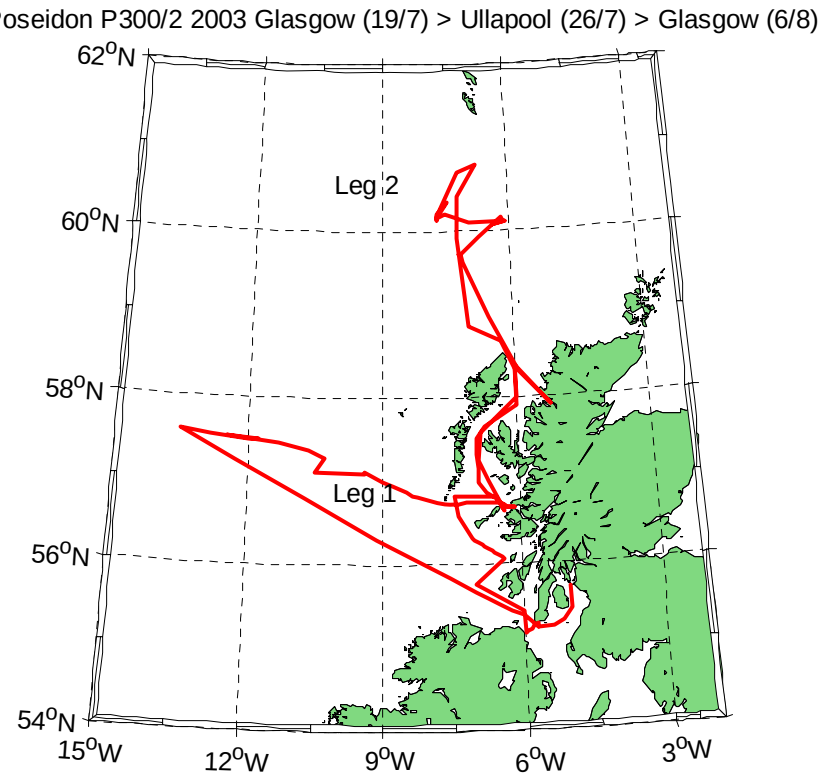
POSEIDON P300-2



Leg 1. Glasgow 19th July 2003 - Ullapool 26th July 2003
Leg 2. Ullapool 26th July 2003 - Glasgow 6th August 2003.

Acknowledgements

It gives me great pleasure to thank Michael Schneider, the officers and crew of the Poseidon for all their help and support during P300/2.

Special thanks to Thomas Mueller for all his support. I would also like to thank the Institut fur Meereskunde, Kiel for the loan of their CTD system. I would also like to thank Mike Webb, Marine Planning Office, NERC, Swindon.

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Personnel

Michael Schneider	Master
Cornelius Nicolai	Chief Officer
Enrico Korner	2nd Officer
Peter Neumann	Chief Engineer
Eberhard Bochnik	2nd Engineer
Daniel Dieling	Electrician
Andreas Schneider	Motor-Man
Franz Grun	Chief Cook
Hans Prechtel	Steward
Joachim Mischker	Bosun
Rainer Badtke	A.B.
Dirk Dehne	A.B.
Reiner Kaiser	A.B.
Frank Schrage	A.B.

Colin Griffiths	PSO, Physics, CTD, Logistics (SAMS)
Paul Provost	CTD, Coring (SAMS)
Clare Johnson	Physics(SAMS)
Rob McLachlan	Moorings (UKORS)
Steve Gontarek	IT, Data Manager (SAMS) – leg 1
Tim Brand	Chemistry (SAMS) – leg 1
Kate Willis	Zooplankton – leg 1
Sonia Mendes	Cetacean Studies (SMRU) – leg 1
Caroline Weir	Cetacean Studies (SMRU) – leg 1
Susan McKinlay	Geochemistry (SAMS) – leg 2
David Hughes	Biology (SAMS) leg 2
Mark Inall	Physics, CTD (SAMS) – leg 2
Jim Watson	Coring (SAMS) leg 2

Cruise Itinerary

Sailed from King George V Dock, Govan, Glasgow on 19th July 2003
Boat transfer of personnel off Ullapool on the 26th July 2003
Returned to KGV Dock on the 6th August 2003.

Cruise Objectives

leg1

1) Occupy the Ellett line CTD stations from Rockall to Sound of Mull.
2) Perform Cetacean survey in the Rockall Channel and the Minch.
3) Collect surface water for Tc99 analysis.
4) Recover remains of moorings F & M.

leg 2

1) Occupy the two stations either side of the Wyville Thomson ridge (WTR), stations WTN and WTS.
2) Gravity core in the Ymir Basin.
3) Deploy two current meter moorings.
4) Conduct various CTD transects in the vicinity of the WTR.
5) Agissez trawling on the WTR between WTN and WTS.
6) Bedhop survey in the vicinty of the Mingulay coral site
7) Gravity core in the Muck deep (+CTD & bedhop camera)
8) CTD surveys in the Tiree Passage (N&S) & North Channel.

Cruise Narrative

18th July 2003

Dave Alsop had arrived in King George V dock just before 0800A. Introduced to the captain, went over some of the paper work, spoke to the agent, everything OK. Fork lift truck and driver helped unload all the SAMS gear. Lorry was unloaded by 1000A. The rest of the day was spent unpacking and stowing all the empty boxes. Meeting in the evening at 1900A with the captain, bosun, chief and 2nd mate to discuss objectives of the cruise and the major items of gear that we will be using.

19th July 2003

Safety briefing at 0900A for the scientific party. Pilot aboard by 1000A and away we go. Overcast with occasional drizzle as we sailed down the river. A bit windy as we sailed down through the Clyde. Southerly wind decreased as we headed through the North Channel. Deployed the hydrophones @ 1833Z, proceeded towards Rockall.

20th July 2003

Making good progress, overcast day with some drizzle, no wind, gentle swell from the south. Hydrophone survey will proceed to Rockall, some contact from dolphins and sperm whales. Passed quite close to a seismic vessel. Change in the weather during the evening, skies began to clear, wind now more from the north, a very gentle swell indeed. Kiel CTD system comprises of CTP + old style Beckman O2 probe, SAMS fluorometer & Seabird rossette with 22 * 10l bottles, bottles 3&4 are missing due to a bracket that has been fitted on the frame. Making good progress towards Rockall, a very gentle swell indeed. Slight mix up with stations, station A (Rockall) had been omitted by mistake. started the line at B with a CTD station just after 2300A, all ok. Hydrophones were recovered just before the station. Steve managed to network CTD machine running Windows 98 with my Gateway 233 running Windows 95. This now means that we can run the Kiel CTD pc for all CTD operations and backup onto my machine. Steve continues to beaver away with the email system, mixed success. Everyone is settling down, the Cetacean watch are busy listening to the signals from the hydrophones, system is working fine. Lots of activity, dolphins followed hydrophones in as they were recovered.

21st July 2003

Arrived at station A (Rockall) at 0030Z, sadly too dark to see the rock, but an extraordinary night, moonlight under a starry night, no wind whatsoever, a very gentle swell indeed. A big change from both D245 & D257. Worked CTDs throught the night, deployed the hydrophones between A & C, broke off after D just after breakfast, proceed straight to F towing the hydrophones. A very good day, sunny spells, not that much cloud. Very little wind just a gentle swell. Interrogated the mooring, no joy, decided to run

along its last known track to H stopping every 2.5 nm to interrogate. Took quite a while to do this, got to H just after 1600Z. No joy talking to the release, sent the release command to the release and waited for 20 minutes keeping a sharp lookout. No sign of mooring on the surface. Towed the hydrophones back to F, ship speed through the night down to 6.5 knots as we are only running on one engine. Deployed the CTD at F just after 2100Z, the release command was sent again, no joy again. A zooplankton net was deployed at F and 50l of surface water were collected for Tc studies. Having problems with the sea water supply in to the lab. Completed F just after 2300Z.

Tuesday 22nd July 2003

Proceeded back to E for the CTD and zooplankton sample, hydrophones on the way. Then a long steam again with the hydrophones to G, just a CTD at this station then onto H. Continued with CTDs along the line. By midnight local time we had got to M.

Wednesday 23rd July 2003

Completed M, hydrophone survey to N, CTD and then towed the hydrophones back to M for 0800A to interrogate the mooring. No joy, we then sent the release code and waited on site for 25 minutes. Conditions have now deteriorated. It's blowing a force 7 and the seas are starting to get up. We will now run an acoustic search between the mooring position and the first Argos alert position. We will stop every 3.5nm to interrogate the mooring. Once again no joy, headed to O towing the hydrophones behind us. CTD at O, then onto P1, completed just before midnight. Wind beginning to pick up again.

Thursday 24th July 2003-07-24

Blowing a good force 8 now from the south. We arrived at P at 0030A. CTD operations have been suspended for the time being. Captain's happy to tow the hydrophones so we headed back West. Decided to switch over to the SAMS system, swapped the SAMS fluorometer from the Kiel system back to the SAMS system. Added the new SBE43 oxygen sensor. Used SAMS CTD at Station P, working fine, had to add some extra weight to it after the first dip as the CTD wire jumped off its roller when the swell picked up the CTD as it entered the water. Sent fax to Graham during the evening with a cruise update.

Friday 25th July 2003

CTD's through the night, nice day, sun is shining, blowing a westerly 4, slight swell from the west. Working our way into the Sound of Mull. Completed the line around 1600A, fist time a SAMS cruise has achieved this since Challenger 124 in January 1996. Slight problems with the Echo Sounder, no reading given that is less than 100m despite the depth, we were caught out twice on the Shelf. Paper record is fine, it's the digital output that is wrong.

On completion of 1G, proceeded to MD4, the station in the Muck Deep, towed the hydrophones en route. We didn't find the deeper part, CTD cast to 200m, water was well mixed below 140m. Then we continued with the hydrophone survey of the Minch. Sadly one of the connections had been damaged on the previous recovery. Steve and the Electrician tried to repair the cable but there was no wiring diagram. The survey was abandoned at 2200A, a new course was set enabling Sonia and Caroline to make a visual survey as we crossed from Stornoway to Ullapool in the morning.

Saturday 26th July 2003

Up at 0800A, a nice day, blowing a 5 SSW, heading across from Stornoway towards Ullapool. On our way into Ullapool stopped to test the NIOZ box corer ~1100A. All went well, near perfect coonditions, bit of sandy mud with the occasional stone. A couple of dents to the bucket. Spoke to Mark in the morning, spoke to Dave Alsop to confirm transport for midday Wednesday 6th August at KGV dock. We will unload that afternoon at the lab. Exchanged personnel just off Ullapool harbour at 1400A. Used a local boat for the transfer, 'Our Seafarer'. Tim, Kate, Steve, Sonia and Caroline got off, Mark, Jim, Susan and Dave joined us. A boat drill at 1530A and away we go. Heading straight for WTS, eta 0800A tomorrow morning.

Sunday 27th July 2003

On station at 0800A, started with a NIOZ box core, first one fine, second one slightly disturbed. Then on a series of 5 failures for various reasons, engineers gave a hand, had tea then tried again, this time successful. Then we did a CTD cast using our CTD, all ok, I've now added the transmissometer. Getting a bit lumpy, CTD fine on recovery though it certainly was a fast re-entry. Prepared the bedhop for deployment but decided to knock it on the head, wind was increasing and conditions were becoming marginal plus I doubted if we'd get any meaningful pictures. I stayed up until midnight, had a chat with the captain, still blowing 6/7 occ 8 SSW.
We'll stay here for the night. Continued with some of the seabird processing, went to bed around 0130A.

Monday 28th July 2003

Conditions slightly better, coring continuing albeit a little slowly but I'm sure things will speed up. Coring had started with the NIOZ box core, took mega cores out of that. Then 3 successful drops with the multicorer. Finished off with a 2.5m successful gravity core. Bedhop camera deployed shortly afterwards, all ok, managed to track it with the E/S on passive with the gain set on 7. No audio o/p but there is a light which indicates pinger activity. All ok, 27 frames exposed, using colour slides. On recovery film had advanced, always a good sign. Then started the 'PA' CTD line over the ridge en route to WTN.

Tuesday 29th July 2003

A far better day, very little wind, just a gentle swell. Full cloud cover but at least it's dry. Wind 2 ENE, sun broke out later in the day. A good coring day, repositioned after doing a Gravity core and multi at WTN (later renamed to WTNa). Moved to a new site using some information from Doug Masson. At last we've found mud North of the WTR. In fact muddier than WTS. A good day, cores galore, everyone very happy. Bedhop after tea, again, splendid fare through the day. CTD's through the night. A nice evening, wind picking up a touch. Forecast 4/5.

