# Paleoclimate (0 to > 14 ka) of W and NW Iceland: An Iceland/USA Contribution to P.A.L.E.

Cruise Report B9-97 R/V *Bjarni Saemundsson* RE 30 17<sup>th</sup> -30<sup>th</sup> July 1997

Gudrun Helgadottir Marine Research Institute Skulagata 4, 101 Reykjavik Iceland



## Research objectives and cruise results.

Cruise B9-97 was part of a co-operative project between the Marine Research Institute (MRI) in Iceland, the Institute of Alpine and Arctic Research (INSTAAR) of the University of Colorado in U.S.A., and the University of Iceland. This co-operation project is, in turn, part of the international *Paleoclimate of Arctic Lakes and Eustaries* (Shelves) (P.A.L.E.) program. The title of the co-operative is *Paleoclimate* (0 to ≥ 14 ka) of W and NW Iceland, A Comparison of Lake and Near-Shore Marine Proxy Records: A USA/Iceland Contribution to P.A.L.E. INSTAARs participation in the cruise and some of the equipment was funded by the USAs National Science Foundation under PALE/ESH grant ATM-9531397. This cruise was intended to supplement earlier MRI data (seismic profiles and cores from Isafjardardjup/Djupall NW Iceland; cores from Jokuldjup) and cores/seismic material from earlier PALE cruises (HU93030 and JM96). The focus was on the troughs and fjords of W, NW and N Iceland; i.e. areas that link the terrestrial environment with the deeper water continental slopes. We wanted to answer questions like:

- 1. Can we demonstrate the extent of the late Weichselian ice on the NW and N Iceland shelf?
- 2. What is the chronology and paleoenvironments during deglaciation?
- 3. What changes have occurred in Icelandic nearshore waters over the last 10,000 years? How were these changes recorded in marine organisms?
- 4. How does the history of the last 1,000 years compare with the previous 9,000 years? Are there any trends in the records that might pertain to changes in marine productivity?

During the cruise we collected 500 km of 3.5 KHz profiles and over 170 m of core from 38 sites (total 40); the longest core was 5.4 m. Magnetic susceptibility logging was performed on all cores on board.

The crew of the Bjarni Saemundsson was very supportive and helpful. Thanks to their efforts, the coring operations were completed successfully in spite of the limitations of the Bjarni Saemundsson as a coring platform.

## Science complement

Chief Scientist **MRI** Gudrun Helgadottir John T. Andrews Co-Chief Scientist **INSTAAR** Kiartan Thors Co-Chief Scientist Jardfraedistofa K Thors Nancy Weiner Micropal. Technician **INSTAAR** Jorunn Hardardottir Ph.D. student **INSTAAR** Laryn Michaela Smith Ph.D. Student **INSTAAR** Stephanie Cartee M.Sc. Student **INSTAAR** Greta Bjork M.Sc. Student Univ. of Iceland

Kristjansdottir

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## R/V Bjarni Saemundsson RE 30 Crew

Ingi Larusson Captain Chief Mate Arni Sverrisson 2<sup>nd</sup> Mate Jon Marteinn Gudrodarson Chief Engineer Sveinn Kristinsson 2<sup>nd</sup> Engineer Gudjon Magni Einarsson Assistant in engineroom Matthias Bjarnason Bjarni Sveinsson Steward Sigurdur R. Gudmundsson Cook Leifur Eggert Vigfusson **Boatswain** 

Sigurdur R. Gudmundsson Cook
Leifur Eggert Vigfusson Boatswain
Stefan Valtysson Deckhand
Halfdan Gudrodarson Deckhand
Kristvin Thorsson Deckhand

#### **Equipment**

CTD\*

Bathymetry\*

3.5 KHz echo sounder (O.R.E./GeoPulse)\*\*

Grab, (Shipek)\*

Small Gravity Corer, (Woods Hole design)\*, 7 cm diameter, 50 cm barrel lenght Great Gravity Corer, (WHOI Suitcase gravity corer)\*, 11 cm diameter, 3 m barrel lenght used

Piston Corer, (Benthos Model 2175)\*\*\*, 7 cm diameter, 6 m max. barrel lenght; 3m, 4.5m and 6m used

Magnetic susceptibility meter and loop, (Bartington MS2)\*\*\*

Provided by: \* MRI, \*\* Jardfraedistofa K Thors, \*\*\* INSTAAR

## Notes from the diary

17 July, Thursday.

Leaving Reykjavik harbour at 2000 hours (8.00 p.m.) in calm weather, steaming for Jokulfirdir NW Iceland. Estimated sailing time about eighteen hours.

## 18 July, Friday.

Very good weather conditions. All equipment was assembled in the morning and tried at the first station in Jokulfirdir in the following sequence: CTD, grab, gravity corer and piston corer. Water samples were collected 10 meters from the seafloor to obtain 180 values. Surface samples, both Rose Bengal stained and extra surface samples, were collected from the grab. The GGC was deployed from the crane on the port with a 3 meter long barrel. The new piston corer was operated from the big crane on the starboard side. This corer had never been used on this ship and we had difficulties of getting it back on board, when using the 6 meter long barrel and a 4.5 meter long free fall. But all went well and a more than three meter long core was retrieved. The whole procedure took about three hours. The cores were cut into 1 or 1.5 meter long sections and taken to the lab were a whole core magnetic susceptibility logging was performed. The cores were kept in the cold hold for the rest of the cruise. The next station wasn't quite as successful and several different modifications were made to the piston corer which resulted only in a 161 cm long sample. After the experience from this first day we decided to have seven of us on a 12 hours core watch during the daytime and one person (Kjartan) on the echo watch during the night hours. Heading to Djupall in the evening to profile overnight.

# 19 July, Saturday.

The weather is still fine. The profiler didn't work and early this morning Kjartan had found out at least one thing that was wrong. But he needed time to solve that. Three coring stations in Djupall during the day, choosing coring sites from the MRI seismic data plus the line from the Jan Mayen cruise last year. A tight Rose Bengal series sampling was made with the small gravity corer. We aren't quite happy with the result of the piston corer, something seems to be wrong. The longest cores are about 270 cm. The echo sounder fish was deployed after the coring. It didn't work well enough either. Therefore we decided to head eastward to Eyjafjardarall and gain time to fix the echo sounder.

#### 20 July, Sunday.

Calm and extremely good weather. The seismic gear worked at least during a short try on our way to Eyjafjardarall. Coring stations were put on a line from the deepest part of the transect and towards land, chosen after grab sample data from MRI. Two coring stations were occupied, starting after lunch. We are still not satisfied with the operation of the piston corer. We made several attempts, with different configurations of the corer, but never obtainded more than 3 mmeters of core. On the second station we definitely got into glacial marine sediment and this change could also be seen in the MS values. A Rose Bengal series sampling was done with the small gravity corer like we did on one of the stations in Djupall.

## 21 July, Monday.

The same good weather. The echo sounder worked for a short time during the night, but then went wrong again. The tow cable isn't working as it should so it has to be shortened. We took three coring stations during the day. Difficulties with the piston corer in the afternoon. All on deck until 2200 hours and still MS measurements to do, but everyone in a very good working mood; the crew too, and the cook rigged up a barbecue on the deck. The echo sounder seemed to work well in the evening.

