

## 14. Benthic studies

### 14.1 Megacoring

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#### D285



Three Megacore deployments were carried out at Station M6 (15510#1, 15510#2, and 15510#3) on 22/11/2004 (Julian Day 327). The Megacorer was deployed with eight core tubes on each deployment, and recovered three, four and five cores on subsequent deployments. The cores ranged in depth from 9 to 22 cm, with the average depth approximately 14 cm. The shallow depth of some cores necessitated that they were removed from the corer using the “open top method”. The cores contained light brown calcareous oozes; the colour was consistent throughout the cores, with no obvious redox potential discontinuity layers. All cores contained small patches of black sediment at various depths, suggesting the presence of anoxic microenvironments. Several cores contained lateral macrofaunal burrows to 10 cm sediment depth. Preliminary microscopic examination of the sediments revealed the presence of large numbers of planktonic foraminiferal tests in the sediments.

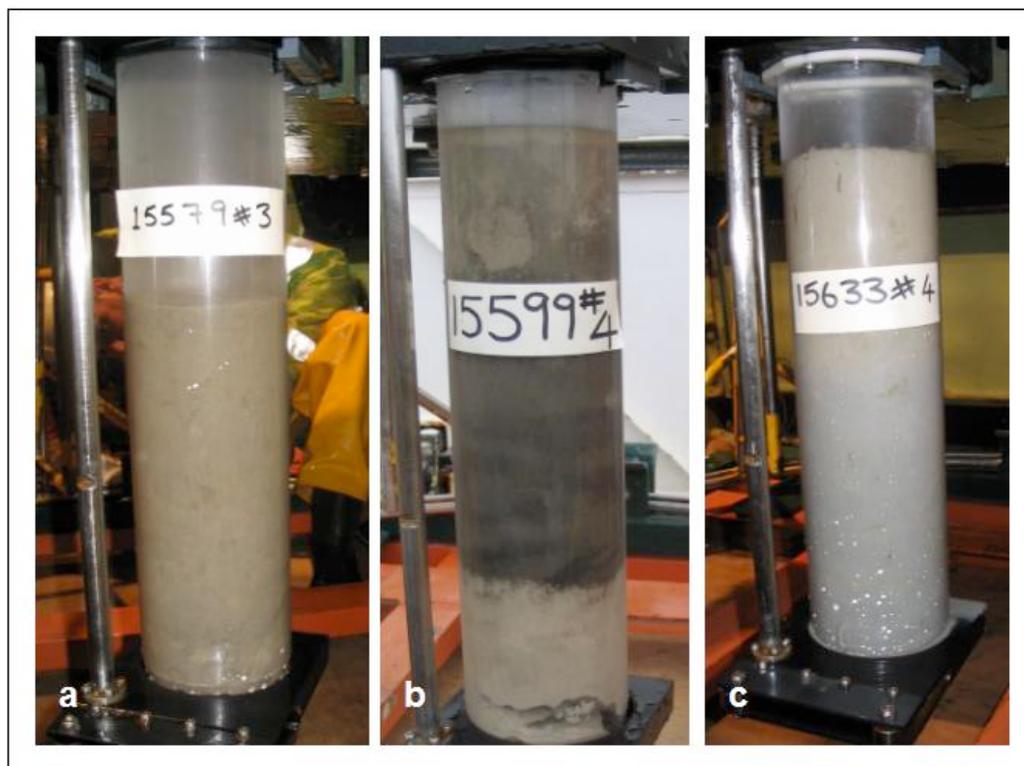
**Table 14.1 Details of Megacorer deployments on D285**

Sample	Water Depth (m)	Number of cores recovered	Comments
15510#1	4201	3	One core sectioned to 10 cm for meiofauna. The other two cores were too disturbed to be used.
15510#2	4217	4	One core sectioned to 10 cm for meiofauna. One core sectioned to 10 cm for lipid analysis. One core sectioned to 5 cm for particle size analysis. Surface sample taken for cyst analysis. One core to be used by Dr. Peter Statham (SOC) for iron flux experiments
15510#3	4220	5	One core sectioned to 10 cm, and one to 5 cm, for meiofauna. One core sectioned to 10 cm for lipid analysis. One core to be used by Dr. Peter Statham (SOC) for iron flux experiments. One core was too disturbed to be used.

In total, seventeen Megacorer deployments were carried out during the cruise: nine at Station M5, six at Station M6, and two at station M10. These are in addition to the three deployments carried out at M6 during D285. The cores were used for a variety of purposes, outlined below.

The overall poor performance of the Megacorer was disappointing. This may be attributed to a combination of the sediments in the area, together with problems with the Megacorer itself.

**D286      M5**



**Fig. 14.1** Photographs of representative cores from a) Site M5 (15579#3), b) Site M6 (15599#4), and c) Site M10 (15633#4). The core tubes have a 10 cm diameter.

The cores ranged in depth from 12.5 to 34.5 cm, with the average depth approximately 23 cm. The cores contained light brown calcareous oozes; the colour was consistent throughout the cores, with no obvious redox potential discontinuity layers (Figure 1a).

**D286      M6**

The seven good cores obtained at M6 varied from 14 to 57 cm deep, with the average depth 42 cm (Figure 1b). All of the cores contained a soft, very pale brown surface layer about 1 cm thick. The sediments got steadily darker with depth, with a series of darker layers, gradually turning black at around 30 cm, although the exact depth varied between cores. In all the deeper cores, there was a “white band” (3 – 9 cm deep) at 35 to 50 cm sediment depth.