Wednesday 30th July 2003

A fine day, finishing off coring at WTNb, CTD, bedhop and release test. Slight problem with the release tests, put two down together but too light, or we went down too fast, came up in a birds nest. Later discovered that one of the releases had been damaged. Wire sorted by Bosun, tail remade by electrician. On our way to pick up the PB line were we left it. A very nice day indeed. Wind beginning to pickup.

Thursday 31st July 2003

CTD's ceased at 0400A, we had got as far as PB11. By breakfast time wind now blowing a good 9. Forecast not looking very good. Depression is not moving. Stay put for the time being. Ship steamed around at 5 knots with the stabilisers out. Not too bad but seas building all the time.

Friday 1st August 2003

On mooring station Wtop at 0600, still blowing a fair bit, CTD first. All ok but a wee bit bumpy. Decided to deploy the mooring, all went ok in marginal sea conditions. Mooring deployed from the stern, using the A frame to get the S/S and anchor clump over the side. Everything was under control but there are a few alterations we can make for the next mooring. In particular, we will need more chain between A/R and train wheels. The A/R with the pyros are extremely vulnerable just as they are going over the back. We were fortunate that the A/R was not damaged during the deployment. We were buzzed by a Danish helicopter just as we were finishing the mooring deployment. All ok bang in position, then set off to rejoin the CTD line were we left it. Conditions continued to deteriorate through the day. CTD's were knocked on the head, conditions were such that the E/S survey wasn't attempted. Forecast is not good, we are stuck in a stationary depression. No let up in sight.

Saturday 2nd August 2003

On the nominal mooring position at 0600, not even going to attempt a CTD dip, conditions not good at all. Mooring postponed for the time being. Sadly we're running out of time, Our breaking off time is accelerating

towards us. The original estimate was based on 9.5 knots all the way to Glasgow. We'll be very lucky if we do 7.5 knots at the moment. With present weather conditions we will have to break off sometime around breakfast tomorrow. By lunchtime it became clear that conditions were not going to improve before the revised break off time. It was decided to run for the Minch were we'd be able to do some work before the end of the cruise. Still very lumpy conditions, made around 5 knots initially, speed up a bit towards midnight.

Sunday 3rd August 2003

Into the Minch, still blowing hard. Conditions a lot better re the sea state. Trying to get hold of Murray to confirm Coral site position. In the meantime we'll head to Tiree for a CTD across the Passage. Started the line at 2308Z, continued with CTD's through the night.

Monday 4th August 2003

Finished the Tiree line at 0225Z, a calm clear night, both lights clearly visible on the spar and the torroid of the Tiree Passage mooring. Steamed up to MD4, the deepest station, started with a CTD then switched over to the gravity core, first attempt too long, removed some lead. Second attempt was fine producing a core of 2.6m. Finished off the station with a bedhop camera survey. Steamed across the Minch to Murray's Coral site off Mingulay. Reached the site at 1406Z. A fair tide running, two attempts at a bedhop camera survey, first attempt was abandoned, second attempt was more successful but the rig was found to be slightly damaged on recovery. Steamed down to the start of the Skerryvore section, a very pleasant evening, slight swell running. Started the line at 2054Z and worked CTD's through the night.

Tuesday 5th August 2003

CTD line completed at 0308Z, steamed down to the North Channel for the final CTD section of the cruise. Commenced the A line at 1304Z and finished at 1613Z. End of science for P300_2. Started packing up and sailed into the Clyde. Thunder and lightening during the evening with a torrential downpour.

Wednesday 6th August 2003

Docked at 1030A in King George V Dock. Unloading completed by mid afternoon. Straight back to the lab, arrived soon after 1800A, unloaded before 1900A.

Poseidon P300/2 Station Log

Date	Time	Lat	Long	Event	Depth	I/W	Bottom	O/W	Stn	Activity	Comments
19/7/03	1833	55 25.69	06 10.58	1	104m	1833	-	2202		HYDRO	27 1/2hour
20/7/03	2244	57 34.077	13 20.379	2	178m	2245	2251	2259	B	CTD001	
21/7/03	0035	57 35.065	13 37.947	3	109m	0036	0040	0051	A	CTD002	
21/7/03	0055	57 35.085	13 38.028	4	109m	0055	0057	0101	A	ZOO001	100m
21/7/03	0124	57 35.06	13 37.38	5	107m	0124	-	0408	A-C	HYDRO	
21/7/03	0429	57 32.914	13 00.078	6	294m	0430	0436	0455	C	CTD003	
21/7/03	0501	57 33.01	12 59.84	7	295m	0501	0506	0510	C	ZOO002	100m
21/7/03	0604	57 31.905	12 51.991	8	1073m	0605	0632	0710	D	CTD004	
21/7/03	0713	57 31.790	12 51.968	9	1080m	0715	0722	0726	D	ZOO003	100m
21/7/03	0735	57 31.60	12 51.23	10	1146m	0735	-	0931	D-F	HYDRO	
21/7/03	0952	57 30.38	12 14.96	11	1810m	0952	-	2020		HYDRO	
21/7/03	2037	57 30.545	12 14.501	12	1807m	2038	2116	2214	F	CTD005	50l Tc99
21/7/03	2222	57 30.78	12 13.10	13	1808m	2222	2226	2230	F	ZOO004	100m
21/7/03	2300	57 30.51	12 13.49	14	1808m	2300	-	0035	F-E	HYDRO	
22/7/03	0056	57 31.920	12 37.997	15	1644m	0058	0143	0246	E	CTD006	
22/7/03	0257	57 31.514	12 36.315	16	1682m	0257	0304	0308	E	ZOO005	100m
22/7/03	0325	57 31.29	12 35.63	17	1690m	0325	-	0545	E-G	HYDRO	
22/7/03	0618	57 29.632	11 51.289	18	1818m	0619	0656	0750	G	CTD007	
22/7/03	0755	57 30.202	11 49.109	19	1786m	0755	-	0850	G-H	HYDRO	
22/7/03	0902	57 28.957	11 32.145	20	2015m	0903	0342	1050	H	CTD008	50l Tc99
22/7/03	1055	57 29.364	11 32.083	21	2016m	1055	1100	1105	H	ZOO006	100m
22/7/03	1200	57 27.964	11 19.037	22	751m	1202	1220	1242	I	CTD009	
22/7/03	1353	57 27.018	11 05.040	23	592m	1353	1407	1432	J	CTD010	50l Tc99
22/7/03	1437	57 27.455	11 04.412	24	592m	1440	1445	1450	J	ZOO007	100m
22/7/03	1551	57 24.291	10 52.233	25	773m	1551	1605	1624	K	CTD011	
22/7/03	1630	57 24.60	10 51.10	26	773m	1630	-	1740	K-L	HYDRO	
22/7/03	1806	57 22.177	10 40.116	27	2079m	1807	1849	2005	L	CTD012	50l Tc99
22/7/03	2008	57 21.950	10 40.619	28	2043m	2008	2017	2021	L	ZOO008	100m
22/7/03	2215	57 17.963	10 22.950	29	2216m	2214	2259	0011	M	CTD013	
23/7/03	0020	57 18.202	10 24.264	30	2213m	0021	0029	0034	M	ZOO009	100m
23/7/03	0033	57 18023	10 23.96	31	2213m	0100	-	0231	M-N	HYDRO	

23/7/03	0248	57 14.101	10 03.325	32	2110m	0248	0327	0425	N	CTD014	50l Tc99
23/7/03	0443	57 14.590	10 6.079	33	2139m	0443	-		N-M	HYDRO	
23/7/03	1426	56 56.151	10 36.799	34		1428		1805		HYDRO	
23/7/03	1820	57 08.961	09 42.103	35	1944m	1820	1901	2005	O	CTD015	
23/7/03	2103	57 07.412	09 33.884	36	1797m	2103	2140	2228	P1	CTD016	
24/7/03	0010	57 06.37	09 27.06	37	1591m	0010	-	0615	P1-P	HYDRO	
24/7/03	1025	57 06.029	09 25.186	38	1427m	1025	1106	1152	P	CTD017	50l Tc99
24/7/03	1318	57 04.666	09 19.202	39	732m	1318	1339	1412	Q1	CTD018	
24/7/03	1511	57 03.066	09 12.944	40	303m	1511	1519	1538	Q	CTD019	
24/7/03	1544	57 03.213	09 12.505	41	273m	1546	1551	1558	Q	ZOO010	100m
24/7/03	1644	57 01.528	09 06.441	42	151m	1644	1648	151	R1	CTD020	
24/7/03	1743	57 00.030	08 59.945	43	132m	1743	1752	1805	R	CTD021	50l Tc99
24/7/03	1808	57 00.013	08 59.749	44	131m	1808	1814	1818	R	ZOO011	100m
24/7/03	1934	57 56.964	08 46.931	45	123m	1935	1944	1952	S	CTD022	
24/7/03	1959	56 56073	08 46.23	46	124m	1959	-	2134	S-15G	HYDRO	
24/7/03	2145	56 52.979	08 30.089	47	124m	2145	2158	2215	15G	CTD023	50l Tc99
24/7/03	2218	56 52.981	08 30.603	48	125m	2218	2223	2228	15G	ZOO012	No sample
24/7/03	2342	56 50.251	08 20.089	49	131m	2342	2345	2350	T	CTD024	
25/7/03	0001	56 50.164	08 19.290	50	132m	0005	-	0140	T-13G	HYDRO	
25/7/03	0155	56 47.037	08 00.112	51	121m	0155	0159	0208	13G	CTD025	50l Tc99
25/7/03	0214	56 47.238	08 00.326	52	120m	0215	0222	0228	13G	ZOO013	100m
25/7/03	0244	56 47.100	07 57.720	53	118m	0244	-	0400	13G-11G	HYDRO	
25/7/03	0423	56 44.030	07 39.971	54	~56m	0423	0425	0432	11G	CTD026	Hit bottom
25/7/03	0442	56 44.135	07 39.864	55	~56m	0442	0445	0448	11G	ZOO014	50m
25/7/03	0456	56 44.120	07 39.711	56	~56m	0456	0458	0502	11G	CTD027	
25/7/03	0605	56 44.033	07 29.973	57	217m	0605	0615	0623	10G	CTD028	50l Tc99
25/7/03	0733	56 44.000	07 19.991	58	156m	0733	0744	0757	9G	CTD029	
25/7/03	0802	56 43.99	07 20.14	59	154m	0802	0807	0813	9G	ZOO015	100m
25/7/03	0821	56 43.78	07 20.10	60	154m	0810	-	1008	9G-7G	HYDRO	
25/7/03	1011	56 44.080	06 59.920	61	136m	1011	1021	1028	7G	CTD030	25l Tc99
25/7/03	1133	56 44.111	06 44.678	62	~35m	1133	1136	1140	6G	CTD031	25l Tc99
25/7/03	1146	56 44.222	06 44.489	63	~35m	1147	1149	1151	6G	ZOO016	30m
25/7/03	1158	56 44.141	06 42.557	64	~35m	1207	-	1252	6G-4G	HYDRO	
25/7/03	1254	56 44.009	06 27.126	65	111m	1311	1315	1324	4G	CTD032	50l Tc99
25/7/03	1331	56 44.223	06 27.199	66	~120m	1330	1334	1338	4G	ZOO017	100m

