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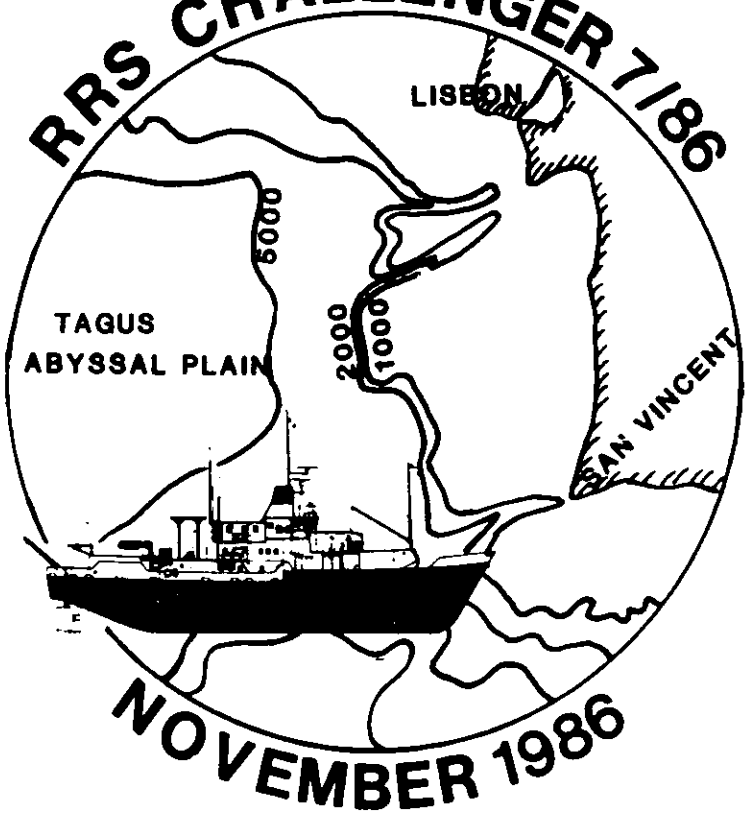

THE PORTUGUESE SLOPE

RRS CHALLENGER

CRUISE 7/86
Madeira to Barry

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SUMMARY

Challenger 7/86 was a successful cruise that concentrated on a sampling programme to the south and west of the Portuguese mainland down to a maximum working depth of 4500m. 21 successful boxcores were taken in the San Vincent Canyon and on the adjacent slope from depths of 500 to 4500m and these were used for the analyses of biological, microbiological, geochemical, geotechnical and sedimentological properties. A series of 16 Agassiz trawls or rock dredges were taken on the continental slope from 500 down to 3000m. These samples contained a wide variety of benthic megainvertebrates. These data were supplemented by two epibenthic sledge samples where the seabed appeared suitable for the deployment of this gear. Ten succéssful stereo camera stations were completed at various points in the San Vincent Canyon and on the continental slope. A series of pleuston samples were collected at a variety if stations. The samples and data collected during Challenger 7/86 is stored at either U.C. Swansea, SMBA, or the Universities of Glasgow and St, Andrews.

CRUISE OBJECTIVES

a) To continue studies of the benthic ecology of the eastern Atlantic. The samples required are from the area 35N to 45N, from the coast to 35W including the continental slope.

b) The samples and data will be collected by spade box corer, epibenthic sledge, Agassiz trawl, stereo camera and plankton net.

c) The samples collected will be used for:-

i. Population studies

ii. Comparison with samples collected in the Rockall Trough

iii. Genetic studies of species collected in the NE Atlantic

iv. Quantitative studies of macrofauna

v. Geochemical, geotechnical and microbiological studies of the surface 50cm of sediment colected by box core

CRUISE PARTICIPANTS

M. Harding	Master
B. Richardson	Chief Officer
J. Sellick	Second Officer
G. Procter	Third Officer
D. Rowlands	Chief Engineer
G. Gimber	Second Engineer
A. Greenhorn	Third Engineer
P. Edgell	Electrician
P.A. Tyler	PSO U.C. Swansea
J.D. Gage	SMBA
R. Harvey	SMBA
P.S. Meadows	Univ. of Glasgow
A. Tufail	Univ. of Glasgow
C.D. Todd	Univ. of St. Andrews
G. Davies	Heriot-Watt University
S.J. Wakefield	U.C. Swansea
J.G. Colman	U.C. Swansea
R.S. Hensley	U.C. Swansea
J.C. Rimmer	U.C. Swansea
J. Strangward	RVS Barry
G. White	RVS Barry

CRUISE NARRATIVE

The cruise track is shown in Fig. 1 and the station data given in Table 1. All times are GMT.

30/10/86 Challenger left Funchal at 10.30hrs and steamed towards the Seine seamount in moderate seas.

31/10/86 Challenger arrived over Seine seamount at 03.30hrs in moderating seas. The stereo camera was prepared for lowering but it was found that the three strand cable on the side A-frame was damaged. After the cable repair the camera was deployed in 310m. of water. 31 frames were taken and the camera was recovered at 07.00hrs. At 08.00hrs a neuston net was deployed from the hydrographic winch and this was towed away from the side of the ship. The net was retrieved at 10.00hrs and contained a mass of tar balls and a variety of surface living marine invertebrates.