## 22 July, Tuesday.

The weather is very good. Seismic measurements during the night with fine records. A strong reflector at about 30 ms depth in the sediment. An ash layer or stiffer bottom? Three coring stations during the day time, in the outer part of Eyjafjardarall and Hunafloadjup.

## 23 July, Wednesday.

The weather is still extremely good. An iceberg is near. Seismics in Hunafloadjup and Reykjafjardarall during the night. Four coring stations in the daytime, but still problem with the PC corer. It doesn't seem to obtain longer than three meter long cores.

#### 24 July, Thursday.

Seismics in Byrgisvikurpollur and in Reykjarfjordur during the night. Three stations afterwards. A break for a short land visit in the morning to Hotel Djupavik on the Zodiac. After an ingenious (and simple) modification of the piston corer, made by the crew, the corer is now doing fine, we are getting up to five and a half meter long cores. The valve on the gravity corer needed a check out.

#### 25 July, Friday.

Seismic profiling north along Hunafloaall and back towards Ingolfsfjordur during night hours. Two coring stations and one grab station in daytime. The GGC is doing fine. Seismic profiling in Drangaall after lunch. A sandy bottom and therefore no core in the GGC. Steam to Djupall in the evening.

## 26 July, Saturday.

Seismic in Djupall from two a.m. Four coring stations with 4 - 5 meters sediment recovery in most of the cores. Heading to Isafjordur town in the afternoon, where we docked overnight.

#### 27 July, Sunday.

Foggy and calm weather. Seismic in Skotufjordur and one coring station in the outer part of the fjord resulting in a 5.3 meter long PC core retrieve. We are definitely getting through the strong reflector at this station. The top 3 meters are sandy with broken shells and gray, mud and silt below. The reflector seems to be the surface of this glaciomarine mud. At the Borgarey station from the beginning of the cruise we now tried to get a longer piston core, and got 382 cm compared to the erlier 160 cm core. Again we obtained a piston core in the Jokulfirdir station with a 4.5 meter retrieve of sediment. The top two meters are sandy and a glaciomarine mud in the lower part like we had in Skotufjordur. A short seismic profile was surveyed out of Jokulfirdir and subsequently we steamed at full speed towards Kolluall overnight.

28 July, Monday.

The wind is stronger, between five and six knots. Seismic profiling in Kolluall in the morning and four coring stations along the trough during the afternoon. The PC was not put out, but the GGC worked well in spite of the weather. Steam to Jokuldjup in the evening.

29 July, Tuesday.

The weather is good, slight breeze. Seismic profiling in Jokuldjup during the night. Four coring stations, with up to five meters long piston cores on all stations. Seismics in the evening. The cores were brought up from the hold and prepared for transport. Heading to Reykjavik.

30 July, Wednesday.

Calm and sunny. In Reykjavik at 0900 hours. Everything put on dock right away; the PC cores were already packed and ready for shipment. The GGC cores were put in the warehouse in Faxaskali. Total length of sediment recovery in the cores over 170 meters.

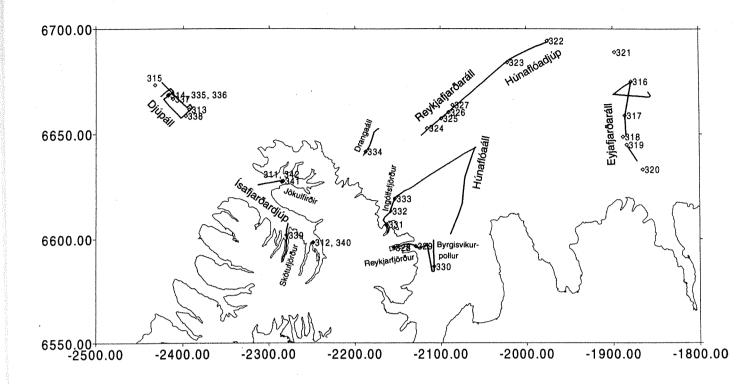
Fig. 1. Maps of echo track lines and sample stations.

Figs. 2 and 3. CTD data from selected stations.

Fig. 4. MS data from selected cores.

Appendix I. Sample record.

Appendix II. Selected seismic profiles with some of the coring stations.



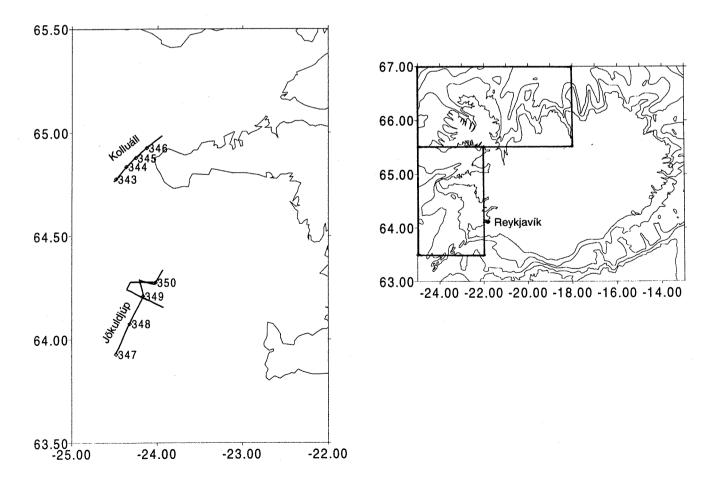


Fig. 1. Maps of echo track lines and sample stations.

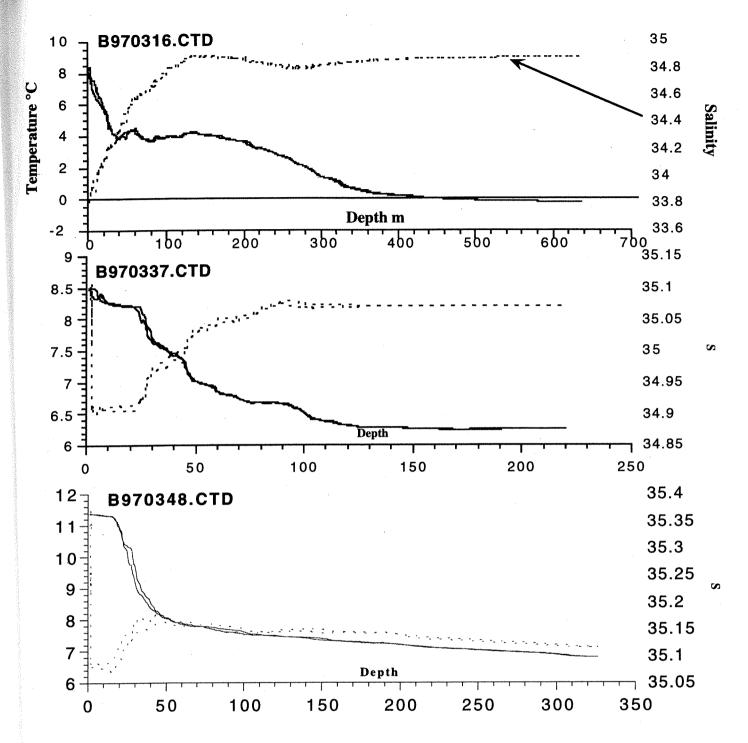


Fig. 2. CTD data from selected stations (see fig. 1 for locations).