25/7/03	1434	56 41.115	06 17.155	67	~25m	1434	1435	1436	2G	CTD033	50l Tc99
25/7/03	1534	56 40.182	06 08.122	68	~80m	1534	1543	1549	1G	CTD034	50l Tc99
25/7/03	1555	56 40.200	06 08.013	69	~70m	1555	1558	1605	1G	ZOO018	70m
25/7/03	1615	56 40.03	06 08.53	70	~70m	1615	-	1750		HYDRO	
25/7/03	1807	56 48.339	06 31.334	71	220m	1807	1818	1827	MD4	CTD035	
25/7/03	1833	56 48.41	06 31.40	72	268m	1833	-	2057		HYDRO	Problems
25/7/03	1003	57 56.402	05 28.088	73	62m	1003	-	1026	Skerries	NIOZ	Trial
27/7/03	0722	59 43.078	07 09.929	74	1054m	0722	0800	0827	WTS	NIOZ	SSW 5/6
27/7/03	0851	59 43.09	07 09.91	75	1092m	0851	0920	0947	WTS	NIOZ	1148m w/o
27/7/03	1121	59 43.08	07 09.85	76	1141m	1121	1143	1203	WTS	NIOZ	No sample
27/7/03	1205	59 43.15	07 10.06	77	1091m	1205	1220	1239	WTS	NIOZ	No sample
27/7/03	1254	59 43.03	07 09.96	78	1091m	1254	1312	1333	WTS	NIOZ	No sample
27/7/03	1357	59 43.01	07 10.00	79	1090m	1357	1414	1435	WTS	NIOZ	No sample
27/7/03	1705	59 42.96	07 09.77	80	1093m	1705	1728	1751	WTS	NIOZ	1147m w/o
-	-	-	-	81	-	-	-	-	-	-	-
27/7/03	1851	59 42.958	07 09.167	82	1095m	1851	1917	1945	WTS	CTD036	
28/7/03	0729	59 42.841	07 08.695	83	1094m	0709	0728	0750	WTS	NIOZ	1155m w/o
28/7/03	1002	59 43.05	07 10.29	84	1088m	1002	1020	1042	WTS	Mega x2	No sample
28/7/03	1159	59 43.27	07 11.08	85	1076m	1113	1131	1255	WTS	Multi x6	5 OK
28/7/03	1381	59 43.074	07 09.918	86	1088m	1333	1350	1418	WTS	Multi x6	5 OK
28/7/03	1427	59 43.10	07 10.01	87	1092m	1427	1445	1509	WTS	Multi x6	5 OK
28/7/03	1555	59 43.37	07 10.17	88	1093m	1555	1609	1631	WTS	Gravity	2.5m
28/7/03	1733	59 42.91	07 10.19	89	1090m	1730	1849	1855	WTS	Bedhop	27exps.
28/7/03	2039	59 49.212	06 57.038	90	1038m	2039	2102	2126	PA2	CTD037	
28/7/03	2215	59 52.103	06 50.007	91	935m	2215	2235	2258	PA3	CTD038	
29/7/03	0000	59 55.083	06 43.446	92	618m	0000	0015	0031	PA4	CTD039	
29/7/03	0130	59 58.109	06 37.113	93	330m	0129	0139	0150	PA5	CTD040	
29/7/03	0252	60 01.099	06 30.522	94	467m	0252	0304	0317	PA6	CTD041	
29/7/03	0544	60 10.00	06 09.91	95	1226m	0544	0601	0630	WTNa	Gravity	2.5m
29/7/03	0719	60 10.53	06 08.41	96	1232m	0719	0740	0810	WTNa	Multi	2 stony
29/7/03	0818	60 11.20	06 07.51	97	1236m	0818	0836	0858	WTNa	Multi	1 OK
29/7/03	1020	60 05.78	06 06.27	98	1155m	1020	1036	1057	WTNb	Multi	7 OK
29/7/03	1145	60 06.27	06 06.25	99	1163m	1145	1201	1225	WTNb	Multi	7 OK
29/7/03	1232	60 06.43	06 06.37	100	1165m	1232	1246	1310	WTNb	Multi	5 OK
29/7/03	1324	60 06.06	06 06.52	101	1169m	1324	1342	1403	WTNb	Multi/Mega	2Me,1Mu

29/7/03	1422	61 06.67	06 06.79	102	1170m	1422	1436	1502	WTNb	Multi/Mega	1Me,6Mu
29/7/03	1520	60 06.62	06 07.03	103	1169m	1520	1533	1555	WTNb	Gravity	3m
29/7/03	1729	60 05.855	06 05.919	104	1159m	1730	1750	1855	WTNb	Bedhop	25 exps.
29/7/03	2004	60 10.080	06 10.006	105	1227m	2002	2038	2112	WTNb	CTD042	
29/7/03	2213	60 06.957	06 16.730	106	1166m	2213	2239	2303	PA8	CTD043	
30/7/03	0000	60 04.009	06 23.792	107	1087m	0003	0021	0042	PA7	CTD044	
30/7/03	0124	60 01.674	06 29.192	108	590m	0124	0140	0154	PB1	CTD045	
30/7/03	0249	60 03.087	06 37.971	109	712m	0249	0304	0320	PB2	CTD046	
30/7/03	0603	60 05.69	06 05.38	110	1153m	0603	0619	0641	WTNb	NIOZ	No sample
30/7/03	0729	60 50.76	06 03.85	111	1154m	0729	0748	0807	WTNb	NIOZ	1200m w/o
30/7/03	0827	60 05.93	06 02.27	112	1152m	0827	0846	0905	WTNb	NIOZ	
30/7/03	0946	60 06.098	06 05.631	113	1160m	0946	1012	1042	WTNb	CTD047	
30/7/03	1119	60 06.237	06 05.312	114	1163m	1119	1136	1250	WTNb	Bedhop	25 exps.
30/7/03	1302	60 06.54	06 05.31	115	1162m	1302	0321	0354	WTNb	ReleaseTest	Double
30/7/03	1620	60 03.048	06 49.180	116	712m	1622	1638	1759	PB3	CTD048	
30/7/03	1741	60 05.113	06 56.031	117	737m	1741	1759	1818	PB4	CTD049	
30/7/03	1903	60 06.724	07 04.197	118	719m	1903	1923	1958	PB5	CTD050	
30/7/03	2052	60 08.527	07 13.826	119	754m	2052	2111	2132	PB6	CTD051	
30/7/03	2224	60 10.464	07 23.230	120	753m	2224	2242	2259	PB7	CTD052	
30/7/03	2343	60 12.441	07 31.865	121	675m	2343	2358	0017	PB8	CTD053	
31/7/03	0055	60 14.130	07 39.588	122	716m	0056	0113	0133	PB9	CTD054	
31/7/03	0213	60 16.155	07 48.065	123	708m	0213	1230	0251	PB10	CTD055	
31/7/03	0329	60 17.694	07 55.014	124	705m	0332	0349	0406	PB11	CTD056	
31/7/03	1910			Pos1							Survey
31/7/03	1925	60 08.831	07 50.806	Pos2	617m						
31/7/03	1930	60 09.095	07 50.927	Pos2	606m						
31/7/03	1955	60 12.655	07 48.969	Pos3	570m						
31/7/03	2003	60 12.521	07 48.982	Pos3	569m						
31/7/03	2059	60 07.534	07 46.995	Pos4	549m						
31/7/03	2107	60 07.683	07 46.969	Pos4	637m						
31/7/03	2203	60 14.802	07 44.965	Pos5	687m						
31/7/03	2212	60 14.660	07 49.986	Pos5	687m						
31/7/03	2343	60 06.339	07 42.928	Pos6	619m						
1/8/03	0049	60 13.53	07 40.97	Pos7	675m						
1/8/03	0207	60 05.76	07 39.00	Pos8	590m						

1/8/03	0305	60 11.76	07 37.00	Pos9	578m						
1/8/03	0330	60 08.60	07 35.00	Pos10	544m						
1/8/03	0351	60 10.50	07 32.50	Pos11							
1/8/03	0517	60 10.866	07 44.199	125	642m	0517	0538	0550	WTOP	CTD057	
1/8/03	0810	60 10.98	07 44028	126	643m	0810	0858	-	WTOP	Mooring	
3/8/03	2308	56 36.723	06 20.328	127	45m	2308	2312	2316	Y8	CTD058	
3/8/03	2340	56 37.233	06 20.834	128	78m	2340	2345	2350	Y7	CTD059	
4/8/03	0010	56 37.448	06 22.091	129	54m	0010	0014	0016	Y6	CTD060	
4/8/03	0035	56 37.936	06 22.948	130	50m	0035	0039	0042	Y5	CTD061	
4/8/03	0103	56 38.318	06 24.114	131	50m	0107	0109	0111	Y4	CTD062	
4/8/03	0130	56 38.728	06 25.276	132	49m	0130	0133	0136	Y3	CTD063	
4/8/03	0152	56 39.293	06 26.467	133	69m	0152	0157	0201	Y2	CTD064	
4/8/03	0217	56 39.392	06 26.967	134	70m	0217	0221	0225	Y1	CTD065	
4/8/03	0703	56 48.703	06 30.900	135	302m	0704	0714	0728	MD4	CTD066	
4/8/03	0743	56 48.674	06 30.920	136	308m	0743	0750	0759	MD4	Gravity	Too long
4/8/03	0833	56 48.663	06 30.945	137	311m	0837	0846	0852	MD4	Gravity	2.6m
4/8/03	0930	56 48.680	06 31.020	138	310m	0930		1100	MD4	Bedhop	25 exps.
4/8/03	1406	56 49.178	07 24.819	139	105m	1407		1429	C1	Bedhop	Aborted
4/8/03	1500	56 49.178	07 24.819	139a	129-88m	1500		1600	C1	Bedhop	20 exps.
4/8/03	2054	56 18.472	07 04.985	140	85m	2054	2100	2107	S1	CTD067	
4/8/03	2133	56 17.049	07 00.605	141	75m	2133	2136	2142	S2	CTD068	
4/8/03	2209	56 15.657	06 56.409	142	70m	2209	2213	2218	S3	CTD069	
4/8/03	2245	56 14.251	06 52.093	143	67m	2245	2249	2255	S4	CTD070	
4/8/03	2330	56 12.607	06 47.854	144	66m	2330	2333	2337	S5	CTD071	
5/8/03	0009	56 11.213	06 43.591	145	60m	0009	0011	0014	S6	CTD072	
5/8/03	0049	56 09.691	06 39.353	146	69m	0049	0051	0055	S7	CTD073	
5/8/03	0124	56 08.289	06 34.962	147	70m	0124	0127	0130	S8	CTD074	
5/8/03	0157	56 06.767	06 30.902	148	44m	0157	0159	0201	S9	CTD075	
5/8/03	0230	56 05.381	06 26.609	149	40m	0230	0232	0234	S10	CTD076	
5/8/03	0304	56 03.868	06 22.273	150	30m	0304	0306	0308	S11	CTD077	
5/8/03	1304	55 09.387	05 59.732	151	78m	1304	1308	1313	A5	CTD078	
5/8/03	1351	55 11.305	05 55.807	152	133m	1351	1358	1403	A4	CTD079	
5/8/03	1435	55 13.084	05 51.903	153	124m	1435	1443	1448	A3	CTD080	
5/8/03	1523	55 15.162	05 47.589	154	125m	1523	1530	1535	A2	CTD081	
5/8/03	1613	55 16.697	05 44.317	155	41m	1607	1613	1617	A1	CTD082	

Individual Cruise Reports

Acoustic surveys for cetaceans West of Britain
Sonia Mendes & Caroline Weir

Passive acoustic surveys for cetaceans were carried out west of Scotland throughout the Ellet Line and Minch from the *RV Poseidon* between the 19th of July and 26th July 2003. In total 146 hours were spent monitoring for cetacean vocalizations corresponding to 826 miles of track surveyed. 30 hours were also spent visually scanning the horizon in search of cetaceans.

A two-element hydrophone array was towed 400 metres behind the vessel between the CTD stations where travel times exceeded 1 hour, and between transect lines and the acoustic signals were monitored around the clock by a two person team, with 1 minute listening stations each 15 minutes. The system was sensitive to frequencies between 200 Hz and 22 kHz and allowed the detection of sperm whales and most dolphin species. In addition, the software packages *Rainbow Click* (IFAW) and *Whistle* (IFAW), designed to automatically detect the calls of sperm whales and dolphins, were run in real time throughout the surveys.

Sperm whales and dolphin species were acoustically detected during these surveys. Dolphins were detected in 39.3% of the listening stations (Fig. 1); sperm whales in 14.3% (Fig. 2). Seismic surveys were heard on 34.8% of the occasions (Fig. 3).