At 10.14hrs the rock dredge was deployed in 420m. of water. 800m. of warp was paid out and the dredge was towed for 30mins. in water that shallowed to 190m. At 11.20hrs the tension meter suggested that the weak link had broken and this was found to be the case on retrieval. The net contained a variety of sponges and their associated fauna including hermit crabs, an ophiuroid and tubiculous polychaetes.

On completion of the dredge Challenger steamed NE to 34 13'N; 13 04'W ,depth 4140m, arriving at 19.45hrs. The epibenthic sledge was deployed at 20.10hrs and 9000m. of warp paid out until

23.52hrs.

1/11/86 The epibenthic sledge was towed at 1.5kt. On retrieval it was found that the sledge had not been on the seabed and, in addition, water had penetrated the firing mechanism resulting in premature closing of the sledge door. This may have affected the sinking characteristics of the sledge. During retrieval there was noted a problem with the main warp in so much as it was frayed at 6900m. This problem is detailed in the Masters report and limited the amount of useful wire for the rest of the cruise to 6500m.

At 08.26hrs the spade box corer was deployed in 4300m. of water at 34 32'N; 13 03'W. The wind was 12 kts.and the sea state was considered just acceptable for coring. The corer was retrieved at 1202hrs. but contained no sample. The drop was repeated as the sea state had improved but no sample was retrieved when the box core was recovered at 15.43hrs.

Challenger proceeded to 34 57'N; 13 04'W near the Ampere seamount to core in more shallow water. At 18.29hrs the box core was deployed in 2475m. of water. On retrieval the box core had triggered but the release bolt had not retracted and the spade had not been released. At 21.11hrs the stereo camera was deployed at 34 57'N; 13 06'W. Although the rig could be traced to within 30m. of the bottom the echo was lost, which together with the line out meter not registering made the camera work impossible and it was retrieved at 00.15hrs.

2/11/86 Challenger moved to a position north of the Coral Patch seamount at 35 05'N; 12 01'W. At 06.30hrs the Agassiz trawl was deployed in 2400m. of water. 5500m. of warp was paid out and

the tension meter showed a steady increase until the end of the tow when there were three large peaks.On retrieval at 12.42hrs the Agassiz frame had been bent and the net torn but a small sample contained some dead coral fragments encrusted in manganese,Munidopsis, Astroschema inornata, a crinoid and a fish.

At 16.04hrs the spade box core was deployed and although the trigger mechanism worked there was no sample owing, possibly, to the worsening sea conditions.

At 18.15hrs the stereo camera was deployed but was affected by the same problems as before and less than ten frames were taken. There was then a consultation between the Master, PSO and scientific complement when the PSO suggested that we steam to the slope off SW Portugal and continue the programme there owing to:

1) Lack of success round the seamounts and that they are secondary objectives.

2) Limitation on warp use to 6500m. precluded Agassiz trawls and epibenthic sledges on the abyssal plains but they could be carried out at less than 3000m. depth on the continental slope.

3) The worsening sea conditions were precluding the use of the spade box corer.

Before leaving the vicinity of the seamount plankton samples were taken with the neuston net lowered from the hydrowinch and a plankton net from the main warp.

3/11/86 At 00.15hrs Challenger set course for the SW Portuguese coast. Challenger arrived at 36 18'N; 09 07'W at 17.00hrs. An echosounder trace was run up the slope from 3900m. to the 500m.

contour at 36 46'N; 08 12'W to determine the angle of the slope and select suitable sites for sampling. Sites at 500m. depth intervals, except at 1500m. appeared suitable for sampling. The 1500m. site appeared both steep and exceptionally rugged. There was also a topographic high in the general trend of the slope at 36 15'N; 08 51'W where a ridge 300m. above the surrounding seafloor of 2900m. depth was found. It was decided to start at the 500m. station and work down the slope using gear appropriate to the prevailing sea conditions.

At 23.51hrs the stereo camera was lowered in 500m. of water and 36 exposures taken by 00.24hrs. Development of the film showed a successful drop.

4/11/86 At 00.47hrs a rock dredge lined with trawl mesh and shrimp netting was towed along the 500m. contour centred at 36 46'N; 08 11'W and successflly retrieved at 02.21hrs containing a large bag of mud and fine shelly material.

Challenger then proceeded east to tow the Agassiz along the contour. The trawl was deployed at 03.07hrs. and recovered at 05.52hrs. with a large sample which contained a variety of benthic invertebrates dominated by the crustacea.

At 06.38 the spade box corer was deployed and recovered at 07.13hrs. with an excellent core. A second box corer was completed at 11.38hrs. and a third was successfully recovered at 13.28hrs. The first two cores were sieved for invertebrates whilst the last core at 500m. was sub-cored by P.S. Meadows and S.J. Wakefield and additional subcores taken for P.R. Williams and A.E. James at U.C. Swansea.

Challenger then proceeded to the 1000m. contour. The box corer was deployed at 15.05hrs at 36 35'N; 08 14'W and recovered at 16.20hrs. with a 15cm. deep sample. The stereo camera was lowered at 16.33hrs. at 36 35'N; 08 14'W and a successful film of the seabed at 1000m. was obtained. An unsuccessful box core was attempted between 17.51 and 18.42hrs. At 19.00hrs the box corer was lowered and recovered at 20.05hrs. with a partially washed core which was sieved. Two other box cores did not seat properly on the spade and were washed on recovery. Owing to this technical problem box coring was suspended for the day.