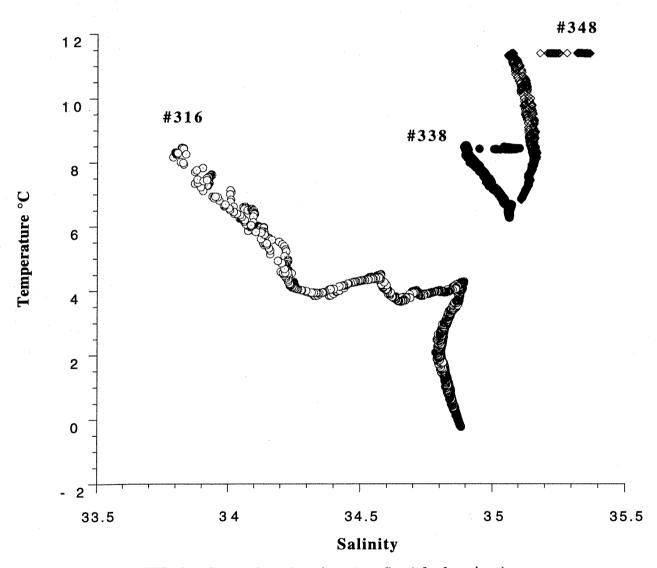
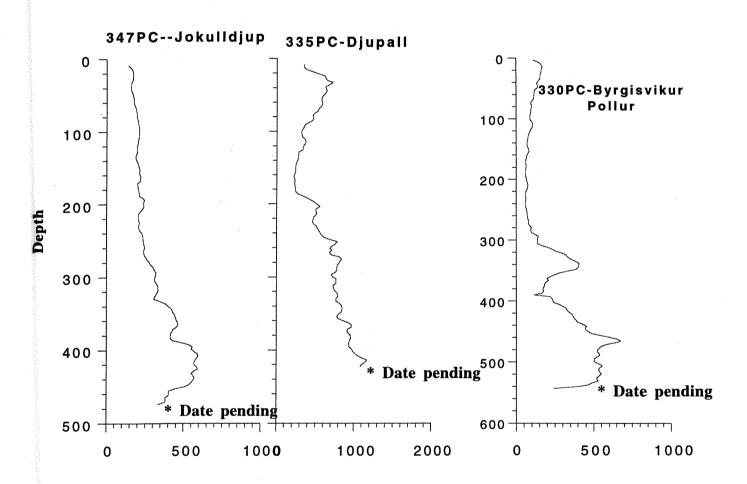


Fig. 3. CTD data from selected stations (see fig. 1 for locations).

Fig. 4. MS Data from selected cores
B9-97 (see map for core locations)



Appendix I. Sample record.