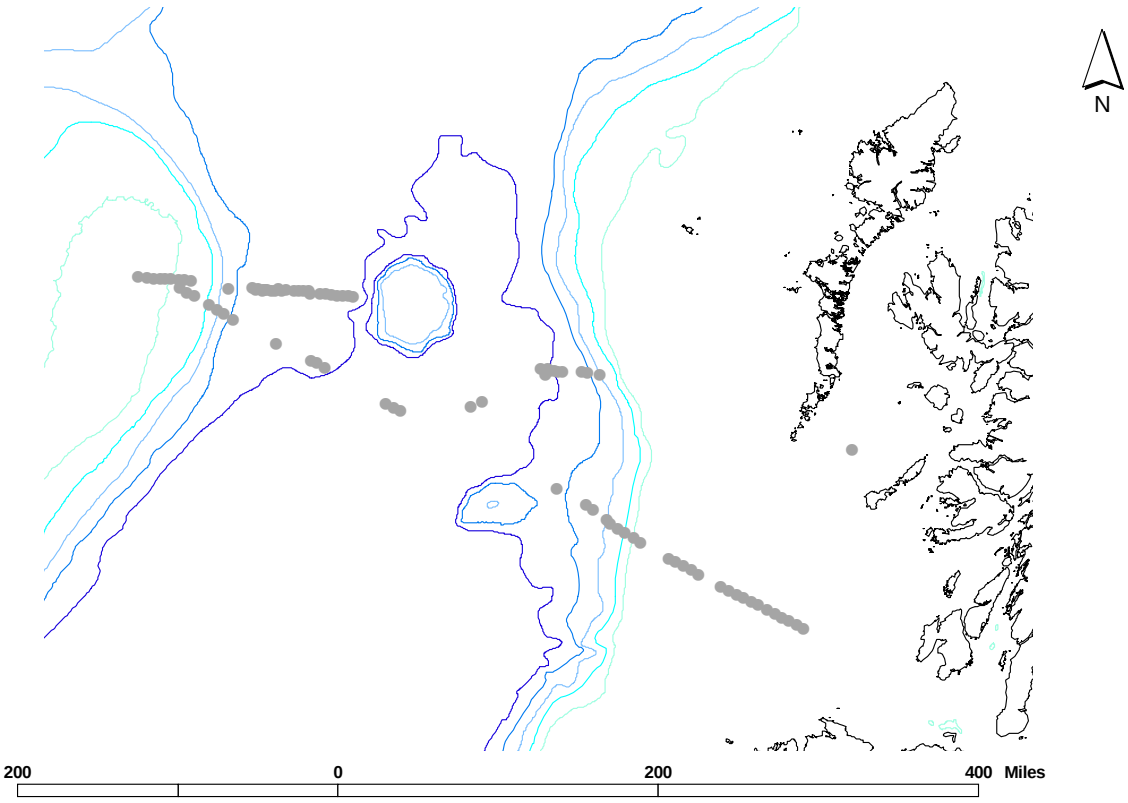

Fig.1. 1-minute listening stations where dolphin whistles were heard.

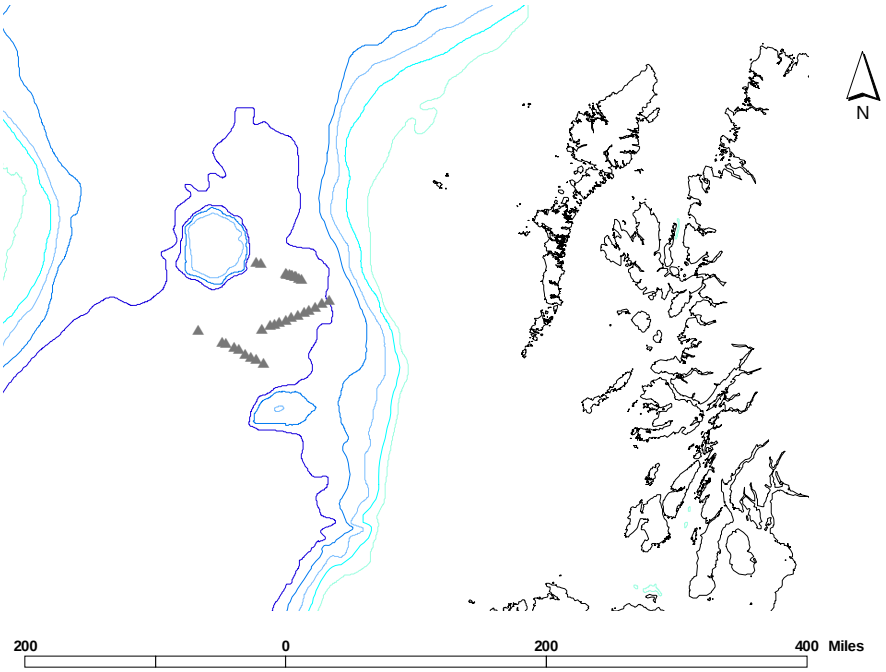

Fig. 2. 1-minute listening stations where sperm whale clicks were heard

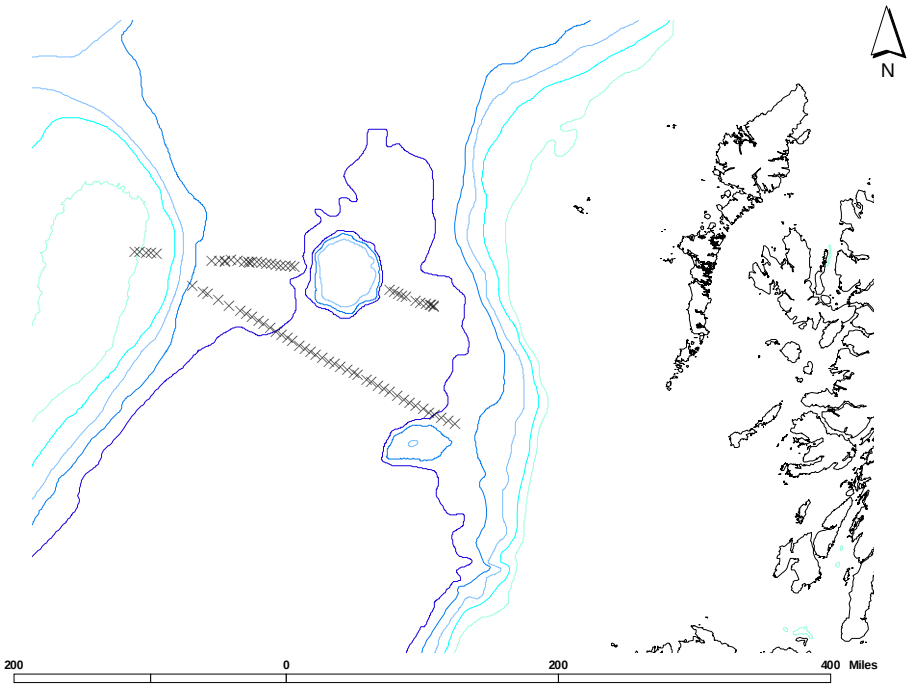

Fig. 3. 1-minute listening stations where seismic surveys were heard

A total of 7 species were sighted during the survey, encompassing 23 sightings. Species sighted were sperm whales, pilot whales, white-sided dolphins, porpoises, northern bottlenose whales, bottlenose dolphins, common dolphins.

The high number of acoustic detections of cetaceans in this study has highlighted the value of using passive acoustic techniques to survey in offshore areas. They have proved particularly advantageous in this area, where rough seas are common and winter days are short.

Coring Report
Paul G. Provost

Coring apparatus

NIOZ Box Core (SAMS)
Core size 500x500x550mm (L,W,D)
The box core was used to collect undisturbed samples for biological analysis. Sub samples were also collected from the box core in order to quantify the disturbance of the sediment surface caused by the 'bow wave' effect.

Barnett & Watson Multi corer
Core size 59x400mm (LxØ), 8 out of a possible 12 cores were set up for this cruise.
The multi corer was used to collect undisturbed samples for chemical, physical and biological analyses.

SAMS Modified Mega corer
Core size 110x800mm (LxØ), initially 4 cores were set up for this cruise.
The mega corer was used to collect undisturbed samples for chemical and physical analyses. The design of the mega corer is unique and incorporates the frame and firing head mechanism of the Barnett & Watson Multi corer. Up to four coring heads each containing one mega core can be fitted in this design. The firing mechanism is unique to this system. The traditional mega corer design could not be incorporated into this because of patent restrictions.

The relatively shallow cores collected using the multi and mega corers created an overlap of undisturbed sediment profiles in the top 20cm of the surface sediment that the SAMS gravity corer was unable to provide due to the disturbance caused on penetration.

It has been suggested, but not quantified that the nature of action of the box core sample collection creates sufficient turbulence of the sediment-seawater interface that very fine floc material and biota can be lost from the sample. The damped action of the multi and mega corer on sediment penetration is thought not to have this effect. Hence samples that required an undisturbed sediment interface were collected using the multi and mega corer.

SAMS Gravity corer
Core size 3000x120mm (LxØ)
The SAMS gravity corer uses either a 3m or 6m barrel and a variable head weight up to 500 kg. Inside the barrel is a polycarbonate liner. Inside the mouth of the core cutter is a core 'catcher' which prevents sample loss during recovery. Gravity corers can over-penetrate the seabed and lose the core top –

The do however collect long cores (i.e., old samples). Used in muds/sands for best results.

Method

Box corer deployment

The box corer was deployed from the vessel using the port midships extending gantry. The veer (drop) speed was up to 70 m/min to approximately 40m above seabed. The winch was stopped for approximately 30 seconds for wire to settle and then dropped at 20-30 m/min into seabed. In very soft sediments, the box corer was landed to the seabed at 10 m/min to minimise frame penetration into the sediment. Once the corer was landed onto the seabed, 5m of additional wire was paid out, and then the wire was immediately hauled to complete the mechanical action of the corer. The haul (recovery) speed was up to 70m/min.

Multi and mega corer deployment

The Multi and Mega corer was deployed from the vessel using the port midships extending gantry. The veer (drop) speed was up to 70 m/min to approximately 40m above seabed. The winch was stopped for approximately 30 seconds for wire to settle and then dropped at 20-30 m/min into seabed. In very soft sediments, the corer was landed to the seabed at 10 m/min to minimise frame penetration into the sediment. Once the corer had landed onto the seabed, 10-15m of additional wire was paid out (depending on sea conditions) and the corer was allowed to rest on the seabed for 2 minutes to allow the hydraulic firing action of the corer to complete. The wire was then hauled to recover the corer. Therefore in total the corer sat for approximately 3 minutes on the seabed. The haul (recovery) speed was up to 70m/min.

Gravity corer deployment

The gravity corer was deployed from the vessel using the port midships extending gantry. The veer (drop) speed was up to 70 m/min to approximately 100m above seabed. The veer rate was slowed down to approximately 30-60 m/min for penetration into seabed depending on sediment type. In very soft sediments, the gravity corer was landed to the seabed at 20 m/min to prevent corer head penetration into the sediment. Once the corer was landed onto the seabed the wire was immediately hauled to complete core recovery. The haul (recovery) speed was up to 70m/min.

Results

Box coring

Twelve box core deployments were made during the cruise. Of these five failed to collect any sample (water only) and one collected a trial sample for testing purposes. A list of box coring deployments during the cruise is described in Table 1.

Multi coring

Ten multi core deployments were made during the cruise. The corer was set up to collect from only 8 of the maximum of 12 core tube positions – this allowed for redundancy of spare parts and requirements of the sampling. Every drop was successful, although on every drop, less than 8 acceptable cores were collected. On two sampling events the multi core heads were used simultaneously with two mega core heads. A list of multi coring deployments during the cruise is described in Table 2.

Mega coring

Three mega core deployments were made during the cruise. The corer was initially set up to collect from the maximum of 4 core tube positions (one made to an earlier design and three to a later design). The first mega corer deployment was unsuccessful. On the subsequent deployments, two mega core heads were used simultaneously with up to a maximum of eight multi core heads The success of the mega core collection would be increased if improvements were made to the way in which the core tubes are held in the corer. Presently the suction of some types of sediment upon the core tube on recovery of the core results in the core tube being drawn from the corer when it is hauled from the sediment surface. A list of mega coring deployments during the cruise is described in Table 3.

Gravity coring

Five gravity core deployments were made during the cruise. All of these deployments were successful and only one deployments collected a sample that was over penetrated. At the first deployment (Station WTS) the complete 500kg head weight was used, on all subsequent deployments an approximate 250 – 300kg head weight was utilised. A list of box coring deployments during the cruise is described in Table 4.