At 20.58 hrs. the Agassiz trawl was deployed and recovered at 23.45hrs. The inner bag had come out of the outer bag but the sample contained some fine specimens of Poriocidaris as well as Lophelia and sponges. Challenger proceeded downslope to the 2000m. contour.

5/11/86 The rock dredge was deployed during the early hours but on retrieval was found not to have touched bottom. It was weighted with chain and redeployed at 06.57hrs at 36 30'N; 08 28'W and recovered at 10.20hrs containing clods of muddy ooze. The Agassiz trawl was shot away at 11.13hrs at 36 28'N; 08 27'W. At 12.45 the trawl became fast and by careful manouvering by the ships officers the Agassiz was released and recovered, damaged, at 15.26hrs but contained an excellent muddy sample including Hyalinoecia, Ophiura irrorata, Pourtalesia miranda and ? Asteroschema.

At 18.52 the spade box corer was lowered at 36 33'N; 08 28'W. and recovered at 20.31hrs. containing an excellent core filling

the box core right to the top with soft greyish sediment. The stereo camera was deployed at 21 12hrs. at 36 34'N; 08 28'W. and a successful film taken. A second box core was deployed at 23.55 hrs. at 36 33'N; 08 29'W. and recovered at 01.45hrs. containing a core right up to the vents on the box corer. This sample was used for subcoring by P.S. Meadows and S.J. Wakefield and additional subcores were taken for P.R. Williams at U.C. Swansea.

6/11/86 Challenger proceeded to the 2500m. contour where the spade box corer was lowered at 04.01hrs at 36 26'N;08 34'W and a successful core recovered at 06.04hrs. Challenger then steamed to the 3000m. contour. A first box core was unsuccessful but a box core deployed at 13.50hrs at 36 12'N; 08 56'W and recovered at 15.56hrs was successful containing a core up to 28cm. deep with pteropod and foraminifera shells in the surface layer. Challenger then steamed to the 3500m. contour. Between 18.35hrs and 00.19hrs two unsuccessful box cores were attempted.

7/11/86 At 01.04 hrs the box corer was lowered into 3585m. of water at 36 09.25'N; 09 00.66'W and an excellent core 35cm. deep was recovered at 03.25hrs. Challenger then steamed to the 4000m contour at 36 00.41'N; 09 12.38'W and tried unsuccessfully to obtain a box core. A second attempt between 07.53 and 11.26hrs produced a 28cm deep core. The stereo camera was lowered at this station at 11.40hrs.but the trigger weight broke free and the camera was recovered at 15.24hrs with only four frames exposed. The weather during this stage of the programme was excellent and it was decided to press ahead with box coring whilst the good conditions lasted. An additional excellent box core was obtained

at the 4000m. station which was subcored for microbiology and chemistry. Challenger steamed to 35 51.50'N; 09 55.53'W. in 4500m. of water and another magnificent box core was obtained between 21.59 and 01.40hrs.

8/11/86 The next phase of the cruise programme was to box core up the San Vincent canyon from 4000m to 500m. Challenger arrived at the 4000m. station at 36 33.57'N; 09 51.62'W and the box core taken between 07.14 and 10.31hrs contained a sample 36cm. deep. This excellent core contained a specimen of an, as yet, unidentified irregular echinoid, possibly Brissopsis sp.

Challenger proceeded to the 3000m. contour and a transverse profile was taken with the PES. A box core was deployed at 13.04hrs at 36 47.43'N; 09 40.86'W and was recovered at 15.36hrs containing another superb sample. At the 2000m. contour in the axis of the canyon the canyon is quite narrow and before using the box corer a depth profile trending NW-SE was prepared with the PES(Fig. 2). This showed a moderately sloping north side and a steep apparently rocky southern slope. The bottom of the canyon had a narrow flat bottom. Challenger was positioned at 36 58.53'N; 09 23.35'W over 2075m. of water. The box core was lowered at 18.46 hrs and recovered at 20.28 hrs with a sample almost to the top of the box. The core surface contained a number of burrows and a small branched ?Xenophyophore. The box core was redeployed at 21.38hrs. at the same station and recovered at 23.20hrs. with another brilliant core which was subcored for microbiology and geochemistry by PSM and SJW with additional cores being taken for P.R. Williams at U.C. Swansea.

9/11/86 Challenger steamed towards the 1000m. contour on the axis of the canyon. Before using the box core the canyon was echosounded from N to S(Fig. 3). It appeared to have steep walls with a narrow flat apparently soft bottom. At 01.34hrs the box core was lowered over the side at 37 03.09'N;09 06.29'W, touched bottom at 02.13hrs. and was recovered at 03.00hrs with a huge core to within 12cm. of the top of the box. The surface layer of the core was only 2mm. thick overlying dense compact material. Challenger steamed back to the 1500m. contour at 37 03.38'N; 09 15.05'W where another good core with a surface layer 3cm. thick was obtained at 12.23hrs. The seastate was generally calm but with a moderate groundswell of low amplitude. Challenger proceeded to the 700m. contour and after a brief bathymetric survey (Fig. 4) another excellent core at 37 02.80'N; 09 06.3'W was obtained at 14.31hrs. A second core between 15.10 and 15.43 hrs was unsuccessful but an additional core at 555m.,37 02.7'N; 09 06.3'W. was collected and subcored for microbiology and geochemistry by PSM and SJW. By this time the groundswell was c 3m. but this phase of the programme was successfully completed. Between 17.35 and 23.05hrs. successful stereocamera drops were taken at 500m., 2000m., and 1000m. depths in the axis of the canyon.