**D286      M10**

The four good cores obtained at M10 varied from 36.5 to 39 cm sediment depth. All cores contained homogeneous grey mud (Figure 1c).

**Table 14.2 Details of the Megacorer deployments at M5, and the fate of the cores obtained. From deployment 15577#3 onwards, the Megacorer was deployed with eight multicorer weights attached to corer head.**

Sample	Date	Water Depth (m)	Number of cores recovered	Comments
15577#1	25/12/2004	4269	0/8	
15577#2	25/12/2004	4269	0/6	
15577#3	25/12/2004	4269	3/4	All cores too disturbed to be used.
15579#2	26/12/2004	4269	3/4*	One core sectioned to 10 cm for meiofaunal studies. One core was lost while removing it from the Megacorer. One core was too disturbed to be used.
15579#3	26/12/2004	4269	3/4*	One core sectioned to 10 cm for meiofaunal studies. One core sectioned to 10 cm for lipid analysis. One core was used for pore water studies.
15579#4	27/12/2004	4268	4/4*	One core sectioned to 10 cm for meiofaunal studies. One core sectioned to 10 cm for lipid analysis. One core was used for pore water studies. One core was sectioned for biomarkers.
15582#6	28/12/2004	4270	4/4*	One core was sub-sampled for pigment analyses and a syrin, sub-sample taken for meiofauna. One core sectioned to 10 cm for lipid analysis. One core sectioned to 20 cm for thorium profiles. One core was used for gel probe studies.
15582#9	28/12/2004	4269	4/4*	One core was sub-sampled for pigment analyses and a syrin, sub-sample taken for meiofauna. One core was used for gel probe studies. One core subsampled with syringe subcores for thorium profiles. One core frozen whole.
15582#10	28/12/2004	4267	0/4*	

**Table 14.3 Details of the Megacorer deployments at M6, and the fate of the cores obtained. The Megacorer was deployed with extra weights attached to the head in all deployments.**

Sample	Date	Water Depth (m)	Number of cores recovered	Comments
15597#1	04/01/2005	4221	1/4	One core was sub-sampled for pigment analyses and a syringe sub-sample taken for meiofauna.
15597#2	04/01/2005	4222	1/4	One core was used for pore water studies.
15597#3	04/01/2005	4218	1/4	This core was frozen whole.
15599#4	05/01/2005	4221	4/4	One core was sub-sampled for pigment analyses and a syringe sub-sample taken for meiofauna. One core sectioned to 3 cm for lipid analysis. One core was used for pore water studies. One core was used for gel probe studies, then syringe sub-samples were taken for Thorium studies.
15599#5	05/01/05	4224	0/4	The corer heads failed to fire.
15599#6	05/01/05	4223	0/4	The corer heads failed to fire.

**Table 14.4 Details of the Megacorer deployments at M10, and the fate of the cores obtained.**

Sample	Date	Water Depth (m)	Number of cores recovered	Comments
15633#4	15/01/2005	2955	3/4	One core sectioned to 20 cm for thorium profiles. One core was used for pore water analyses. One core was used for gel probe studies.
15633#5	15/01/2005	2935	3/4	One core was sectioned to 6 cm for pigment analyses. The other two cores were too disturbed to be used.

### Analysis of the Cores

#### Meiofaunal Studies – Alan Hughes

Cores were sectioned to 10 cm sediment depth, and fixed in buffered 4% formalin. On return to the laboratory, these samples will be wet-sorted for benthic foraminifera, including soft shelled and agglutinated taxa, as well as metazoan meiofauna. Syringe sub-cores (2.9 cm internal diameter) were also taken from four cores. These were sectioned in 1 cm layers (0-5 cm), and fixed in buffered 4% formalin. The samples will be used in the study of live (= rose Bengal stained) and dead calcareous foraminiferal assemblages.

### Frozen Cores – Alan Hughes

Entire cores were frozen from both M5 and M6. These will be used for geological analyses.

### Thorium Profiles – Ian Salter

One core was sectioned to 20 cm and frozen. All remaining cores were sub-sampled with syringe cores to 5 cm and sectioned at 1 cm intervals. I attempted to use syringe cores for Thorium analysis but there was too much material for the filter. On return to the laboratory, cores will be analysed for major biogenic components.

### Pigment Analyses – Tania Smith



The surface layers of the cores (5mm) were taken and frozen immediately at -80 °C. HPLC analysis for pigments will be carried out at SOC. These samples will give preliminary results ahead of the benthic CROZEX cruise in December 2005. The objective of my work is to look at the essential compounds available to deep-sea megafauna and how this may effect the community structure and biodiversity. During the Benthic CROZEX cruise Dec 2005 I will trawl for megafauna and compare what the megafauna are consuming with what is available to them, as well as comparing the two contrasting sites, M5 and M6.

### Lipid Analyses – for George Wolff (University of Liverpool)

Cores were sectioned to 10 cm sediment depth, and frozen at -80 °C. On return to the laboratory these samples will be used to compare the biochemical and isotopic composition of carotenoids, steroids and other lipids in sediments at the two stations.

### Gell Probe – Gary Fones

See section 14.6 on sediment geochemistry.

### Pore Water Analyses – Sarah Taylor

See section 14.6 on sediment geochemistry.