Table 1. Box Corer deployments during Poseidon 300_2 cruise

Date	Time	Lat	Long	Event	Depth	I/W	Bottom	O/W	Station	Comments
25/7/03	10:03	57º56.402	05º28.088	73	62m	1003	-	1026	Skerries	Trial
27/7/03	07:22	59º43.078	07º09.929	74	1054m	0722	0800	0827	WTS	Ok
27/7/03	08:51	59º43.09	07º09.91	75	1092m	0851	0920	0947	WTS	Ok
27/7/03	11:21	59º43.08	07º09.85	76	1141m	1121	1143	1203	WTS	No sample
27/7/03	12:05	59º43.15	07º10.06	77	1091m	1205	1220	1239	WTS	No sample
27/7/03	12:54	59º43.03	07º09.96	78	1091m	1254	1312	1333	WTS	No sample
27/7/03	13:57	59º43.01	07º10.00	79	1090m	1357	1414	1435	WTS	No sample
27/7/03	17:05	59º42.96	07º09.77	80	1093m	1705	1728	1751	WTS	Ok
28/7/03	07:29	59º42.841	07º08.695	83	1094m	0709	0728	0750	WTS	Ok
30/7/03	06:03	60º05.69	06º05.38	110	1153m	0603	0619	0641	WTNb	No sample
30/7/03	07:29	60º50.76	06º03.85	111	1154m	0729	0748	0807	WTNb	Ok
30/7/03	08:27	60º05.93	06º02.27	112	1152m	0827	0846	0905	WTNb	Ok

Table 2. Multi Corer deployments during Poseidon 300_2 cruise

Date	Time	Lat	Long	Event	Depth	I/W	Bottom	O/W	Station	Comments
28/7/03	11:59	59º43.27	07º11.08	85	1076m	1113	1131	1255	WTS	5 OK
28/7/03	13:81	59º43.074	07º09.918	86	1088m	1333	1350	1418	WTS	5 OK
28/7/03	14:27	59º43.10	07º10.01	87	1092m	1427	1445	1509	WTS	5 OK
29/7/03	07:19	60º10.53	06º08.41	96	1232m	0719	0740	0810	WTNa	2 Cores
29/7/03	08:18	60º11.20	06º07.51	97	1236m	0818	0836	0858	WTNa	1 OK
29/7/03	10:20	60º05.78	06º06.27	98	1155m	1020	1036	1057	WTNb	7 OK
29/7/03	11:45	60º06.27	06º06.25	99	1163m	1145	1201	1225	WTNb	7 OK
29/7/03	12:32	60º06.43	06º06.37	100	1165m	1232	1246	1310	WTNb	5 OK
29/7/03	13:24	60º06.06	06º06.52	101	1169m	1324	1342	1403	WTNb	2 Megacores, 1 Multicore
29/7/03	14:22	61º06.67	06º06.79	102	1170m	1422	1436	1502	WTNb	1 Megacore, 6 Multicores

Table 3. Mega Corer deployments during Poseidon 300_2 cruise

Date	Time	Lat	Long	Event	Depth	I/W	Bottom	O/W	Station	Comments
28/7/03	10:02	59º43.05	07º10.29	84	1088m	1002	1020	1042	WTS	No sample
29/7/03	13:24	60º06.06	06º06.52	101	1169m	1324	1342	1403	WTNb	2 Megacores, 1 Multicore
29/7/03	14:22	61º06.67	06º06.79	102	1170m	1422	1436	1502	WTNb	1 Megacore, 6 Multicores

Table 4. Gravity Corer deployments during Poseidon 300_2 cruise

Date	Time	Lat	Long	Event	Depth	I/W	Bottom	O/W	Station	Comments
28/7/03	15:55	59º43.37	07º10.17	88	1093m	1555	1609	1631	WTS	2.5m
29/7/03	15:20	60º06.62	06º07.03	103	1169m	1520	1533	1555	WTNb	3m
29/7/03	05:44	60º10.00	06º09.91	95	1226m	0544	0601	0630	WTNa	2.5m
4/8/03	07:43	56º48.674	06º30.920	136	308m	0743	0750	0759	MD4	Overpenetration Sample retained
4/8/03	08:33	56º48.663	06º30.945	137	311m	0837	0846	0852	MD4	2.6m

Benthic biological Report
David Hughes

Objectives

The major objective of the biological component of the cruise was to quantitatively sample and characterize the benthic faunas from comparable sediments immediately north and south of the Wyville-Thomson Ridge in order to compare the taxonomic composition and size structure of benthic communities separated by a major submarine topographic boundary. Particular attention was focused on animal-sediment interactions, specifically potential differences in modes and intensities of bioturbation, and how these may relate to contrasts in benthic biogeochemistry at the two sampling stations.

Methods

Seabed photography

Photographs were taken using the POL 'bed-hop' camera system, consisting of a 35mm camera and strobe light in pressure-resistant housings, activated by contact of a lead drop-weight suspended below the camera frame. The change in frequency of returns from a pinger attached to the frame is monitored by operators on board ship, and is used to count the number of bottom contacts and photographs taken (usually 25 per deployment). On cruise P300/2 the camera was loaded with 100 ISO colour transparency film. The system was deployed easily and efficiently from the Poseidon, and with the exception of the final station near Mingulay (see below) no difficulties were encountered. Contact with the seabed was monitored visually using the echo-sounder display in the ship's laboratory.

Boxcoring

The NIOZ boxcorer was deployed at the Wyville-Thomson stations in order to allow investigation of larger epifauna and infauna (and the burrows produced by them), which are unlikely to be sampled in small multi/megacores. After recovery to the deck and draining-off of the overlying water, the surface of each boxcore was sketched and photographed, and any larger epifauna removed and preserved separately. The box was then opened, and the core excavated by proceeding laterally through the sediment with a trowel. Sediment stratification and any conspicuous biological features were noted and photographed. Burrowing animals encountered were photographed *in situ* if possible, and carefully removed for fixation in 4% formaldehyde.

The boxcorer was not intended to be used as a quantitative sampler of infauna, but in order to ensure recovery of any larger animals present in the sediment, the uppermost 3 cm (approximately) of sediment from each box was sieved through a coarse mesh (2 mm) and any animals retained on the sieve picked off using forceps and preserved.

Multi/megacoring

This hydraulically-damped multiple corer was used as the principal quantitative sampler for benthic macro- and meiofauna. In the sediment types encountered, the corer was more consistently successful when fitted with the multicore head so most samples obtained were from the 6 cm-diameter cores associated with this, rather than from the 11 cm diameter megacores.

For meiofaunal sampling, one multicore from each deployment was sectioned at intervals of 1 cm down to 5 cm depth, and the sediment slices fixed in 4% formaldehyde. Meiofauna will later be extracted using a 45 or 63 µm sieve mesh. For sampling of the macrofauna, larger volumes of sediment were required, so as many individual cores as were available from a deployment were taken. Macrofaunal cores were sectioned at intervals of 0-1, 1-3, 3-5, 5-10 and 10-15 cm (and deeper at 5 cm intervals if core penetration made this possible), and the sediment slices fixed as above. Each corer deployment was treated as a single spatial replicate, so the corresponding depth intervals from the individual cores were combined during fixation. Four or five macrofaunal cores were taken per deployment. No sieving was done aboard the ship, but on return to the laboratory the fixed sediment samples will be washed through stacked 500 and 250 µm sieves before sorting and identification of fauna.

Samples obtained and shipboard observations

Wyville-Thomson South (WTS)

Three boxcores were taken for biological sampling at this site, which was originally sampled on cruise Discovery 257 in 2001. The most conspicuous metazoan epifauna were ophiuroids and small echinoids (one or two of each per core). The second boxcore (NBC 1033) also yielded four specimens of the xenophyophore *Syringammina fragilissima*, including a large (diameter 7 cm) intact individual in the centre of the core surface. There were no large burrow openings or large subsurface burrows in the cores, but small 'pinhole' openings were visible at the surface when the overlying water had been drained off. Sieving of the uppermost 3 cm of sediment showed that these openings belonged to small echiuran worms approximately 1 cm in body length, provisionally identifed as the species *Echiurus abyssalis.* Approximately 20 of these echiurans were picked off the 2 mm sieve from each boxcore.

Cores for quantitative analysis of meiofauna and macrofauna were obtained from three multicorer deployments. One core per deployment was taken for meiofauna, and 3 or 4 cores per deployment for macrofauna, sliced vertically to 15 cm depth. It was intended to re-visit this site later in the cruise in order to increase the number of spatial replicates, but bad weather prevented this.

The bed-hop camera was deployed once at WTS. The system performed successfully and 27 good seabed images were obtained. Preliminary inspection

of the images shows a biogenic seabed topography of small mounds, pits and burrow openings. Xenophyophores are the most conspicuous epifaunal organisms.

Wyville-Thomson North (b) (WTNb)

Exploratory sampling showed that the substratum at this site consisted of fine mud, so a full benthic biological sampling was carried out here. Two boxcores were taken, both of which showed a relatively featureless flat surface with only a few small (2 – 3 mm diameter) burrow openings. One or two extremely fragile, gelatinous worms identified as enteropneusts ('acorn worms') were present at the surface of each core. A localized contourite sand belt characterized by epifaunal enteropneusts had been previously recorded by Bett (2001) during the AFEN survey cruises, and our samples from WTNb now demonstrate that these rarely-sampled organisms occur more widely in the Faeroe-Shetland Channel. Excavation of the boxcores showed an apparently uniform grey-brown sediment without visually obvious stratification. Narrow burrows, possibly belonging to maldanid polychaetes, occurred to depths of at least 20 cm. No large burrowing animals were found in the first boxcore, but the second one examined contained five intact or fragmentary enteropneust worms in burrows at depths of 10-20 cm below the surface. Burrowing enteropneusts are rarely sampled in the deep sea, so this discovery is of considerable interest, and these animals are likely to be important agents of bioturbation owing to their relatively large size and depth range in the sediment. Detailed study of the preserved specimens will show whether or not these burrowing enteropneusts belong to the same species as those found on the boxcore surfaces.

Samples for meio- and macrofauna were taken from five deployments of the multiple corer, four using the multicorer head, and one using megacores. Four spatial replicates were obtained for meiofauna, and five for macrofauna (consisting of 4-5 combined cores). Core penetration was enhanced in this fine sediment found at WTNb, so that macrofaunal cores were sectioned to 20 cm depth.

Two successful bed-hop camera deployments were carried out, giving a total of 50 good seabed images. Preliminary examination suggests that biogenic holes and mounds are present at lower density than at WTS, but that the features present may be of larger individual size. Few conspicuous epifauna have been noted so far, but careful viewing of the colour transparencies under binocular microscope will probably be required to distinguish semi-translucent animals such as enteropneusts if any are present at the sediment surface.

Additional bed-hop camera deployments

After persistent bad weather led to the abandonment of further attempts to work at the Wyville-Thomson Ridge, the bed-hop camera was deployed

opportunistically at two stations in the Minch between the Outer Hebrides and the Scottish mainland. The camera was deployed once in the Muck Deep at a depth of approximately 310 m. Boxcore sampling on previous cruises had shown that rich benthic communities exist in at least some parts of this shelf depression, but to date the seabed has never been successfully photographed. The camera was deployed without difficulties. The processed film (BHC 1048) showed that the normal complement of 25 frames had been exposed, but the seabed was completely obscured by a dense haze of suspended particles, indicating very high levels of turbidity in the near-bed water column. No further information could be obtained from the images.

Two attempts were made to take seabed photographs at a site east of the island of Mingulay (Outer Hebrides), at which SAMS cruises in 2001 and summer 2003 had demonstrated the presence of the cold-water coral *Lophelia pertusa* on or around a bedrock reef. Position details to guide the camera deployment were obtained by phone communication with staff at SAMS. A first attempt to deploy the camera was abandoned after the wire angle showed that strong currents were running at the site and reliable contacts with the seabed could not be made without serious risk to the equipment. A second attempt made approximately 1.5 hours later was more successful, but was also aborted after 20 exposures when a continuous high-speed return from the pinger indicated the loss of the suspended drop-weight. After recovery to the deck, it was confirmed that the weight had been lost, and also that the compass arm had been severely bent by contact with the hard seabed. Fortunately the camera and strobe light were not damaged. The processed film (BHC 1049) produced 17 seabed images and three misfires. No corals were visible, but a rich epifaunal community of sponges, crinoids, anemones and other sessile invertebrates could be seen. It is likely that the depth range covered by the deployment (starting at 129 m and rising rapidly to 88 m) was too shallow to record the main zone of *Lophelia* growth, but the images provide useful background information on the benthic communities occurring here and will help to guide future photographic surveys in this area.

