

14.4 Sediment chemistry sampling on D286

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The objectives of the sediment geochemistry program were two fold, firstly to calibrate core top proxies for productivity (Opal/calcite/C_{org} accumulation and preservation, authigenic U, Biogenic Ba, 231Pa/230Th) and nutrient utilisation ($\delta^{15}\text{N}$, $\delta^{30}\text{Si}$, $\delta^{13}\text{C}$, Cd/Ca) and to quantify changes through the LGM - recent. All these proxies are affected by sediment focussing, diagenesis, dissolution, and changing water mass characteristics. Secondly to elucidate trace metal gradients within the sediments using pore waters and gel probes. The cores collected represent a

range of productivity and sedimentation regimes which can be coupled to work on the overlying water column.

Table 14.6 Cores for sediment chemistry

Station	Site	Latitude	Longitude	Depth (m)	Date	Time at seafloor (GMT)	# cores
15579#	M5	45°59.97'S	56°08.95'E	4269	26/12/04	21:39	1
C1 - sectioned anaerobically and porewaters extracted for trace metal (SOC) and nutrient (onboard) analysis. Porewaters and solid residue stored at 4°C.							
15579#	M5	45°59.99'S	56°08.93'E	4268	27/12/04	02:14	2
C2 - sectioned for geochemical analysis and stored at 4°C C3 - sectioned for biomarker analysis and stored frozen at -20°C (R. Pancost)							
15582#	M5	45°59.91'S	56°08.94'E	4270	28/12/04	05:41	2
D1 - sampled with DET/DGT probes. Top 5cm subsequently sampled for particle size analysis (A. Hughes)							
15582#	M5	46°00.00'S	56°09.07'E	4269	28/12/04	10:45	2
D2 sampled with DET/DGT probes. Subsequently sampled with 50ml syringe subcores which were then stored frozen at -20°C							
15597#	M6	48°59.98'S	51°20.03'E	4222	04/01/05	10:00	1
C4 - sectioned anaerobically and porewaters extracted for trace metal (SOC) and nutrient (onboard) analysis. Porewaters and solid residue stored at 4°C. Solid sample stored frozen at -20°C							
15599#	M6	49°00.01'S	51°20.00'E	4268	05/01/05	11:26	2
C5 - sectioned for geochemical and biomarker analysis D3 - sampled with DET/DGT probes and subsequently with 50ml syringe cores which were then frozen (2 – I. Salter, 1- G. Fones)							
15633#	M10	44°31.45S	49°59.86E	3227	15/01/05	15:07	2
C6 - sectioned anaerobically and porewaters extracted for trace metal (SOC) and nutrient (onboard) analysis D4 – Sampled with DET/DGT probes and subsequently with 50ml syringe subcore which were then frozen.							

Samples were obtained from the megacorer deployments carried out by Alan Hughes and Ben Boorman (section 14.1). Cores from site M5 contained light brown calcareous oozes, with no obvious redox boundaries. Cores from M6 contained a soft brown surface layer, darkening to black layer at 15-25cm depth suggesting an anoxic environment, overlying a distinct colour change to a light band 2-9cm thick. This layer contained small stones and grains of a volcanic material. Cores from M10 contained light brown shading to light grey sediment. See Fig. 14.1 for photographs of representative cores.

Porewater analysis

Sediment samples for pore water analysis were extruded in a glovebag in which a nitrogen atmosphere has been established and transferred to 125ml centrifuge bottles. The centrifuge bottles were capped in the glovebag, then removed and centrifuged at 3000rpm and 4°C for 30 minutes. The bottles were reopened under a nitrogen atmosphere and the separated porewaters were filtered through 0.45, 0.2 and a 1ml sub-sample through 0.02, filters into 15ml bottles for trace metal analysis (acidified) and vials for nutrients (unmodified). Nitrate, silicate and phosphate were measured on board.

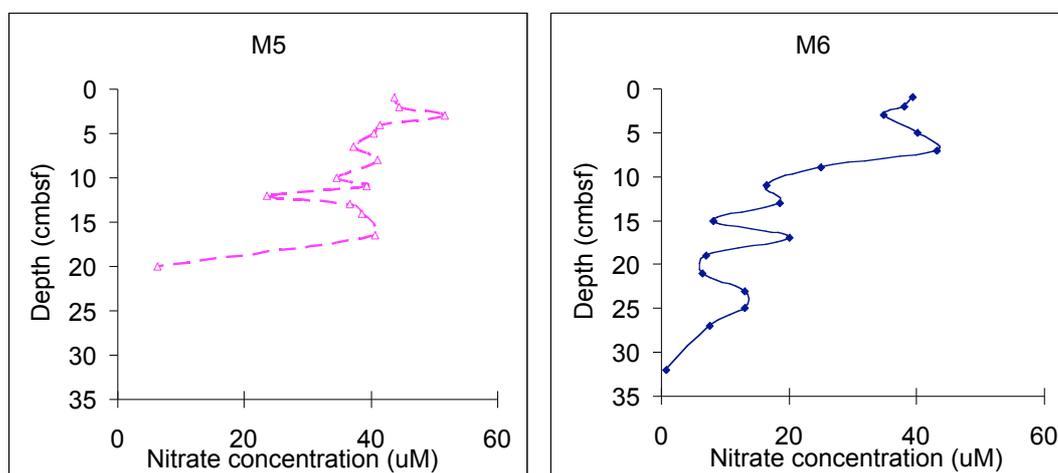


Fig. 14.2 Nitrate profiles obtained for sites M5 and M6

Trace metal geochemistry



Diffusive gradient in thin-films (DET) and diffusive gradients in thin-film (DGT) gel probes were deployed in collected cores (Table 2). These will be used to measure Fe and Mn pore water concentrations (DET) and trace metal gradients (DGT). Collected pore waters will also be analysed for a suite of trace metals including Fe in two fractions (dissolved and soluble) to determine Fe speciation through the core.

Table 14.7 DGT and DET core deployment times

Deployment	Site	Core #	Gel Probes	Date/Time In	Date/Time Out
15582#6	M5	D1	1 x DET & 1 x DG	28/12/04 16.30 GMT	30/12/04 11.20 GMT
15582#9	M5	D2	1 x DET & 1 x DG	28/12/04 16.30 GMT	30/12/04 11.20 GMT
15599#4	M6	D3	1 x DET, 1 x DGT and 1 x μ DGT	06/01/05 08.00 GMT	07/01/05 16.15 GMT
15633#4	M10	D4	1 x DET, 1 x DGT and 1 x μ DGT	16/01/05 13.00 GMT	18/01/05 05.15 GMT