10/11/86 Between 00.30hrs and 03.30hrs Challenger carried out a further series of bathymetric profiles across the canyon. At 03.38hrs. Challenger set course northwards for the 500m. contour at 37 49.5'N; 09 15.0'W. arriving on station at 08.03hrs. As we have not trawled in these waters previously it was decided to

survey each track before shooting the trawl. The 500m. contour between 37 49.9'N; 09 15.0'W and 37 56.55'N; 09 13.62'W was surveyed between 08.03 and 08.45hrs. At 09.02hrs. the Agassiz trawl was lowered and towed on a reciprocal bearing to the survey. It was recovered at 10.50hrs and contained an excellent sample dominated by crustacea and fish. At the same time as the Agassiz trawl was being towed a neuston net was deployed to sample the very surface layer of the sea. Challenger steamed south to 37 51.9'N, 9 27.7'W to conduct an echosounder transect along the 1000m contour just north of Cabo de Sao Vincente. This was completed at 13.10hrs. and showed a suitably flat bed for trawling. The Agassiz trawl was lowered at 13.25hrs and recovered at 16.48hrs containing a poor fauna of hydroids, Acanella, sponges and a variety of megainvertebrates dominated by the echinothurid Phormosoma.

Challenger then surveyed three possible transects but each did not appear suitable for trawling. A transect aat 3200m was suitable and the Agassiz trawl was shot at 21.53hrs and recovered at 03.30hrs, but had not touched bottom. By this time weather conditions had deteriorated significantly.

11/11/86 Challenger surveyed a series of potential sites and identified two sites, one at 1000m north of Cabo de Sao Vincente, and one at 1500m to the west of this. To aid the sinking of the Agassiz trawl the line was weighted with 6m of chain. At 12.27hrs the Agassiz was deployed at 37 29.1'N, 9 22.8'W in 1000m of water and recovered at 16.16hrs at 37 33.82'N, 9 25.66'W containing a small sample of invertebrates, but containing our first record of

Nymphaster. Sea conditions were now very poor and Challenger steamed to the start of the 1500m transect. However weather conditions had deteriorated so badly with force 8 winds and a strong swell that work was suspended and Challenger hove to during the night.

12/11/86 At 0900hrs the seas were moderating and an echosounder transect along the 1500m contour was conducted for 10 nautical miles, ending at 10.02hrs.

The seabed appeared suitable for trawling and the Agassiz trawl was deployed at 10.09hrs. This was successfully recovered at 14.44hrs containing a moderate sample dominated by scaphopods, Zoroaster, Poriocidaris, Plutonaster, Hyalinoecia and a variety of other invertebrates. We wished now to do an Agassiz trawl at 2000m. in this area but repeated echosounder transects did not produce a suitable seabed. Eventually a suitable site at c 37 54.8'N; 09 46.22'W at 2200m seemed suitable and the Agassiz trawl was deployed at 20.33hrs and recovered at 01.17hrs. This produced an excellent sample dominated by Ophiomusium, Hyalinoecia, Hyqrosoma and Phormosoma.

13/11/86 Challenger steamed overnight to the 2000m. contour NW of Lisbon at c 39 N;10 40'W. Echosounder transects were taken and the Agassiz trawl deployed at 12.30hrs and recovered at 18.31hrs containing a superb sample dominated by scaphopods and gastropods but containing a wide variety of benthic invertebrates. Although some clinker had been retrieved with the trawl it was decided to do an epibenthic sledge at this station. This was deployed at 21.02hrs in 2165m. of water and recovered at 01.43hrs containing

a large sample dominated by pteropod shells and containing a rich invertebrate fauna.

14/11/86 Challenger steamed through the night in very rough sea conditions to a site at c 40 35'N; 09 34'W to the east of the Oporto seamount at the 2000m. contour. The chart suggested suitable sites for a trawl but it was only after repeated echosounder transects that a gentle incline in the otherwise steep slope was found. The Agassiz was deployed at 19.16hrs. During the tow the tension went up to 4 tons and the trawl was immediately recovered. The weak link had sheared but the trawl contained a small sample of Hygrosoma and Ophiomusium, some other invertebrates and two fish together with a great deal of clinker.

15/11/86 After the Agassiz trawl was inboard there was a camera drop between 01.00hrs and 03.00hrs in which 36 frames were exposed. Challenger then proceeded northwards east of the Oporto seamount to the 3000m.+ contour. After a brief survey the Agassiz trawl was deployed at 09.10hrs and the maximum available warp of 6500m. was paid out. Although there was no obvious increase in tension during the tow on recovery the weak link had sheared and the net had come away from the chains as though cut by a knife! Owing to this it was decided not to use the epibenthic sledge at this station and thus at 16.05hrs Challenger proceeded to the next station on the southern tip of the Galicia Bank, in Portuguese waters.