Sample list

BHC = Bed-hop camera, MC = Multicorer, MGC = Megacorer, NBC = NIOZ boxcorer

Station	Date	SAMS DSBG sample code	Samples obtained
WTS	27 July 03	NBC 1032	Large fauna from 0-3 cm sediment layer
	27 July 03	NBC 1033	Large fauna from 0-3 cm sediment layer
	28 July 03	NBC 1034	Large fauna from 0-3 cm sediment layer
	28 July 03	MC 1035	1 core for meiofauna, 3 combined for macrofauna
	28 July 03	MC 1036	1 core for meiofauna, 4 combined for macrofauna
	28 July 03	MC 1037	1 core for meiofauna, 4 combined for macrofauna
	28 July 03	BHC 1038	27 seabed photos
WTN b	29 July 03	MC 1039	1 core for meiofauna, 5 combined for macrofauna
	29 July 03	MC 1040	1 core for meiofauna, 4 combined for macrofauna
	29 July 03	MC 1041	1 core for meiofauna, 4 combined for macrofauna
	29 July 03	MGC 1042	1 megacore + 1 multicore combined for macrofauna
	29 July 03	MC 1043	1 core for meiofauna, 5 combined for macrofauna
	29 July 03	BHC 1044	25 seabed photos
	30 July 03	NBC 1045	Large fauna from 0-3 cm sediment layer
	30 July 03	NBC 1046	Large fauna from 0-3 cm sediment layer. Enteropneusts from subsurface burrows
	30 July 03	BHC 1047	25 seabed photos
Muck Deep	4 Aug 03	BHC 1048	25 photos, seabed obscured by turbidity
Mingulay	4 Aug 03	BHC 1049	17 seabed photos

Water Column Report
Tim Brand & Kate Willis

Water samples were collected along the Ellett line using the SBE CTD rosette and subsampled for chlorophyll a, particulate organic carbon and nitrogen and dissolved inorganic nutrients. Staions sampled were:-
A,C,D,E,F,H,J,L,M,Q,R,15G,13G,11G,9G,6G,4G & 1G. Full details are given in the station list.
Water samples were also collected and analysed for dissolved oxygen for CTD oxygen probe calibration purposes.

Water column chlorophyll A, particulate organic carbon and inorganic nutrients

Water samples were collected from the CTD rosette using 2l polythene bottles. Up to 12 samples were taken from each water cast. Known volumes of each sample were decanted from the bottles and filtered through 25mm dia. Whatman GF/F filters. The filters were kept frozen for chlorophyll A analysis later. The filtrates was collected in 250ml polythene bottles and were frozen immediately after collection and kept for inorganic nutrient analysis later. A further known volume was decanted from the polythene bottles and filtered through ignited (450C) Gelman 13mm dia. AE filters. The filters were kept frozen for particulate organic carbon and nitrogen analysis later.
The filtration was performed using the Dunstaffnage Marine Laboratory filtratrion rig which allows collection of the sample filter and the filtrate in a clean environment.

Water column dissolved oxygen by Winkler determination

Water samples were collected in volume calibrated gas-tight glass bottles and the oxygen content was determined by the Winkler method titration, using a Radiometer auto-titrator. The samples were collected so that the oxygen probe on the CTD could be calibrated.

Zooplankton Sampling

A Zooplankton net was deployed from the Starboard winch at each of the water column stations.

Tc99 Surface water sampling

50l samples were taken from the non-toxic supply in the wetlab at the following stations:-
F,H,J,L,P,R,15G,13G,10G,7G*,6G*,4G,2G & 1G (* 25l samples).

Marine Physics Data Report

ME Inall, CR Griffiths, PG Provost C Johnson

Objectives

The cruise objectives were: 1) To occupy the 'Ellett Line' of CTD stations between Scotland and Rockall (Figure 1), 2) To deploy two moorings, WDeep and WTop, designed to measure the overflow of Arctic origin waters over the Wyville-Thomson Ridge and into the NE Atlantic (Figure 2), and 3) to perform one CTD section to inform the NSP activities between stations WTS and WTN (section PA), and two further CTD sections to determine the overflow characteristics at the time of mooring deployment (sections PB and PC, Figure 2).

Perversely, due to adverse weather conditions extra objectives were achieved: 1) the detailed mapping of the bathymetry at the lowest portion of the Wyville-Thomson Ridge (Figure 3), 2) the occupation of three further CTD sections in the coastal waters (Figure 4, sections Y, S, and A).

CTD Activities

The first 16 CTD casts were made with the Keil Seabird 911 Plus CTD system (Rockall to the continental slope), all remaining CTDs were undertaken with the SAMS Seabird SBE911 Plus CTD system. Additional sensors: The Keil system was fitted only with the SAMS deep fluorimeter, the SAMS system was fitted with a transmissometer, a fluorimeter, and a dissolved oxygen sensor. The switch in systems was made to facilitate safer deployment and recovery, the SAMS system being considerable smaller that the Keil package. All processing was carried out using Seabird 'seasoft' routines. Processed data were transferred into the Matlab environment for further processing and plotting. Water samples were collected for post cruise analysis and final calibration of salinity and dissolved oxygen. On the whole the systems performed without fault for the duration of the cruise.

Note: Density and salinity sections in Figures 5 to 10 have not had the final salinity calibration applied.

The Ellett Line was successfully completed (Figure 5). Section PA was also successfully completed and illustrates the dramatic difference between water masses below approximately 500m on either side of the Wyville Thomson Ridge (Figure 6). Due to adverse weather conditions Section PB remained incomplete. The part-section PB (Figure 7) does however suggest the presence of an unusually large overflow of Arctic origin waters into the Rockall Trough. Using

the 8.5°C contour as the level of no motion results in southward flowing geostrophic velocities of up to 40 cms^{-1} over this section of the ridge (not shown).

Adverse weather prevented the occupation of CTD line PC. However three further lines were occupied on our premature return to coastal waters (Figure 4): Line Y between Coll and Mull (Figure 8), passing the long-term mooring at station Y, Line S between Skerryvoor Light and Colonsay (Figure 9), and Line A across the North Channel between Northern Ireland and the Mull of Kintyre (Figure 10). Unusually high salinity water where observed in sections Y (up to 34.79) and S (up to 35.17).

Mooring Activities

One mooring was successfully deployed on the top of the Wyville Thomson Ridge ('WTop' in Figure 2). Adverse weather prevented the deployment of the second mooring ('WDeep' in Figure 2). Table 1 gives details of the mooring 'WTop'. Recovery is planned for May 2004 from RV Scotia. Deployment of 'WDeep' will be attempted from RV Scotia in September 2003. (Late note: WDeep successfully deployed in September from RV Scotia). It is planned to recover both these moorings in May 2004 from RV Scotia.

Table 1: Instruments deployed on mooring WTop (Figure 7).

Position: 60 10.98N 07 44.028W			
Instrument	**Serial Number**	**Sample interval**	**Ht above bed**
Acoustic Release	316		5 m
RCM 7	9069	30 mins	7 m
Argos beacon	11713		9 m
75 kHz ADCP	1644	30 mins	10 m
Vemco minilog	8519	60 mins	30 m
Vemco minilog	8518	60 mins	50 m
Vemco minilog	8517	60 mins	70 m
Vemco minilog	8515	60 mins	90 m
Vemco minilog	8513	60 mins	110 m
Vemco minilog	8512	60 mins	130 m
Vemco minilog	8511	60 mins	140 m
Vemco minilog	8510	60 mins	160 m
Vemco minilog	7169	60 mins	180 m
Vemco minilog	7168	60 mins	200 m
Vemco minilog	7167	60 mins	220 m
Vemco minilog	7165	60 mins	240 m
Seabird 37IM	2367	30 mins	260 m

Table 2: CTD positions

Date	**Time**	**Lat**	**Long**	**Depth**	**Bottom**	**Stn**	**Activity**
20/7/03	2244	57 34.077	13 20.379	178m	2251	B	CTD001
21/7/03	0035	57 35.065	13 37.947	109m	0040	A	CTD002
21/7/03	0429	57 32.914	13 00.078	294m	0436	C	CTD003
21/7/03	0604	57 31.905	12 51.991	1073m	0632	D	CTD004
21/7/03	2037	57 30.545	12 14.501	1807m	2116	F	CTD005
22/7/03	0056	57 31.920	12 37.997	1644m	0143	E	CTD006
22/7/03	0618	57 29.632	11 51.289	1818m	0656	G	CTD007
22/7/03	0902	57 28.957	11 32.145	2015m	0342	H	CTD008
22/7/03	1200	57 27.964	11 19.037	751m	1220	I	CTD009

22/7/03	1353	57 27.018	11 05.040	592m	1407	J	CTD010
22/7/03	1551	57 24.291	10 52.233	773m	1605	K	CTD011
22/7/03	1806	57 22.177	10 40.116	2079m	1849	L	CTD012
22/7/03	2215	57 17.963	10 22.950	2216m	2259	M	CTD013
23/7/03	0248	57 14.101	10 03.325	2110m	0327	N	CTD014
23/7/03	1820	57 08.961	09 42.103	1944m	1901	O	CTD015
23/7/03	2103	57 07.412	09 33.884	1797m	2140	P1	CTD016
24/7/03	1025	57 06.029	09 25.186	1427m	1106	P	CTD017
24/7/03	1318	57 04.666	09 19.202	732m	1339	Q1	CTD018
24/7/03	1511	57 03.066	09 12.944	303m	1519	Q	CTD019
24/7/03	1644	57 01.528	09 06.441	151m	1648	R1	CTD020
24/7/03	1743	57 00.030	08 59.945	132m	1752	R	CTD021
24/7/03	1934	57 56.964	08 46.931	123m	1944	S	CTD022
24/7/03	2145	56 52.979	08 30.089	124m	2158	15G	CTD023
24/7/03	2342	56 50.251	08 20.089	131m	2345	T	CTD024
25/7/03	0155	56 47.037	08 00.112	121m	0159	13G	CTD025
25/7/03	0423	56 44.030	07 39.971	~56m	0425	11G	CTD026
25/7/03	0456	56 44.120	07 39.711	~56m	0458	11G	CTD027
25/7/03	0605	56 44.033	07 29.973	217m	0615	10G	CTD028
25/7/03	0733	56 44.000	07 19.991	156m	0744	9G	CTD029
25/7/03	1011	56 44.080	06 59.920	136m	1021	7G	CTD030
25/7/03	1133	56 44.111	06 44.678	~35m	1136	6G	CTD031
25/7/03	1254	56 44.009	06 27.126	111m	1315	4G	CTD032
25/7/03	1434	56 41.115	06 17.155	~25m	1435	2G	CTD033
25/7/03	1534	56 40.182	06 08.122	~80m	1543	1G	CTD034
25/7/03	1807	56 48.339	06 31.334	220m	1818	MD4	CTD035
27/7/03	1851	59 42.958	07 09.167	1095m	1917	WTS	CTD036
28/7/03	2039	59 49.212	06 57.038	1038m	2102	PA2	CTD037
28/7/03	2215	59 52.103	06 50.007	935m	2235	PA3	CTD038
29/7/03	0000	59 55.083	06 43.446	618m	0015	PA4	CTD039
29/7/03	0130	59 58.109	06 37.113	330m	0139	PA5	CTD040
29/7/03	0252	60 01.099	06 30.522	467m	0304	PA6	CTD041
29/7/03	2004	60 10.080	06 10.006	1227m	2038	WTNb	CTD042
29/7/03	2213	60 06.957	06 16.730	1166m	2239	PA8	CTD043
30/7/03	0000	60 04.009	06 23.792	1087m	0021	PA7	CTD044
30/7/03	0124	60 01.674	06 29.192	590m	0140	PB1	CTD045
30/7/03	0249	60 03.087	06 37.971	712m	0304	PB2	CTD046
30/7/03	0946	60 06.098	06 05.631	1160m	1012	WTNb	CTD047
30/7/03	1620	60 03.048	06 49.180	712m	1638	PB3	CTD048
30/7/03	1741	60 05.113	06 56.031	737m	1759	PB4	CTD049
30/7/03	1903	60 06.724	07 04.197	719m	1923	PB5	CTD050
30/7/03	2052	60 08.527	07 13.826	754m	2111	PB6	CTD051
30/7/03	2224	60 10.464	07 23.230	753m	2242	PB7	CTD052
30/7/03	2343	60 12.441	07 31.865	675m	2358	PB8	CTD053
31/7/03	0055	60 14.130	07 39.588	716m	0113	PB9	CTD054
31/7/03	0213	60 16.155	07 48.065	708m	1230	PB10	CTD055
31/7/03	0329	60 17.694	07 55.014	705m	0349	PB11	CTD056
1/8/03	0517	60 10.866	07 44.199	642m	0538	WTOP	CTD057
3/8/03	2308	56 36.723	06 20.328	45m	2312	Y8	CTD058
3/8/03	2340	56 37.233	06 20.834	78m	2345	Y7	CTD059
4/8/03	0010	56 37.448	06 22.091	54m	0014	Y6	CTD060
4/8/03	0035	56 37.936	06 22.948	50m	0039	Y5	CTD061
4/8/03	0103	56 38.318	06 24.114	50m	0109	Y4	CTD062