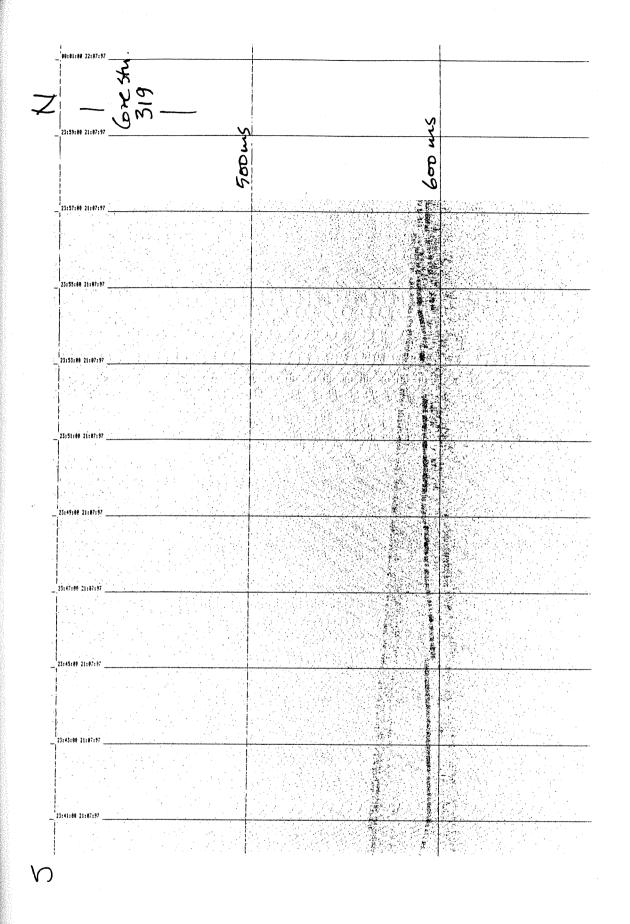
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	Time	Longitude	Latitude	Water depth, m	Grab sample	SGC	399	PC	RB bottle no	CTD bottle no
18-Jul-97	13:55	2251.400	6616.460	100	Įn]				RB 1	769
18-Jul-97	14:25	2250.940	6616.430	100			283.0			
18-Jul-97		2250.580	6616.500	100				328.0		
18-Jul-97	19:13	2229.500	6558.950	72	full				RB 2	770
18-Jul-97	19:50	2229.400	6558.900	74			209.0			
18-Jul-97	20:35	2229.400	6558.900	73				0.0		
18-Jul-97	21:30	2229.440	6558.920	73				0.0		
18-Jul-97		2229.300	6558.890	73	,			160.0		
19-Jul-97	8:30	2356.000	6637.000	213	ĮĘ.				RB3	77.1
19-Jul-97	9:25	2355.800	6637.200	213			128.0			
19-Jul-97		2356.200	6637.200	212			150.0			
19-Jul-97		2355.600	6637.120	212				169.0		
19-Jul-97	13:17	2410.800	6641.000	233	full				RB 4	. 772
19-Jul-97		2410.800	6641.100	234		27.0			RB 26-35	
19-Jul-97		2410.800	6641.100	232			10.0			
19-Jul-97		2411.010	6641.000	228			98.0			
19-Jul-97	16:15	2411.170	6641.020	228				269.0		
19-Jul-97		2419.900	6644.000	217	half full				RB 5	773
19-Jul-97	17:45	2420.600	6644.150	220			20.0			
19-Jul-97	18:15	2418.980	6643.850	220			51.0			
19-Jul-97	19:10	2420.130	6643.960	217				267.	.5	
20-Jul-97	11:40	1847.530	6645.040	656	Į Į				RB 6	774
20-Jul-97	12:05	1847.520	6644.750	658			247.0			
20-Jul-97	7 13:15	1847.240	6645.030	629				268.0		
20-Jul-97	7 14:15	1847.210	6645.170	631		20.0	0		RB 36-45	
20-Jul-97	14:40	1847.260	6645.070	930				0:0	0	
20-Jul-97	7 16:05	1846.870	6645.000	622				281.0		
20-Jul-97		1851.940	6635.330	495	full				RB 7	775
20-Jul-97		1852.170	6635.410	494			127.0			
20-Jul-97		1851.900	6635.270	494				248.0	0	
20-Jul-97	8	1851.850	6635.170	498				0.0	0	
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Sillation         Sillation         Date         Trine         Longlude         Latifude         Water depth, in Gaba sample         SSC         GGC         PC         RRB Date           318         31882         21-Jud-97         8-37         1853-10         15-Jud-97         1853-10         15-Jud-97         1853-10         15-Jud-97         1851-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10-10         18-10         18-10-10									3	Core rengini, cin	_ E		
31851   21-July47   8:30   1853.140   6629.240   450   small sample   minky   mink sample   mink s	Station	Sample no	Date	Time	Longitude	Latitude	Water depth, m		SGC	GGC	PC	RB bottle no	CTD bottle no
318622   21-July47   8447   8450   451   6mpy   451   6mpy   451   6mpy   452   full   452   f	318	318S1	21-Jul-97	8:30	1853.140	6629.240	450	small sample					776
31863C   21-Jul-97   8100   8629.310   452   1411   1435   1852.840   6629.310   453   1411   1415   1851.800   6629.310   453   1411   1415   1851.800   6629.310   450   1411   1415   1851.800   6629.310   422   1411   1415   1851.800   6629.310   422   1411   1412	318	318S2	21-Jul-97	8:47			451	empty					
1180GCC   21-Jul-97   1112   1180Z-800   453   1453   1453   1453   1550CC   11-Jul-97   11151   1180Z-800   451   1450   1451   1451   1451   1450CC   11-Jul-97   11203   1180Z-800   450	318	318S3	21-Jul-97	9:00			452	Tu Tu				RB 8	
318PC2   21-Jul-97   10:10   1883.160   6629.200   451   9.00	318	318GGC	21-Jul-97	9:12	1852.840	6629.310	453			143.5			
318PCZ   21-Jul-97   11:15   1881.800   6628.150   460   460   460   463   4	318	318PC1	21-Jul-97	10:10	1853.160	6629.230	451		٠.		ca. 5.0		
318PC3   21-Jul-97   12.03   1863.110   6628.860   450   1401   180.240   180.240   6628.860   422   14ul   192.0   180.240   6628.820   422   14ul   192.0	318	318PC2	21-Jul-97	11:15	1851.800	6629.150	460				0.0	AND THE PROPERTY OF THE PROPER	
3195   21-Jul-97   13:39   1860.260   6626.850   422   full   f	318	318PC3	21-Jul-97	12:03	1853.110	6628.980	450				ca. 5.0	82	
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320GGC1         21-Jul-97         1945         1893710         6619.890         386         6620.080         386         60.05           320GGZ         21-Jul-97         20:27         1839.900         6620.100         386         160.5         327.0           320PC         21-Jul-97         21:15         1838.040         6620.100         386         161         160.5           321S         22-Jul-97         21:15         1858.675         6653.386         487         full         130.0           321GGC         22-Jul-97         10:02         1868.470         6653.486         484         138.0         300.0           321GGC         22-Jul-97         13:01         144.550         6656.600         357         ca full         130.0           322GGC         22-Jul-97         13:01         144.755         6656.600         358         50         150           322GGC         22-Jul-97         13:45         144.755         6656.608         358         50         150           322GGC         22-Jul-97         14:32         146.560         665.068         358         50         150           322GGC         22-Jul-97         14:32         146.560         665.068	320	3208	21-Jul-97	19:30	1839.500	6620.000	385	full					778
320GGZ         21-Jul-97         20.27         1839,900         6620.100         386         160.5           320PC         21-Jul-97         21:15         1839,040         6620.100         388         16         160.5           321S         22-Jul-97         21:15         1858,040         6620.100         388         17         165.8           321GGC         22-Jul-97         9:11         1668,856         6653,486         484         1380         1380           321GGC         22-Jul-97         10:02         1858,470         6656,800         357         ca full         1380         300.           322GG         22-Jul-97         13:01         1945,500         6656,600         358         50         50         50           322GGC         22-Jul-97         13:45         1945,500         6656,600         358         50         150         50           322GGC         22-Jul-97         13:45         1945,500         6656,068         358         50         150         150           322GGC         22-Jul-97         14:32         1945,560         6656,068         358         358         150         160           323GGC         22-Jul-97         16:25	320	320GGC1	21-Jul-97	19:45	1839.710	6619.890	385			80.0			
320PC         21-Jul-97         21:15         1839,040         6620,100         388         487         full         327.0           321S         22-Jul-97         8:48         1858,675         6653,365         487         full         1380           321GGC         22-Jul-97         9:11         1868,866         6653,470         480         1380         1380           322S         22-Jul-97         13.01         1945,500         6666,800         357         ca full         5.0           322GGC1         22-Jul-97         13.20         1944,725         6666,800         358         5.0         5.0           322GGC2         22-Jul-97         13.45         1945,600         666,800         358         5.0         16.0           322PC1         22-Jul-97         14.32         1945,600         666,008         358         5.0         16.1           322BC2         22-Jul-97         14.32         1946,554         666,008         358         5.0         16.1           323SGC         22-Jul-97         17.44         2013,251         666,043         391         401         16.1           323GC         22-Jul-97         16:00         2013,844         666,068	320	320GG2	21-Jul-97	20:27	1839.900	6620.080	386			160.5			
321S         22-Jul-97         8:48         1858.675         6653.386         487         full         138.0           321GGC         22-Jul-97         9:11         1868.866         6653.470         484         138.0         138.0           321PC         22-Jul-97         10:02         1858.470         6656.800         357         cafull         138.0           322S         22-Jul-97         13:20         1944.725         6656.800         358         5.0         15.0           322GGC1         22-Jul-97         13:45         1945.500         6656.000         358         5.0         15.0           322GGC2         22-Jul-97         13:45         1945.500         6656.000         358         5.0         15.0           322PC1         22-Jul-97         13:45         1945.560         6656.008         358         5.0         15.0           322PC2         22-Jul-97         14:32         1945.564         6656.008         358         5.0         16.1           323BC         22-Jul-97         17:44         2013.261         6650.600         393         5.0         17.0         16.1           323BC         22-Jul-97         18:05         2013.544         6650.600	320	320PC	21-Jul-97	21:15	1839.040	6620.100	388				327.0		
321GGC         22-Jul-97         9:11         1868.856         6653.496         484         1380         1380           321PC         22-Jul-97         10:02         1888.470         6656.600         357         cafull         900.           322SC         22-Jul-97         13:01         1945.500         6656.600         358         5.0         5.0           322GGC2         22-Jul-97         13:45         1945.500         6656.600         358         5.0         5.0           322PC1         22-Jul-97         13:45         1945.500         6656.608         358         5.0         5.0           322PC1         22-Jul-97         14:32         1945.60         6656.068         358         5.0         15.0           322PC1         22-Jul-97         14:32         1945.62         6656.068         358         5.0         16.1           322PC2         22-Jul-97         17:44         2013.251         6650.629         397         6.0         16.1           323GC         22-Jul-97         18:05         2013.251         6650.629         398         170.0         16.1           323GC         22-Jul-97         18:06         2013.644         6650.788         399 <t< td=""><td>321</td><td>3215</td><td>22-Jul-97</td><td>8:48</td><td>1858.675</td><td>6653.395</td><td>487</td><td>full</td><td></td><td></td><td></td><td>RB 11</td><td></td></t<>	321	3215	22-Jul-97	8:48	1858.675	6653.395	487	full				RB 11	
322BC         22-Jul-97         10:02         1858.470         665.340         480         90         300           322S         22-Jul-97         13:01         1945.500         6656.600         357         ca full         9           322GGC1         22-Jul-97         13:20         1944.725         6656.608         358         5.0         5.0           322BC1         22-Jul-97         13:45         1945.568         6656.068         358         5.0         15.0           322PC2         22-Jul-97         15:25         1946.554         6656.088         358         5.0         16.1           322PC2         22-Jul-97         17:44         2013.251         6650.432         357         6.1         16.1           323SC2         22-Jul-97         17:44         2013.251         6650.432         391         ca full         16.1           323GC         22-Jul-97         18:05         2013.394         6650.650         393         170.0         16.1           324SC         22-Jul-97         19:00         2016.804         6650.829         389         170.0         292.0           324SGC         22-Jul-97         19:00         2019.80         6650.829         389	321	321GGC	22-Jul-97	9:11	1858.856	6653.486	484			138.0			
322S         22-Jul-97         13:01         1945.500         6656.809         357         cafull         5.0           322GGC1         22-Jul-97         13:20         1944.725         6656.309         358         15.0         15.0           322GGC2         22-Jul-97         13:45         1945.500         6656.600         358         15.0         15.0           322PC1         22-Jul-97         14:32         1945.685         6656.660         358         15.0         15.0           322PC2         22-Jul-97         14:32         1945.685         6650.689         357         16.1         161.0           323PC         22-Jul-97         17:44         2013.541         6650.650         393         170.0         161.0           323PC         22-Jul-97         18:05         2013.644         6650.650         393         170.0         293.6           324S         22-Jul-97         18:05         2013.644         6650.650         393         170.0         293.6           324SGC         22-Jul-97         8:49         2109.110         6631.450         281         40.0         167.0           324SGC         23-Jul-97         9:00         2109.680         6631.450         284<	321	321PC	22~Jul-97	10:02	1858.470	6653.470	480				300.0		779
322GGC1         22-Jul-97         13:20         1944.725         6656.600         358         5.0           322GGC2         22-Jul-97         13:45         1945.685         6656.608         358         15.0           322PC1         22-Jul-97         14:32         1945.685         6656.068         358         5.0           322PC2         22-Jul-97         15:25         1946.584         6656.284         357         9.0         161.0           323BC         22-Jul-97         17:44         2013.330         6650.650         393         170.0         161.0           323BC         22-Jul-97         18:05         2013.644         6650.650         393         170.0         292.0           323BC         22-Jul-97         19:00         2013.644         6650.650         393         170.0         292.0           324S         22-Jul-97         19:00         2013.644         6650.829         398         40.0         200.0           324S         23-Jul-97         8:49         2109.110         6631.450         281         40.0         40.0         200.0           324GC         23-Jul-97         9:25         2110.061         6631.450         282         40.0         40.0	322	322S	22-Jul-97	13:01	1945.500	6656.600	357	ca full				RB 12	
322GGC2         22-Jul-97         13:45         1945.685         6656.068         358         15.0         15.0           322PC1         22-Jul-97         14:32         1945.685         6656.068         358         9.0         161.0           322PC2         22-Jul-97         15:25         1946.554         6656.294         357         9.0         161.0           323BC         22-Jul-97         17:44         2013.251         6650.650         393         77         70         161.0           323BC         22-Jul-97         18:05         2013.330         6650.650         393         77         70         70           323BC         22-Jul-97         18:05         2013.384         6650.620         393         77         70         292.0           324S         22-Jul-97         20:16         2013.84         6650.829         388         70         70         293.0           324S         23-Jul-97         8:49         2109.110         6631.450         280         40.0         70.0         290.0           324GC         23-Jul-97         9:25         2110.061         6631.426         284         40.0         767.0         70           324PC1         23	322	322GGC1	22-Jul-97	13:20	1944.725	6656.369	358			5.0			
322PC1         22-Jul-97         14:32         1945.685         6656.088         358         958         5.6           322PC2         22-Jul-97         15:25         1946.554         6656.294         357         161.0         161.0           323SC         22-Jul-97         17:44         2013.251         6650.432         391         ca full         161.0           323GC         22-Jul-97         18:05         2013.330         6650.650         393         170.0         161.0           323PC2         22-Jul-97         19:00         2013.644         6650.829         398         170.0         292.0           324SC         22-Jul-97         20:16         2013.984         6650.829         398         170.0         230.0           324SGC         23-Jul-97         9:00         2109.680         6631.600         280         40.0         40.0         167.0           324GC         23-Jul-97         9:25         2110.061         6631.600         284         40.0         167.0         300.0           324PC2         23-Jul-97         11:05         2109.133         6631.51         284         167.0         167.0         300.0           324PC2         23-Jul-97         11:05 </td <td>322</td> <td>322GGC2</td> <td>22-Jul-97</td> <td>13:45</td> <td>1945.500</td> <td>6656.600</td> <td>358</td> <td></td> <td></td> <td>15.0</td> <td></td> <td></td> <td></td>	322	322GGC2	22-Jul-97	13:45	1945.500	6656.600	358			15.0			
322PC2         22-Jul-97         15:25         1946.554         6656.294         357         161.0         161.0           323S         22-Jul-97         17:44         2013.251         6650.432         391         ca full         170.0           323GC         22-Jul-97         18:05         2013.330         6650.650         393         170.0         202.0           323PC         22-Jul-97         19:00         2013.644         6650.829         398         170.0         202.2           324SC         22-Jul-97         8:49         2109.110         6631.450         281         full         170.0         230.6           324SGC         23-Jul-97         9:00         2109.680         6631.600         280         40.0         40.0         167.0           324GC         23-Jul-97         9:25         2110.061         6631.670         284         40.0         167.0         200.6           324PC1         23-Jul-97         10:10         2109.133         6631.519         281         167.0         167.0         167.0           324PC2         23-Jul-97         11:05         2108.688         6631.519         281         167.0         167.0         167.0         167.0         167.0 </td <td>322</td> <td>322PC1</td> <td>22-Jul-97</td> <td>14:32</td> <td>1945.685</td> <td>6656.068</td> <td>358</td> <td></td> <td></td> <td></td> <td>5.0</td> <td></td> <td></td>	322	322PC1	22-Jul-97	14:32	1945.685	6656.068	358				5.0		
323GGC         22-Jul-97         17:44         2013.261         6650.650         393         ca full         70.0           323GGC         22-Jul-97         18:05         2013.330         6650.650         393         170.0         170.0           323PC         22-Jul-97         19:00         2013.644         6650.829         398         170.0         292.0           324SG         22-Jul-97         20:16         2013.984         6650.829         398         16.1         230.1           324SGC         23-Jul-97         8:49         2109.110         6631.450         280         40.0         167.0           324GGC         23-Jul-97         9:25         2110.061         6631.673         284         40.0         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.519         281         167.0         167.0           324PC2         23-Jul-97         11:05         2108.668         6631.519         281         8         167.0         800.0	322	322PC2	22-Jul-97	15:25	1946.554	6656.294	357				161.0		780
323GC         22-Jul-97         18:05         2013.330         6650.650         393         170.0           323PC         22-Jul-97         19:00         2013.644         6650.788         397         70         292.0           323PC         22-Jul-97         20:16         2013.644         6650.788         397         70         293.0           324S         22-Jul-97         20:16         2013.944         6650.829         398         70         230.1           324SGC         23-Jul-97         9:00         2109.680         6631.600         280         40.0         70         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.673         284         167.0         70         300.0           324PC2         23-Jul-97         10:10         2109.133         6631.519         281         70<	323	3238	22-Jul-97	17:44	2013.251	6650.432	391	ca full				RB 13	781
323PC         22-Jul-97         19:00         2013.644         6650.829         397         292.           323PC2         22-Jul-97         20:16         2013.984         6650.829         398         23.01         230.5           324S         23-Jul-97         8:49         2109.110         6631.450         281         full         40.0         230.5           324SGC         23-Jul-97         9:25         2110.061         6631.673         284         40.0         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.426         282         167.0         300.6           324PC2         23-Jul-97         11:05         2108.668         6631.519         281         167.0         1820.6	323	323GGC	22-Jul-97	18:05	2013.330	6650.650	393			170.0			
324SG         23-Jul-97         20:16         2013.984         6650.829         398         239.         230.           324S         23-Jul-97         8:49         2109.110         6631.450         281         full         40.0         230.           324SGC         23-Jul-97         9:00         2109.680         6631.600         280         40.0         167.0           324GC         23-Jul-97         9:25         2110.061         6631.673         284         167.0         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.519         281         167.0         300.0           324PC2         23-Jul-97         11:05         2108.668         6631.519         281         183         183	323	323PC	22-Jul-97	19:00	2013.644	6650.788	397				292.0		
324SGC         23-Jul-97         8:49         2109.10         6631.600         280         40.0         40.0         7           324SGC         23-Jul-97         9:00         2109.680         6631.600         280         40.0         167.0           324GGC         23-Jul-97         9:25         2110.061         6631.673         284         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.519         281         167.0         300.0           324PC2         23-Jul-97         11:05         2108.668         6631.519         281         181         320.0	323	323PC2	22-Jul-97	20:16	2013.984	6650.829	398				230.5		
324GGC         23-Jul-97         9:00         2109.680         6631.600         280         40.0           324GGC         23-Jul-97         9:25         2110.061         6631.673         284         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.426         282         300.           324PC2         23-Jul-97         11:05         2108.668         6631.519         281         320.	324	324S	23-Jul-97	8:49	2109.110	6631.450	281	full				RB 14	782
324PC1         23-Jul-97         9:25         2110.061         6631.673         284         167.0           324PC1         23-Jul-97         10:10         2109.133         6631.426         282         82           324PC2         23-Jul-97         11:05         2108.668         6631.519         281         8	324	324SGC	23-Jul-97	00:6	2109.680	6631.600	280		40.0		ت	ten RB*, RB 46-50	20
324PC1 23-Jul-97 10:10 2109.133 6631.426 282	324	324GGC	23-Jul-97	9:25	2110.061	6631.673	284			167.0			
324PC2 23-Jul-97 11:05 2108.668 6631.519 281	324	324PC1	23-Jul-97	10:10	2109.133	6631.426	282				300.0		
	324	324PC2	23-Jul-97	11:05	2108.668	6631.519	281		-		320.0		