Challenger arrived at 41 28.8'N; 10 37.4'W at 21.15hrs. and the area was surveyed by echosounder. The terrain was very rough and this area was not used for sampling. A survey to the NW of this

point indicated a suitable site to trawl and the Agassiz was deployed at 23.53hrs. at 41 30.7'N; 10 41.8'W.

16/11/86 The Agassiz was recovered at 06.05hrs containing a good sample of clinker but a limited invertebrate fauna dominated by Paragonaster. Owing to the large lumps of clinker it was decided not to tow the sledge at this station. Challenger steamed to the southern tip of the Galicia Bank at the 2600m. contour. At 10.20hrs, after a brief bathymetric survey, the Agassiz trawl was deployed and recovered at 15.12hrs containig an exceptionally interesting haul dominated by the holothuroid Peniagone and various ophiuroids. As the seabed was suitable the epibenthic sledge was deployed at 16.57hrs and recovered at 21.45hrs. containing an excellent sample. This completed the scientific programme and Challenger set course for Barry arriving at 19.15hrs on 19/11/86.

Preliminary results

Biological and microbiological activity and sediment properties.

Cores were taken from the following box cores: 308(517m), 317(2100m), 323(4163m), 328(1980m) and 331(715m).

These cores represent an excellent range of depths and sediment types from abyssal plain areas and the San Vincent canyon off

Portugal. The cores were analysed immediately for a number of physical and chemical parameters including shear strength, Eh, pH and a number of microbial experiments were conducted measuring numbers and activity by C14. Estimates of bioturbation were made also and sediment preserved for later examination in the laboratory.

Preliminary in situ measurements showed that the shear strength increased into the sediment and that Eh values dropped. The latter was more obvious in the shallower water depths. It is intended to relate these and other chemical and physical measurements, made on return,to microbiological and biological activity, although the results of the C14 experiments will not be available for 4 to 6 months.

This work represents part of an ongoing program of research at Glasgow University whose objective is to analyse to what degree biological and microbiological activity influence sediment stability and erosion, and the early stages of sediment diagenesis. This study is supported by grants from NERC, SERC and foreign studentships.

P.S. Meadows and A. Tufail

Geochemical and geotechnical properties of the sediments

Geochemistry. Eleven box cores were subsampled on board using 6cm internal diameter core liner tube. From each of these box cores at least one subcore was frozen and a another nine subcores were retained intact and stored at 5 C. Six further subcores were sectioned on board into 1 or 2cm. depth slices and stored wet at 5 C. The depth of sampled box core ranged from 11 to 39cm.(x=26cm,n=28). The total meterage of frozen, cooled and sliced sediment obtained was 3.95, 2.74 and 1.54m. respectively. This material will be used to characterise rigorously these surface sediments from both a chemical and micropaaeontological standpoint, especially in the region of the Recent/Holocene boundary.

Geotechnical Properties. Seven box cores were subsampled using core tubing (4.8cm. i.d.) provided by Drs. A.E. James and P.R. Williams of U.C. Swansea. From these sites 16 subcores were obtained of which 10 were stored cool and 6 frozen. The material collected wil be used in conjunction with their NERC grant no.GR3/5583.

S.J. Wakefield

Report on the Gastropoda collected

A total of 348 live specimens of gastropods were obtained at the following stations:-

RD304(1),AT305(6),AT314(5),SBC332(1),AT336(54),AT337(6),AT338(1), AT339(22),AT340(12),AT341(201),AT345(33),AT346(6).

These samples represent 24 species and are dominated by the neogastropod families Turridae and Buccinidae. Material previously collected in the Rockall Trough had been fixed in 5% seawater formalin which although a good general fixative is often poor for gastropods. Live specimens collected in the Agassiz trawl were measured and treated:- i) by decalcifying the shell in a formic acid-based decalcifier or ii) several holes were drilled in the shell using a dentists drill and the specimen was then fixed in either Bouins, Hellys, Zenkers, Susa or 95% ethanol. After 24-48hrs the fixed material was rinsed in distilled water and transferred to a mixture of 80% ethanol and 4% glycerol to prevent hardening of the tissues and any further dissolution of the shell. The gonad histology of this well fixed material will be used to analyse the more poorly fixed material of previous cruises.

In addition to this material being fixed for paraffin histology some gonad tissue was fixed in buffered gluteraldehyde for 1hr. at 4 C and then transferred to buffered sodium cacodylate wash at 4 C for transport to Swansea where post-fixation and embedding will take place. This material will be examined by TEM.The species used include:-

Station	Species	Number
AT336	Colus jeffreysianus	2
AT340	Turridae sp.	4
AT341	Colus jeffreysianus	8
AT341	Troschelia bernicensis	7
AT341	Scaphander punctostriatus	1
AT345	Tacita abyssorum	5
AT345	Colus jeffreysianus	1

Two Agassiz samples produced pieces of wood containing three species of the wood-boring limpet Cocculina and the wood-boring bivalve Xylophaga.

This study is supported by NERC Grant GR3/5131.

