th>Trigger core (m)</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Piston core</td>
<td>31° 27.25'N</td>
<td>17°00.43'W</td>
<td>4454</td>
<td>6.45</td>
<td>5.58</td>
<td>1.10</td>
<td>Turbidites in western Agadir Basin</td>
</tr>
<tr>
<td>2</td>
<td>Piston core</td>
<td>30° 59.55'N</td>
<td>18° 00.58'W</td>
<td>4566</td>
<td>6.54</td>
<td>5.19</td>
<td>1.14</td>
<td>Turbidites on north Canary slope/rise</td>
</tr>
<tr>
<td>3</td>
<td>Piston core</td>
<td>29°05.02'N</td>
<td>18° 15.89'W</td>
<td>3820</td>
<td>6.99</td>
<td>8.52</td>
<td>1.47</td>
<td>Sediment wave field</td>
</tr>
<tr>
<td>4</td>
<td>Piston core</td>
<td>29°04.65'N</td>
<td>18° 15.54'W</td>
<td>3808</td>
<td>6.31</td>
<td>8.14</td>
<td>1.47</td>
<td>Sediment wave field</td>
</tr>
<tr>
<td>5</td>
<td>Piston core</td>
<td>28°52.55'N</td>
<td>19°56.15'W</td>
<td>4520</td>
<td>6.35</td>
<td>8.52</td>
<td>0.66</td>
<td>Edge of Canary debris flow</td>
</tr>
<tr>
<td>6</td>
<td>Piston core</td>
<td>28° 53.46'N</td>
<td>19°56.15'W</td>
<td>4540</td>
<td>7.90</td>
<td>5.81</td>
<td>1.27</td>
<td>Edge of Canary debris flow</td>
</tr>
<tr>
<td>7 (start)</td>
<td>SHRIMP</td>
<td>27°32.09'N</td>
<td>18°11.14'W</td>
<td>3130</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bedforms on El Julan embayment</td>
</tr>
<tr>
<td>7 (end)</td>
<td>SHRIMP</td>
<td>27°33.20'N</td>
<td>18°08.96'W</td>
<td>3000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bedforms on El Julan embayment</td>
</tr>
<tr>
<td>8</td>
<td>Piston core</td>
<td>27° 18.92'N</td>
<td>18°17.95'W</td>
<td>3731</td>
<td>7.50</td>
<td>3.31</td>
<td>1.47</td>
<td>Drape over El Julan landslide</td>
</tr>
<tr>
<td>9</td>
<td>Piston core</td>
<td>27° 15.33'N</td>
<td>18°38.84'W</td>
<td>3880</td>
<td>6.10</td>
<td>4.91</td>
<td>1.36</td>
<td>South edge of Saharan landslide</td>
</tr>
<tr>
<td>10</td>
<td>Piston core</td>
<td>27°14.21'N</td>
<td>18°39.00'W</td>
<td>3876</td>
<td>5.80</td>
<td>1.50</td>
<td>1.33</td>
<td>Just off Saharan debris flow</td>
</tr>
<tr>
<td>11</td>
<td>Piston core</td>
<td>27°02.39'N</td>
<td>18°29.02'W</td>
<td>3814</td>
<td>8.20</td>
<td>5.96</td>
<td>1.47</td>
<td>South edge of Saharan debris flow</td>
</tr>
<tr>
<td>12</td>
<td>Piston core</td>
<td>26° 41.97'N</td>
<td>18°15.04'W</td>
<td>3705</td>
<td>5.71</td>
<td>5.47</td>
<td>1.25</td>
<td>South edge of Saharan debris flow</td>
</tr>
<tr>
<td>13</td>
<td>Piston core</td>
<td>26°23.80'N</td>
<td>17° 58.73'W</td>
<td>3626</td>
<td>5.40</td>
<td>5.52</td>
<td>1.07</td>
<td>South edge of Saharan debris flow</td>
</tr>
<tr>
<td>14</td>
<td>Piston core</td>
<td>27°06.83'N</td>
<td>17°56.88'W</td>
<td>3793</td>
<td>5.70</td>
<td>4.44</td>
<td>0.87</td>
<td>North edge of Saharan debris flow</td>
</tr>
<tr>
<td>15</td>
<td>Scatterometer</td>
<td>27°33.05'N</td>
<td>17°57.84'W</td>
<td>1021</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Scatterometer trial</td>
</tr>
<tr>
<td>16</td>
<td>Piston core</td>
<td>27°29.71'N</td>
<td>17°26.70'W</td>
<td>3653</td>
<td>5.86</td>
<td>5.25</td>
<td>0.89</td>
<td>Drape over Las Playas debris avalanche</td>
</tr>
</tbody>
</table>
Fig. 1. General location map for CD 126
Fig. 2. Track chart and station location map for CD 126. For general location map see Fig. 1.