	CTD bottle no	783				784				785			786			787						788				789				790		T		
		╫─			_	12				_			7	,		7						7				7				7				
	RB bottle no	RB 15				RB 16				RB 17			RB 18			RB 19						RB 20	twenty RB			RB 21				RB 22				
	5			0.0	271.0			297.0	167.0			329.5			422.0						447.0				540.0				210.0			530.0		
Core length on	age age		171.0				142.5				116.0			102.0			0.0	0.0	0.0	20.0				153.0			10.0	10.0			221.0			
gio	SGC																						50.0											
	Grab sample	ca full				full				J5			full			ca full						ca full				ca full				full			nearly empty	
	Water depth, m	350	348	348	349	355	360	358	351	368	367	373	94	91	96	110	108	104	=	112	111	165	163	162	170	44	43	46	46	104	112	108	75	
	Latitude	6634.403	6634.508	6634.496	6634.545	6636.193	6636.293	6636.350	6636.333	6638.267	6638.370	6638.485	6557.456	6557.474	6557.416	6557.902	6257.929	6557.805	6558.000	6658.108	6558.002	6552.016	6552.103	6552.366	6552.006	6604.085	6604.020	6604.100	6604.095	6608.177	6908.059	6608.198	6611.514	
	Longitude	2059.837	2059.994	2100.068	2100.197	2054.675	2054.328	2054.822	2055.435	2051.956	2051.651	2051.793	2133.079	2133.176	2132.903	2117.867	2117.780	2117.647	2117.660	2117.780	2117.917	2104.913	2104.829	2104.626	2105.284	2138.177	2138.194	2138.500	2138.422	2135.460	2135.655	2135.085	2132.539	
	Time	12:30	12:50	13:33	14:28	15:41	16:05	16:50	17:57	19:06	19:24	20:05	8:39	8:54	12:58	14:00	14:14	14:27	15:42	15:54	16:30	17:56	18:17	18:48	19:08	10:10	10:18	10:35	10:46	12:00	12:20	12:55	13:42	
	Date	23-Jul-97	24-Jul-97	25-Jul-97																														
	Sample no	325S	325GGC	325PC1	325PC2	326S	326GGC	326PC1	326PC2	327S	327GGC	327PC	328S	328GGC	328PC	329S	329GGC1	329GGC2	329GGC3	329GGC4	329PC	3308	330SGC	330GGC	330PC	3318	331GGC1	331GGC2	331PC	332S	332GGC	332PC	3338	
	Station	325	325	325	325		326		326		327									329	329	330	330	330	330	331	331	331	331	332	332	332	333	