J.G. Colman and P.A. Tyler

Report on the Scaphopoda

Scaphopods were obtained with all the benthic sampling gear used during the cruise. Scaphopods were particularly abundant in the Agassiz trawls and in AT339 they were the dominant species (n=>250). The specimens collected will be used as follows:-

i) The feeding strategies of theses species will be compared with those species in the Rockall Trough.

ii) Narcotization of specimens collected will aid soft body description which for many species is, at present, incomplete and inadequate.

iii) These samples will extend the knowledge of morphological variation, bathymetric and geographical distribution of the

species taken.

In the Rockall Trough foraminifera are an important component of the diet of scaphopods. Analysis of sediments taken from box cores will enable analysis of the numbers and distribution of live benthic and planktonic foraminifera to be examined in sediments from different depths.

This study is supported by a Heriot-Watt University research studentship.

G. Davies

Genetic studies

As part of a comparison of the genetic structure of populations of invertebrates in the NE Atlantic a variety of species (listed in Table 2) were collected and frozen. Part of the material will be used for electrophoretic studies and some will be used for the determination of the organic content of the various body tissues. This research is supported by a NERC studentship.

R. Hensley and P.A. Tyler

Quantitative distribution of macrofauna using box cores

15 successful box cores were obtained at different levels in the San Vincent Canyon and Adjacent slope. The material in these

cores was sieved through a 420um sieve and the residue fixed in 5% seawater formalin. This material will be sorted and identified to determine the density and species diversity in this canyon and the nearby slope.

J.D. Gage, R. Harvey and P.A. Tyler

Report on the samples of Pleuston collected

Marine pleuston communities comprise a variety of organisms from a range of phyla and these are typified by their adaptations (structural and behavioural) to life at the ocean/air interface. Holopleustonic forms are confined to the interface for all stages of their life cycle while many other forms are only (temporarily) meropleustonic. The latter grouping may involve larval stages spending extended periods at the interface or, in some cases, adult organisms which migrate vertically on a diel basis.

Pleuston communities are predominantly an oceanic phenomenon and , broardly speaking are restricted to the latitudes between 40 N and S and a minimum winter temperature of 15 C. This cruise was therefore only likely to encompass the margins of the N. Atlantic assemblages.

A total of 16 net tows from 11 stations were made between 33.5N and 38 N and 8.2 and 14.2W. Tows were taken with a net of 2mm. mesh sweeping a 2m. width to a depth of approx. 15cm. Some sub surface plankton tows were made also. Tars, plastics wood and

algal fragments were separated for qualitative purposes and pleustonic forms will be separated from the surface plankton on analysis.

Among the holopleustonic forms the Chondrophores Velella and Porpita were taken in small numbers at various stations, as were the pleustonic copepods (probably Labidocera, plus a variety of graspid crabs and isopods associated with floating debris. The latter crustacea showed remarkable thigmotactic behaviour and clinging to floating tars, plastics and algae on contact.

It did not prove possible to quantify the diel migration of the plankters to the surface layers at any one station, but with samples taken at various times of the day a number of pertinent features were noted:-

i) Blue pleustonic copepods were absent at night but present at day.

ii) One larger species of euphausid was found to be pleustonic by day but not at night.

iii) Grapsid crabs were present off Madeira, but isopods were abundant only off the Iberian peninsula.

iv) Some species of meropelagic fishwere caught at the surface at night (but not in 1-2m deep tows).

v) On several occasions dead and damaged hatchet fish were taken (as were small dead squid) suggesting an upward flux of organic material from mesopelagic assemblages and not necessarily down to the benthic communities.

The data obtained are necessarily only preliminary and will be extended by future studies. My prime objective was to test the

gear and evaluate the constraints and practicalities of ship-borne work. Probably the most important element of future work will be in necessitating the links and quantitative fluxes of material between mesopelagic and surface assemblages. Here the crucial connections are the feeding behaviour of the fish migrants and the fate of pelagic/planktonic corpses.