4/8/03	0130	56 38.728	06 25.276	49m	0133	Y3	CTD063
4/8/03	0152	56 39.293	06 26.467	69m	0157	Y2	CTD064
4/8/03	0217	56 39.392	06 26.967	70m	0221	Y1	CTD065
4/8/03	0703	56 48.703	06 30.900	302m	0714	MD4	CTD066
4/8/03	2054	56 18.472	07 04.985	85m	2100	S1	CTD067
4/8/03	2133	56 17.049	07 00.605	75m	2136	S2	CTD068
4/8/03	2209	56 15.657	06 56.409	70m	2213	S3	CTD069
4/8/03	2245	56 14.251	06 52.093	67m	2249	S4	CTD070
4/8/03	2330	56 12.607	06 47.854	66m	2333	S5	CTD071
5/8/03	0009	56 11.213	06 43.591	60m	0011	S6	CTD072
5/8/03	0049	56 09.691	06 39.353	69m	0051	S7	CTD073
5/8/03	0124	56 08.289	06 34.962	70m	0127	S8	CTD074
5/8/03	0157	56 06.767	06 30.902	44m	0159	S9	CTD075
5/8/03	0230	56 05.381	06 26.609	40m	0232	S10	CTD076
5/8/03	0304	56 03.868	06 22.273	30m	0306	S11	CTD077
5/8/03	1304	55 09.387	05 59.732	78m	1308	A5	CTD078
5/8/03	1351	55 11.305	05 55.807	133m	1358	A4	CTD079
5/8/03	1435	55 13.084	05 51.903	124m	1443	A3	CTD080
5/8/03	1523	55 15.162	05 47.589	125m	1530	A2	CTD081
5/8/03	1613	55 16.697	05 44.317	41m	1613	A1	CTD082

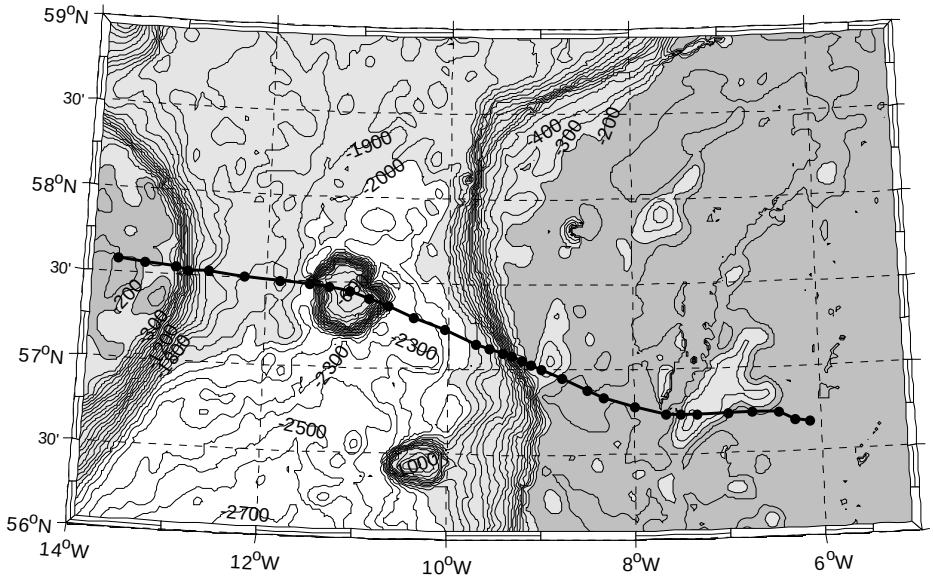

Figure 1: Bathymetric map showing the positions of the Ellett Line stations. Contour interval is 100m, shading changes at 200m and 2000m isobaths

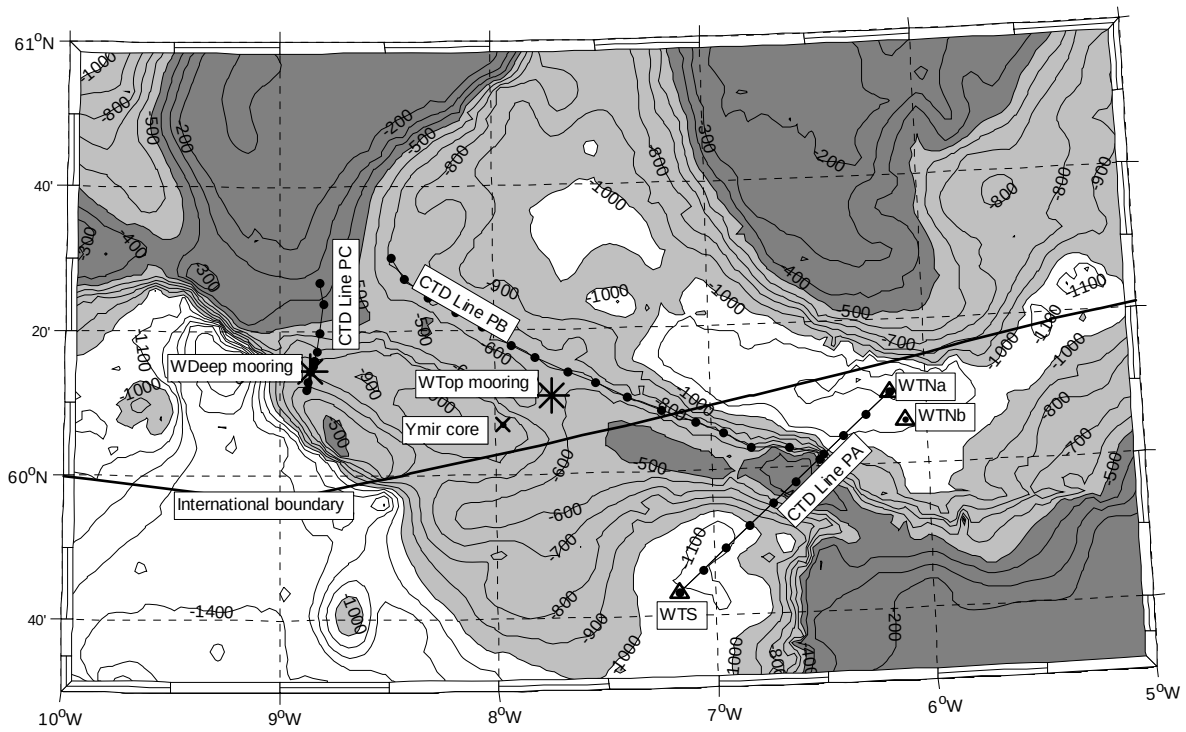

Figure 2**:** Bathymetric map showing work stations and CTD lines for leg 2. Contour interval is 100m and shading changes at 1000m and 500m isobaths**.**

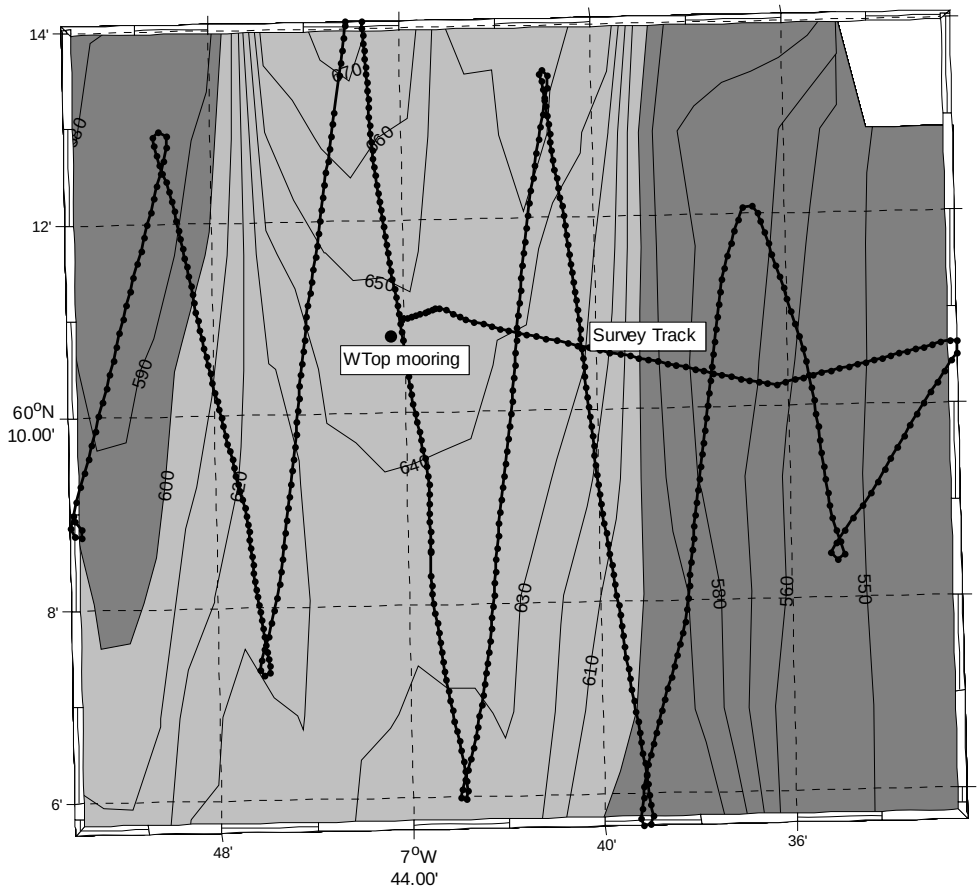

Figure 3: Bathymetric map of bathymetric survey region. Survey track and position of 'WTop' mooring are shown.

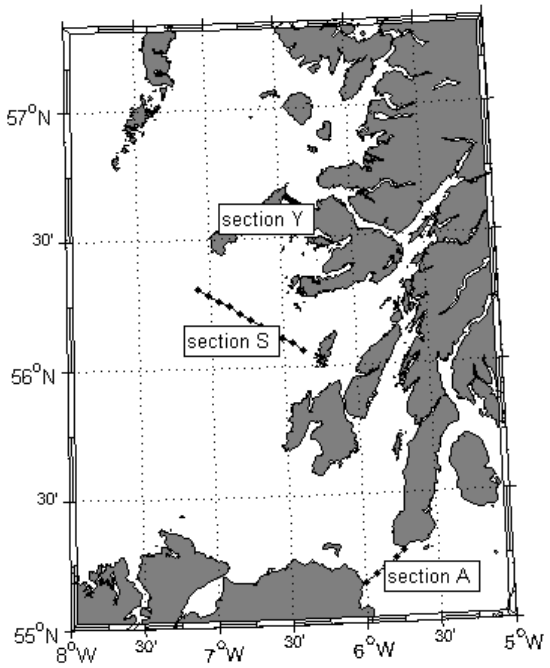

Figure 4 Coastline map showing the locations of CTD sections Y, S and A.

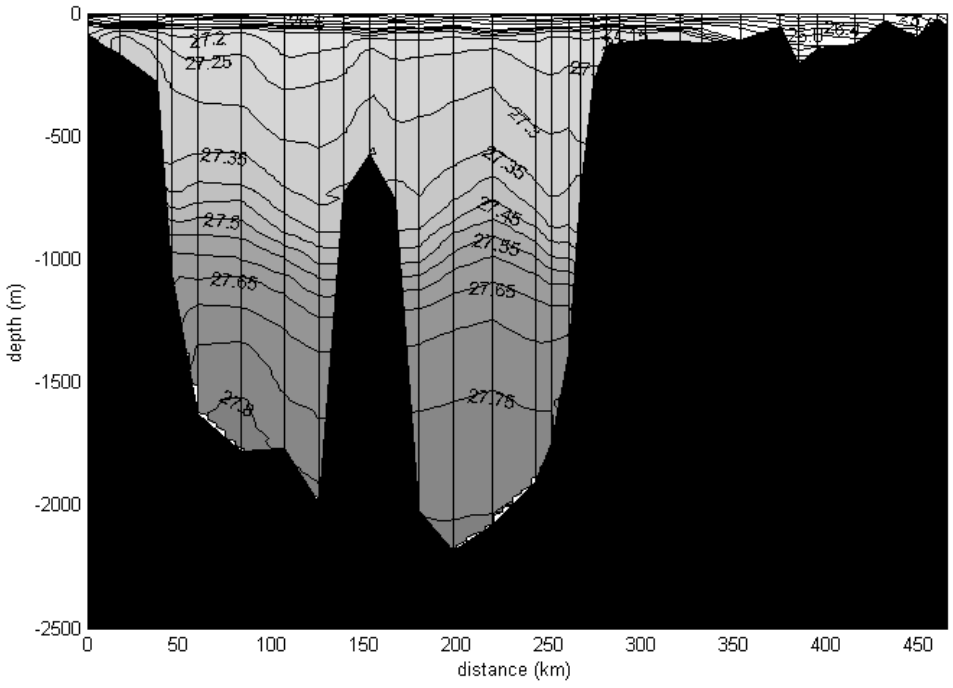

Figure 5: Ellett Line σ_θ contour plot. Contour intervals 0.2 kgm^{-3} from surface to 27.0 kgm^{-3} (unshaded), then 0.05 kgm^{-3} thereafter

.