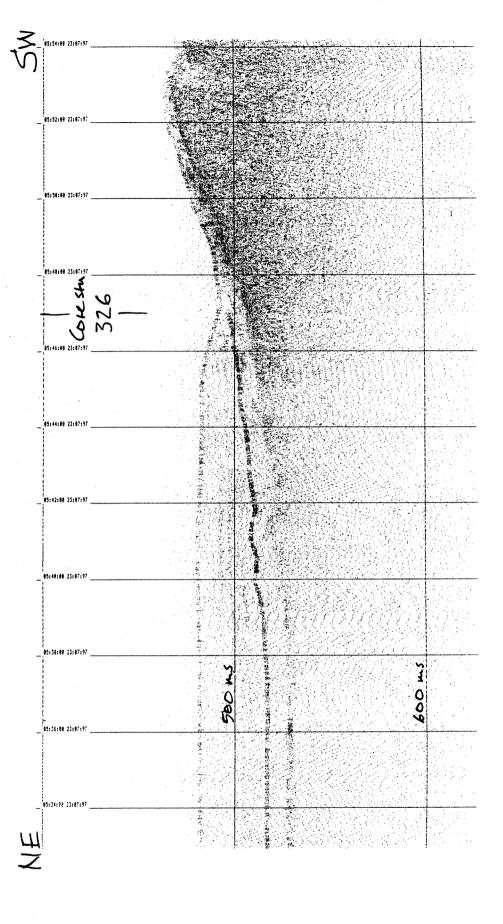
								ŏ	Core lenght, cm	E		
Station	Sample no	Date	Time	Longitude	Latitude	Water depth, m	Grab sample	SGC	GGC	S	RB bottle no	CTD bottle no
334	334S	25-Jul-97	19:26	2152.734	6625.013	131	nearly empty				RB 23	791
334	334GGC1	25-Jul-97	19:34	2152.731	6625.039	132			0.0			
334	334GGC2	25-Jul-97	19:46	2152.824	6625.007	132			0.0			
335	335PC	26-Jul-97	9:22	2410.698	6641.207	239				427.5		
336	336PC1	26-Jul-97	10:10	2409.978	6641.301	242				10.0		
336	336PC2	26-Jul-97	10:58	2409.796	6641.303	242				20.0		
336	336PC3	26-Jul-97	11:35	2409.700	6641.214	242				501.0		
337	3378	26-Jul-97	12:34	2407.544	6640.056	220	ca full				Rb 24	792
337	337GGC1	26-Jul-97	12:48	2407.780	6640.150	223			10.0			
337	337GGC2	26-Jul-97	13:08	2407.728	6640.159	221			10.0			
337	337PC	26-Jul-97	13:28	2407.630	6640.162	221				321.0		
338	33851	26-Jul-97	14:48	2358.546	6635.154	209	one fifth full					721
338	33882	26-Jul-97	14:58	2358.626	6635.242	209	ca full					
338	338GGC	26-Jul-97	15:08	2358.593	6635.332	212			105.0			
338	338PC	26-Jul-97	15:47	2358.606	6635.227	209				412.0		
339	3398	27-Jul-97	13:14	2247.995	6601.075	104	full				RB 25	722
339	339GGC	27-Jul-97	13:27	2248.102	6601.071	104			202.0			
339	339PC1	27-Jul-97	14:07	2248.073	6601.120	104				ca 170.0		
339	339PC2	27-Jul-97	14:57	2248.038	6601.106	104				527.0		
340	340PC	27-Jul-97	16:57	2229.500	6558.950	73				382.0		
341	341PC1	27-Jul-97	20:26	2250.536	6616.612	95				ca. 100.0		
341	341PC2	27-Jul-97	20:56	2250.520	6616.654	94				failed		
341	341PC3	27-Jul-97	21:26	2250.528	6616.620	96				220.0		
342	342PC	27-Jul-97	22:10	2251.674	6616.510	94				444.0		
343	343S	28-Jul-97	14:27	2429.306	6446.604	273	full				two RB	723
343	343GGC	28-Jul-97	14:43	2429.140	6446.559	268			154.0			
344	344S	28-Jul-97	16:38	2422.114	6450.178	282	half full				two RB	724
344	344GGC	28-Jul-97	16:50	2421.826	6450.211	284			10.0			
345	345S	28-Jul-97	18:05	2415.481	6452.716	322	ca full				two RB	725
345	345GGC	28-Jul-97	18:28	2415.920	6452.739	320			61.0			
346	346S	28-Jul-97	19:55	2407.707	6455.615	320	full				two RB	726
346	346GGC	28-Jul-97	20:15	2407.437	6455.812	318			148.0			
347	3478	29-Jul-97	9:03	2428.945	6355.701	321	full				one RB	727
347	347GGC	29-Jul-97	9:20	2429.019	6355.886	372			241.0			
347	347PC	29-Jul-97	10:04	2429.362	6355.828	371				480.0		