C.D. Todd

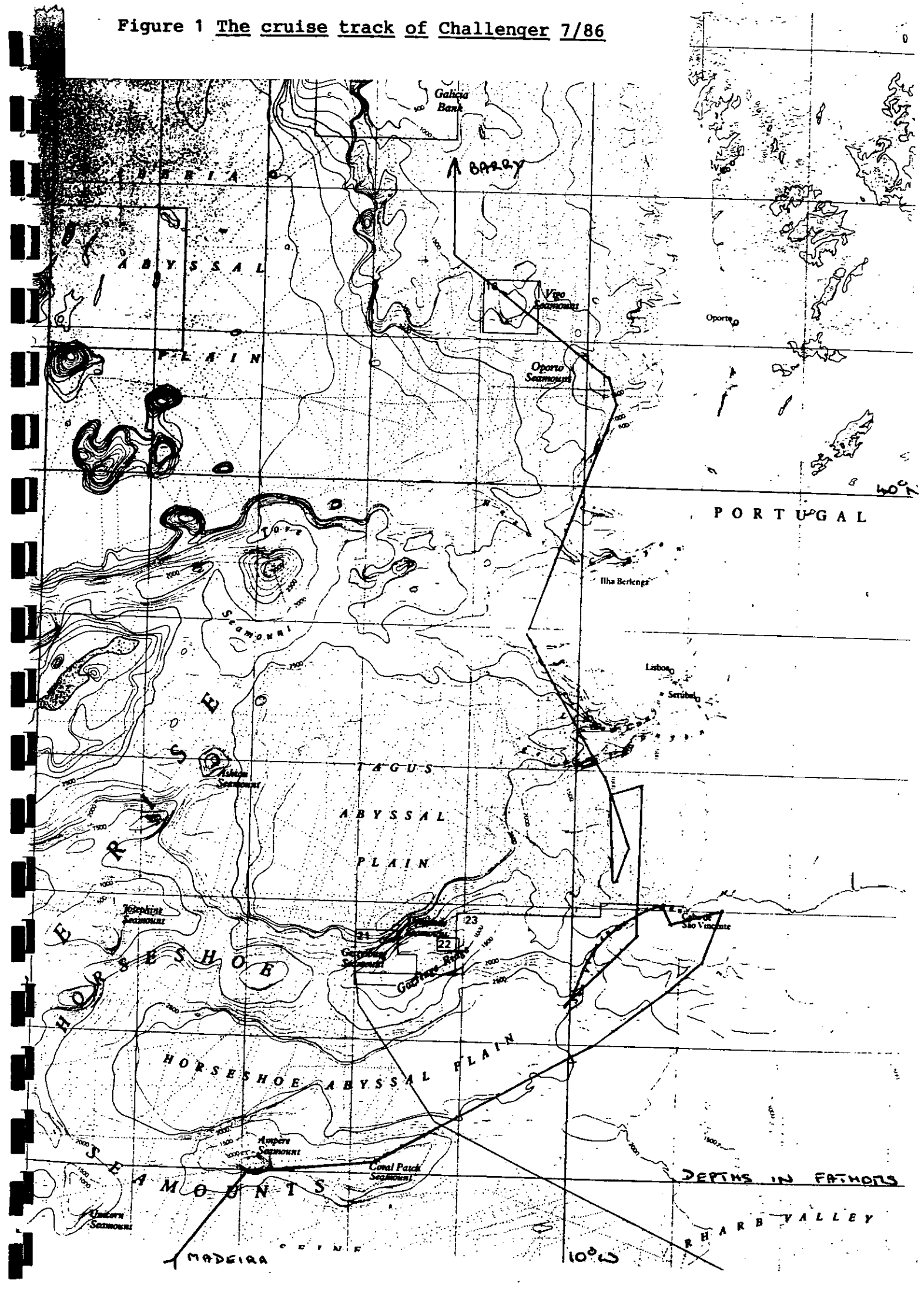
ACKNOWLEDGEMENTS

All the scientific participants wish to acknowledge the skill and assistance offered by the Master, Officers and seamen of RRS Challenger throughout this cruise without which many of our objectives may not have been achieved. To these people we offer our sincerest thanks. We wish to thank also John Strangward and Gary White from RVS for their patience and perseverence in assistance with the onboard equipment, and C. Adams, I. Innes and Mrs. J. Hill for pre-cruise help in both cruise preparation and the logistics of travel. Travel for this cruise was supported by NERC Grant GR3/5131 to PAT which is graefully acknowledged.

Table 1 STATION POSITIONS

Station	Date	Latitude(N)	Longtitude(W)	Depth(m)
CAM299	31/10/86	33 45.36'	14 19.84'	350
RD 300	31/10/86	33 45.69'	14 20.95'	500
AT 301	2/11/86	35 06.68'	11 53.51'	2500
CAM302	2/11/86	35 02.12'	12 18.97'	2480
CAM303	3/11/86	36 46 73'	08 12.01'	470
RD 304	4/11/86	36 46.62'	08 11.16'	540
AT 305	4/11/86	36 47.20'	08 09.30'	527
SBC306	4/11/86	36 47.03'	08 12.14'	442
SBC307	4/11/86	36 46.79'	08 12.05'	517
SBC308	4/11/86	36 46.88'	08 09.73'	515
SBC309	4/11/86	36 35.27'	08 14.88'	1025
CAM310	4/11/86	36 35.27'	08 13.83'	1015
SBC311	4/11/86	36 35.88'	08 12.42'	910
AT 312	4/11/86	36 35.20'	08 17.70'	1030
RD 313	5/11/86	36 29.42'	08 28.96'	2100
AT 314	5/11/86	36 31.94'	08 28.73'	2040
SBC315	5/11/86	36 33.95'	08 28.43'	1820
CAM316	5/11/86	36 34.29'	08 28.36'	1600
SBC317	5/11/86	36 33.80'	08 29.34'	2100
SBC318	6/11/86	36 27.41'	08 35.36'	2450
SBC319	6/11/86	36 12.81'	08 56.30'	2940
SBC320	7/11/86	36 09.25'	09 00.66'	3618
SBC321	7/11/86	36 02.20'	09 14.90'	4030
CAM322	7/11/86	36 04.99'	09 14.38'	3975
SBC323	7/11/86	36 05.11'	09 13.61'	4035
SBC324	7/11/86	36 51.50'	09 55.53'	4525
SBC325	8/11/86	36 33.57'	09 51.62'	3860
SBC326	8/11/86	36 37.43'	09 40.86'	3100
SBC327	8/11/86	36 58.33'	09 23.35'	2075
SBC328	8/11/86	36 59.70'	09 24.30'	2000
SBC329	9/11/86	37 03.09'	09 06.29'	1075
SBC330	9/11/86	37 03.38'	09 15.05'	1430
SBC331	9/11/86	37 02.80'	09 06.40'	785
SBC332	9/11/86	37 02.70'	09 06.30'	555
CAM333	9/11/86	37 03.02'	09 06.58'	434
CAM334	9/11/86	36 57.97'	09 23.02'	1915
CAM335	9/11/86	37 02.90'	09 07.80'	1000
AT 336	10/11/86	37 55.61'	09 15.47'	535
AT 337	10/11/86	37 57.00'	09 23.50'	960
AT 338	11/11/86	37 30.50'	09 23.60'	1015
AT 339	12/11/86	37 31.46'	09 37.21'	1500
AT 340	12/11/86	37 54.37'	09 46.72'	2100
AT 341	13/11/86	39 00.00'	10 40.00'	1915
ES 342	13/11/86	38 59.30'	10 38.90'	c2000
AT 343	14/11/86	40 35.70'	09 36.00'	c2200
CAM344	14/11/86	40 34.22'	09 48.08'	2600
AT 345	15/11/86	41 31.90'	10 47.50	3110
AT 346	16/11/86	41 38.70'	11 21.10'	c2550
ES 347	16/11/86	41 38.03'	11 19.73'	c2505