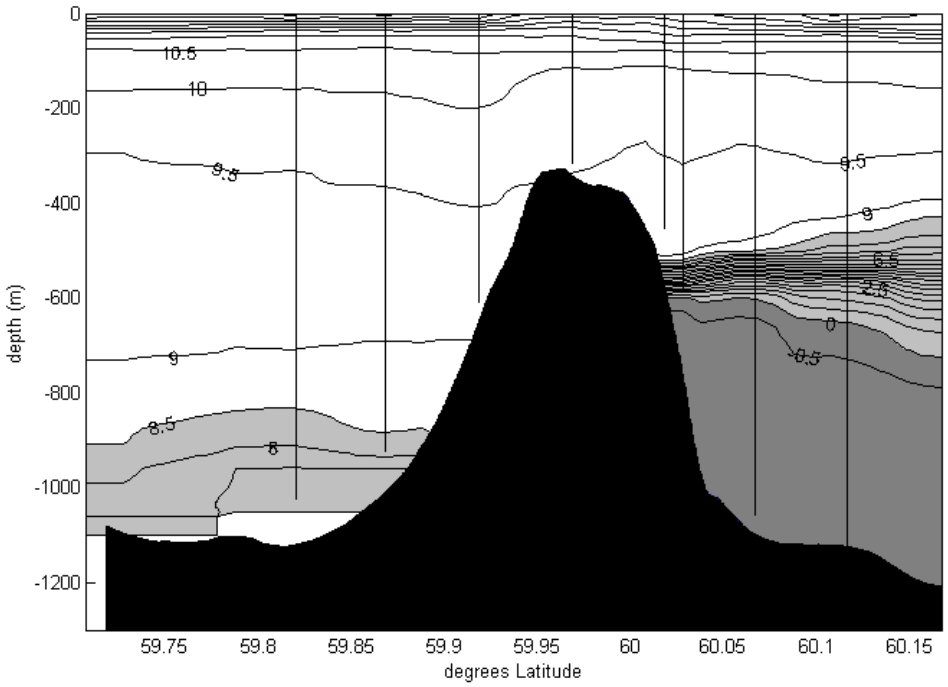

Figure 6: CTD Section PA. Potential temperature, contour interval 0.5°C, shading changes at 0°C and 8.5ºC contour

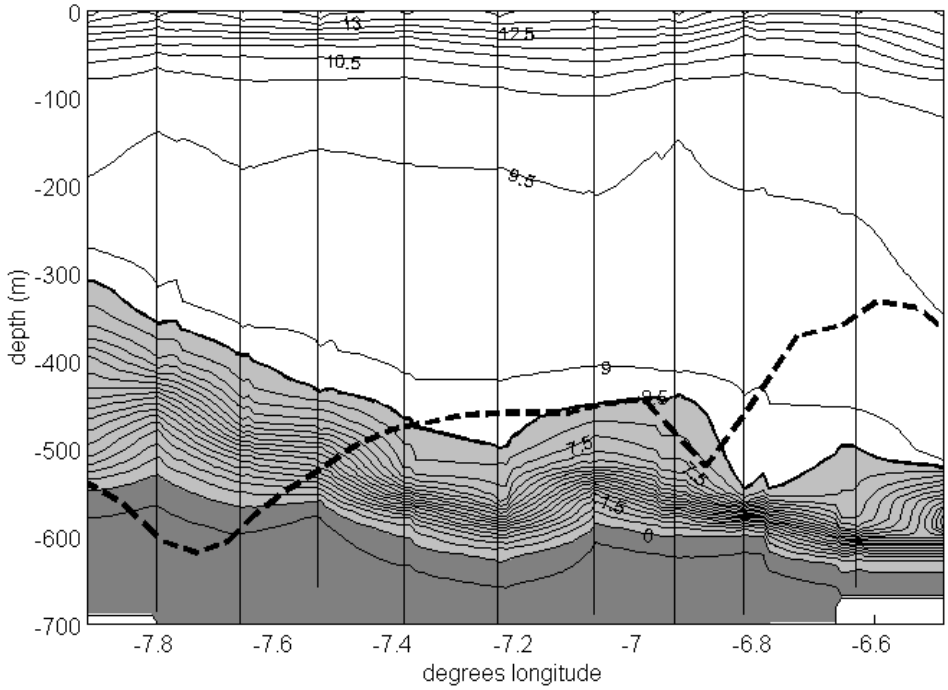

Figure 7: Isothermal contours from incomplete CTD section PB. Contour interval is 0.5°C, shading changes at 8.5°C and 0°C isotherms. Dashed line indicates the level of the top of the ridge just to the south of the section

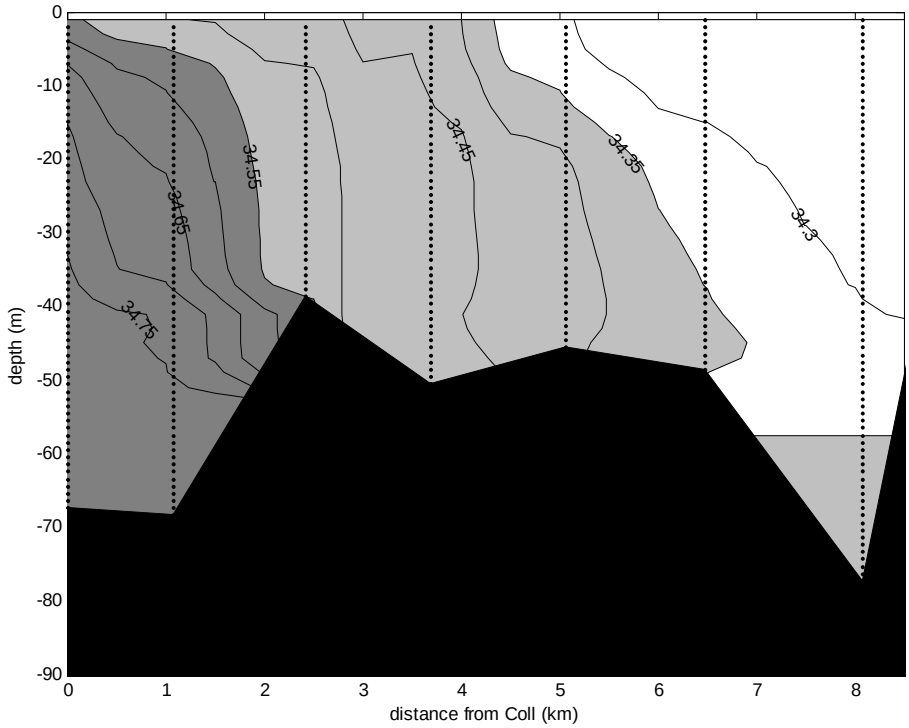

Figure 8: Isohaline contours from CTD section Y. Contour interval is 0.05, shading changes at the 34.35 and 34.55 isohalines.

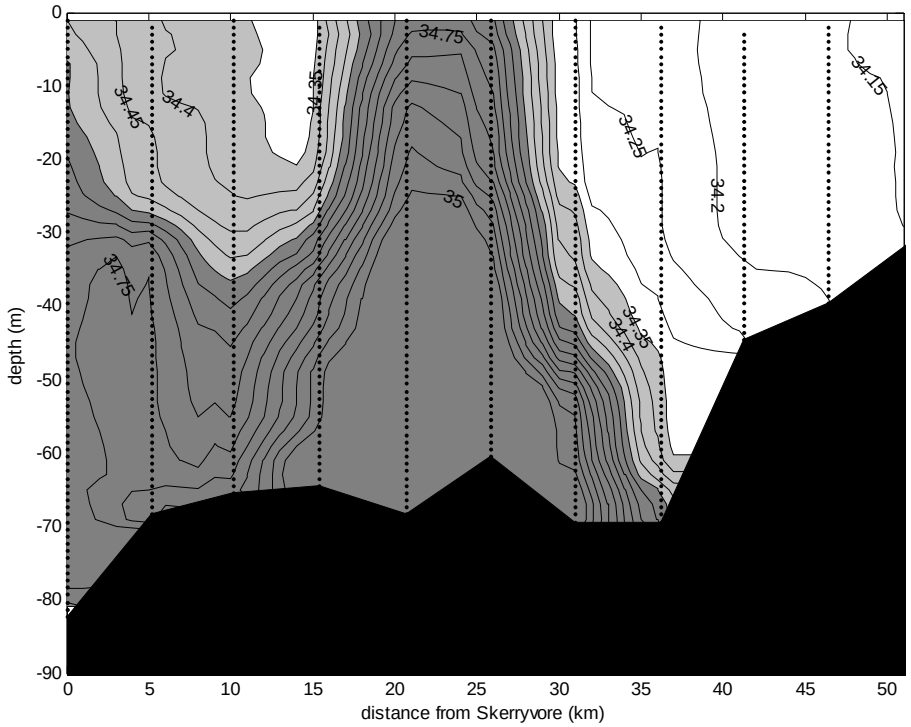

Figure 9: Isohaline contours from CTD section S. Contour interval is 0.05, shading changes at the 34.35 and 34.55 isohalines.

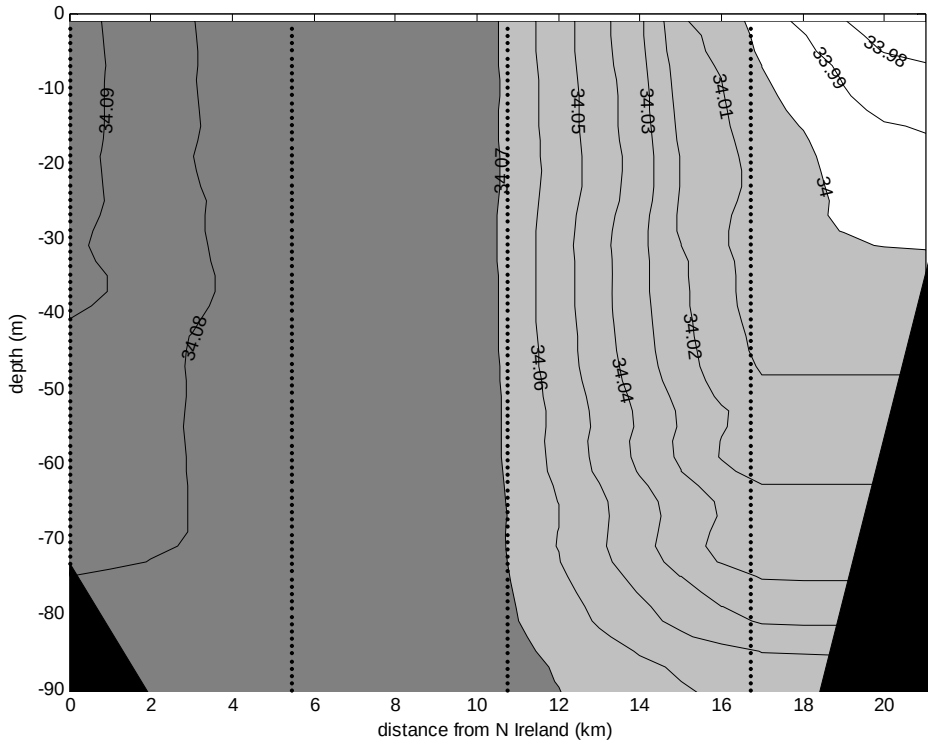

Figure 10 Isohaline contours from CTD section A. Contour interval is 0.01, shading changes at the 34.00 and 34.07 isohalines.