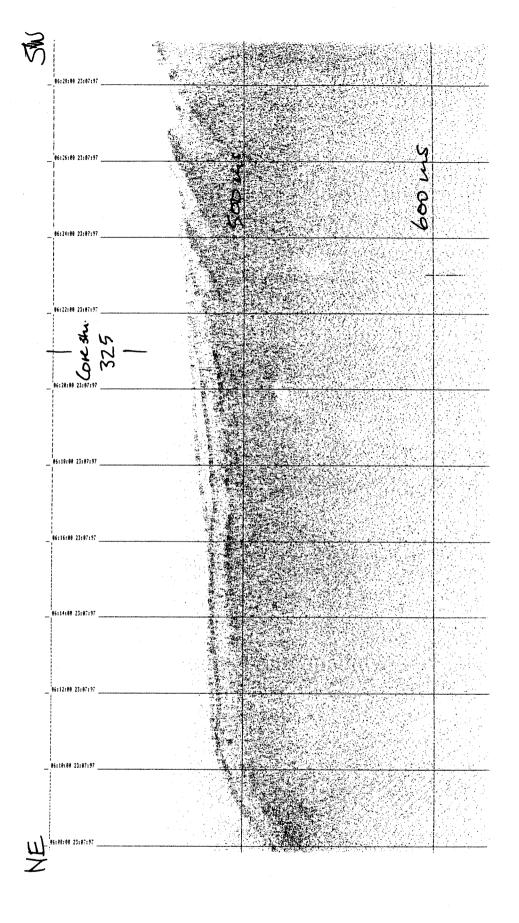
								ပိ	Core lenght, cm	,		
Station	Sample no	Date	Time	Longitude	Latitude	Water depth, m	Grab sample	SGC	GGC	PC	RB bottle no	CTD bottle no
348	348S1	29-Jul-97	11:56	2419.371	6404.563	332	small sample					
348	348S2	29-Jul-97	12:12	2419.567	6404.773	327	<b>1</b>				one RB	728
348	348GGC	29-Jul-97	12:22	2419.345	6404.792	327			212.0			
348	348PC	29-Jul-97	13:10	2419.642	6404.711	328				491.0		
349	349S	29-Jul-97	14:56	2410.044	6412.538	266	ĘĘ				one RB	729
349	349GGC	29-Jul-97	15:26	2410.202	6412.456	267			200.0			
349	349PC	29-Jul-97	16:00	2410.182	6412.502	266				474.0		
350	350S	29-Jul-97	17:24	2401.389	6416.479	239	ca full					730
350	350GGC	29-Jul-97	17:36	2401.373	6416.569	239			199.0			
350	350PC	29-Jul-97	18:00	2401.491	6416.606	238				430.0		
Sum, cm								167.0	4891.5	12649.0		
Total core lenght:	ht:	17707.5										-
S=Shipek grab												
SGC= Small Gravity Corer	ravity Corer											
GGC= Great Gravity Corer	ravity Corer											
PC= Piston Corer	rer											
RB= Rose Bengal sample	gal sample											
* Amount of 60 ml RB bottles	ml RB bottles											

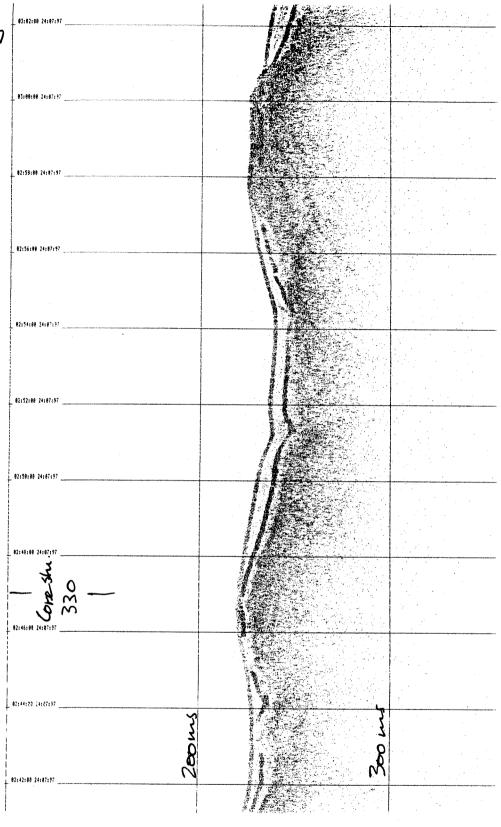


Appendix II. Selected seismic profiles with some of the coring stations.

