

## 14.2 Gravity coring

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Gravity cores were collected on D286 for Rachel Mills (SOES) for her “PaleoCROZEX” contribution to CROZEX. PaleoCROZEX aims to evaluate a range of proxies for upper ocean processes including carbon export with the ultimate aim of reconstructing water column productivity above the crozet plateau back to the last glacial maximum and use the spatial variability in iron supply and productivity across the Crozet plateau as an analogue for the transition between high and low productivity observed elsewhere in the Southern Ocean. It requires the collection of mega and gravity sediment cores, saps samples and sediment trap material from a range of sites across the plateau.

Eight gravity cores were recovered for use in PaleoCROZEX. The technical details of the acquisition are given below and the Table 14.5 summarises the samples obtained. Three were from M5, the longest was 1m and had a layer of granular black material at the core base. Two were from M6, the longest was 1.2m and had extensive white bands in it. Three were from M10, the longest was 1.5m and had no slumping or fracturing. A dark band was apparent at the base of the core but no other features were noted. The cores were stored at 4°C in a vertical position until the surface water had evaporated. At that point they were cut off close to the core top and recapped for transport back to the UK in a chilled environment.

**Table 14.5 Gravity cores recovered**

Core ID	Site	Lat	Long	Date	Length	Comments
CROZ1	M5	46°S	56°09'E	27/12/04	30cm	
CROZ2	M5	46°	56°09'	27/12/04	1m	Black stuff in base of core retained cutter
CROZ3	M5	46°	56°09'	27/12/04	70cm	
CROZ4	M6	49°	51°20'	5/1/05	80cm	
CROZ5	M6	49°	51°20'	5/1/05	1.2m	White bands
CROZ6	M10	44°31.5'	50°	15/1/05	Ca 150cm	Slumped extensively in liner
CROZ7	M10	44°31.5'	50°	15/1/05	Ca 50cm	Very short and water logged
CROZ8	M10	44°31.5'	50°	15/1/05	Ca 150cm	No slumping or fracturing

### Coring technicalities

The Gravity corer was test assembled and a system of deployment and recovery tested in Port Elizabeth whilst the ship was alongside after D285. A chain lifting strop was made up from mooring components to lift the corer horizontally when moving deck position. Planking was laid within the rail track used for CTD deployment to provide a flat surface and reduce the possibility of tripping over the track. A new wooden coring head cradle and core barrel stands were manufactured at sea, by Ben Boorman. Coring parts were all serviced onboard with the catchers being re-fashioned and the cutter heads being cleaned and machined.

On the 27th December the series of gravity coring operations commenced using procedures as practised in Port Elizabeth, no changes were required to the methods of handling. Details of the 8 gravity cores obtained at 3 stations follow.

### Methods

The method developed in Port Elizabeth was to use the auxiliary winch in conjunction with the main coring warp to lift the corer complete with 2 metre barrel horizontally from its stand over the starboard bulwark. The auxiliary winch then paid out to deploy the corer to the vertical position on the main coring warp. The auxiliary winch wire was then disconnected and the corer lowered to the sea surface at which point the metering was zeroed. The coring winch was then deployed to attach a 1 second repetition 10 kHz beacon. Deployment commenced with pay out at 90 metres a minute and was adjusted through the deployment. Details of each deployment follow.

**Station number 15579 # 7** commenced at 0600 gmt with the corer being lowered into the water using the midships system and coring warp .

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
0602	4271	90	825	50m	
0624	4270	100	1550		
0630	4270	110	1991		
0655	4269	Stopped	4150	514	
0706	4269	50	4616	50	3.5
0707	4269	20		20	
0709		Stopped			
0710	4269	Hauling 20			4.0
0715		Hauling 50		77	
0717	4269	Hauling 90		115	

Corer recovered inboard at 0810 gmt

### **Station 15579 # 9**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
0854	4268	in water	0	100m	
0900	4268	110			
0953	4268	70	4647	50	
0954	4268	50	4699	10	
0955		20			
0958	4268	Hauling 20			3-3
1005	4268	Hauling 50	4636		4.4
1007	4268	Hauling 50			4.0
1008	4268	Hauling 90	4533		4.0

Corer recovered inboard at 1054 gmt

**Station 15579 # 10**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
1130	4267	0	0	100	
1140	4267	110	1303		
1215	4268	110	4261		3.5
1220	4268	30	4766		3.3
1221	4268	Stopped		10	
1223	4268	Haul 20			3.5
1233	4268	Haul 90		165	
1234	4268	Haul 90		225	4.0
1309	4269	Haul 90	2030		2.1

Corer recovered inboard at 1337 gmt

**05/01/05 Station 15599 #1**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
0301	4220	0	0		0.7
0306		0	100	100	
0309	4222	90			
0323	4222	110	1541		0.9
0403		90	4500	260	3.8
0404	4222	20	4649	100	3.1
0409		Haul 20	4722	10	3.1
0418		Haul 50			4.0
0419	4222	Haul 50	4553	50	4.1
0420		Haul 90	4527		3.9

Core recovered

**05/01/05 Station 15599 #2**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
0540	4210	0	0		0.7
0543		110	300		
0632		60		100	
0635	4210	20	4680	65	3.7
0637		0 stop on bed	4724	15	3.4
0642	4210	Haul 20	4724	15	3.4
0649		Haul 20	4612		4.1
0651		Haul 90	4544		4.1

As ship maintained position when corer on seabed , the corer was left on bed from 0637 gmt to 0642 gmt several and pinger height observed as near constant at 15m off

Core recovered

**15 / 01/05 Station 15633#1**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
0658	2955	0	0		0.7
0727		110	2000		1.8
0742		50	3124	136	2.7
0746		20	3222	80	2.3
0751	2955	0	3300	20	2.4
0754		Haul 20	3210		2.8
0757		Haul 90	3189		2.9

Core recovered - upper soft core slumped along liner tube .

**Station 15633#2**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
0902	2955	0	0		0.7
0940	2955	110	2958	100	2.8
0942		50	3180		
0944		20	3223		2.3
0948		0	3290	28	
0950		Haul 20	3290		2.3
0955		Haul 20	3211		2.8
0956		Haul 90	3170		
0959		Haul 90	3000		2.8

Core recovered - liner removed whilst corer held at angle at bulwark.

**Station 15633#3**

Time gmt	Depth metres	Winch speed metres/min	Wire out metres	Pinger metres	Load tonne
1109	2955	0	0		
1114		110			
1137		110	2090		1.9
1152		50			2.8
1154		20	3240	80	2.3
1158	2955	0	3300	20	2.3
1201		20	3293		2.8
1209	2955	90	3185		2.8

Core recovered - liner removed in hangar - vertically .