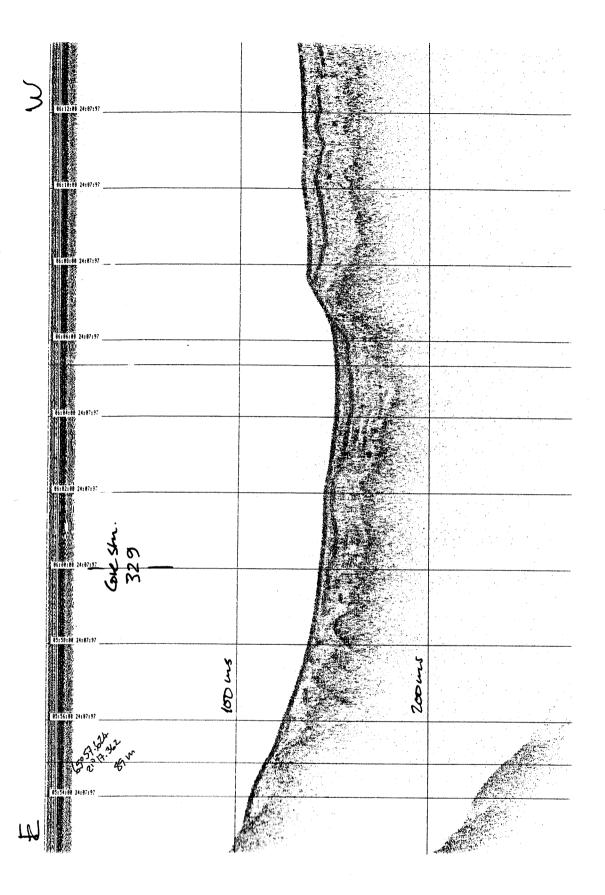
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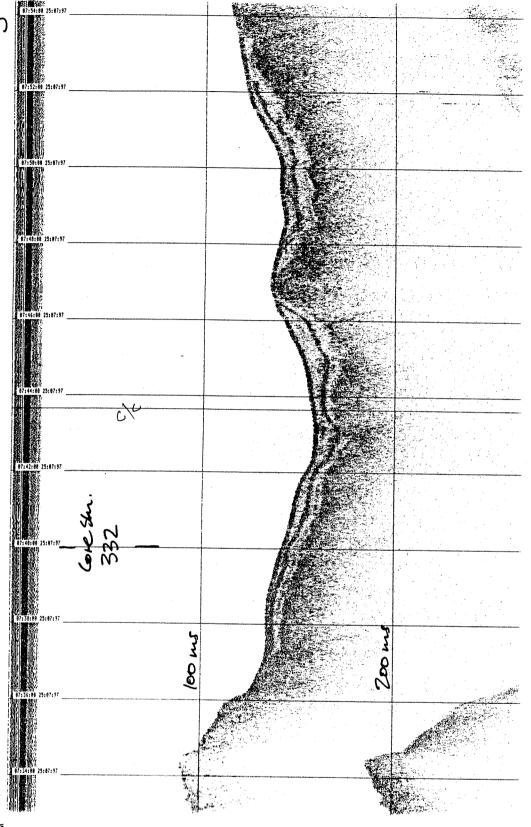


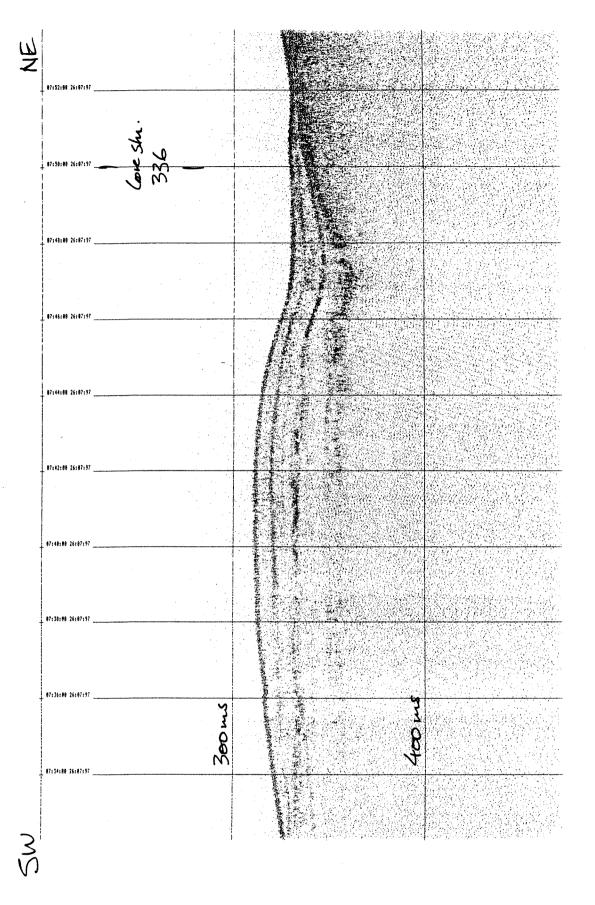




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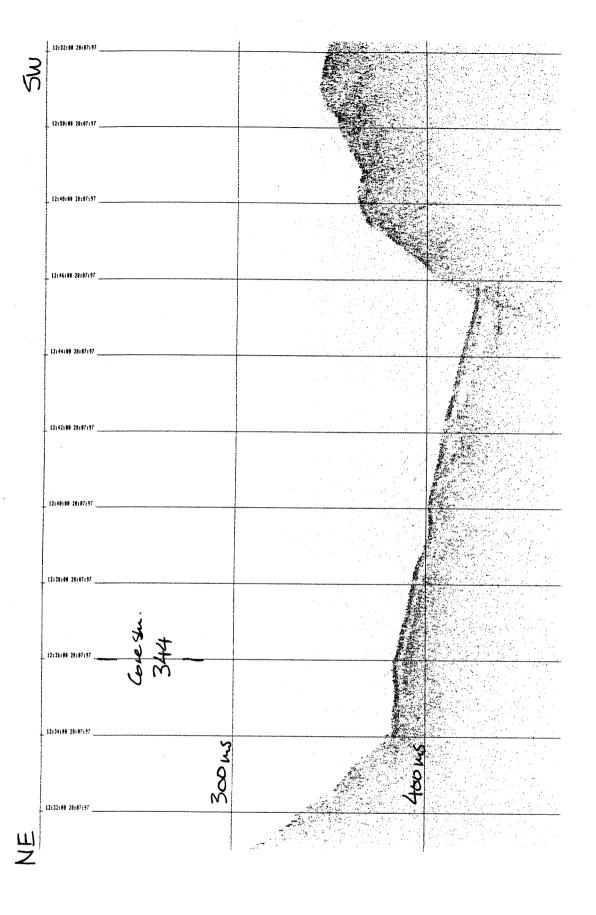




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