Figure 1 The cruise track of Challenger 7/86



Ship. RRS CHALLENGER Cruise No 7/86

Cruise Dates (Inclusive, port to port) 30/10/86 – 19/11/86

It is requested that the following aspects of the cruise may be covered in this report of proceedings for dispatch or delivery to the Director, Research Vessel Base, immediately on return to port.

a) Main objectives of the cruise.
b) Geographical area. Reference stations or points in latitude and longitude.
c) Sea and weather conditions encountered.
d) Conduct of cruise, main problems encountered and success or otherwise of the progra
e) Equipment performance.
f) Ship performance.
g) Any recommendations.
h) Signature and date.

Brief comments are preferred but if necessary please continue on another sheet.

The main objectives of the cruise was to continue studies of the benthic ecology in the NE Atlantic by sampling an area from 35N to 45N along the slope to the west of Portugal by using a spade box corer, an epibenthic sled, an Agassiz trawl and a stereo camera system. Although the main aim of the cruise was biological samples were collected for geochemical and geotechnical studies as well as the microbial content. A station list is appended.

The weather conditions were very variable. On leaving Madeira the sea was rough but the swell was short. As we approached the SW tip of Portugal the sea conditions were excellent. After this a large swell from the NW built up which resulted in the loss of 12hrs work whilst Challenger was hove to. For the remainder of the cruise there was a heavy swell but we were able to complete the programme. The cruise was successful. During the period of calm weather 20 successful boxcores were obtained from the San Vincent Canyon and adjacent slope. During the poor weather we were able to use the epibenthic sled and Agassiz trawl and the camera system. The main problem was with the main warp the use of which was limited to 6500m. thus preventing sampling in the deep abyssal plains. The master is submitting a report about the warp.

All the equipment and support staff worked well as did the officers and crew of the ship. The intercom was not working but this minor problem was overcome.

I believe that the refit to Challenger has been a great success especially in terms of laboratory accomodation and aft deck space.

A detailed cruise report will be submitted shortly.

Paul Tyler

28/11/86

Table 2
Samples frozen and taken to Swansea

Station	Species	No. taken
AT305	Astropecten	4
AT305	Epizoanthus	6
AT312	Cidarids	6
AT314	Pourtalesia	6
AT336	Pagurids	10
AT336	Molpadia	2
AT337	Molpadia	2
AT337	Brisingid	1
AT337	Phormosoma	8
AT338	Pagurids	5
AT338	Nymphaster	2
AT338	Cidaris	3
AT338	Molpadia	2
AT339	Ceramaster	11
AT339	Plutonaster	5
AT339	Nymphaster	2
AT339	Zoroaster	12
AT339	Hygrosoma	15
AT339	Poriocidaris	10
AT339	Laetmogone	30
AT339	Parapagurus	1
AT339	Pagurus	12
AT339	?Caryophelia	6
AT339	Hyalinoecia	40
AT340	Hymenaster	8
AT340	Benthopecten	5
AT340	?Paragonaster	1
AT340	Ophiomusium	40
AT340	Ophiura lj	5
AT340	?Ophiura irr	7
AT340	Hygrosoma	5
At340	Molpadia	4
AT340	Benthogone	10
AT340	Hyalinoecia	40
AT340	Corals	8
AT341	Hygrosoma	10
AT341	Hyalinoecia	10
AT341	Colus	20

Station	Species	No. taken
AT343	Hygrosoma	5
AT343	Ophiomusium	12
AT343	Molpadia	1
AT343	Plutonaster	1
AT343	Benthopecten	1
AT343	?Paragonaster	1
AT343	Corals	6
AT343	Hyalinoecia	5
AT345	Pagurid	1
AT345	Paragonaster	5
AT345	Hygrosoma	1
AT346	Ophiura irrorata	20
AT346	Ophiomusium	8
AT346	Peniagone	20

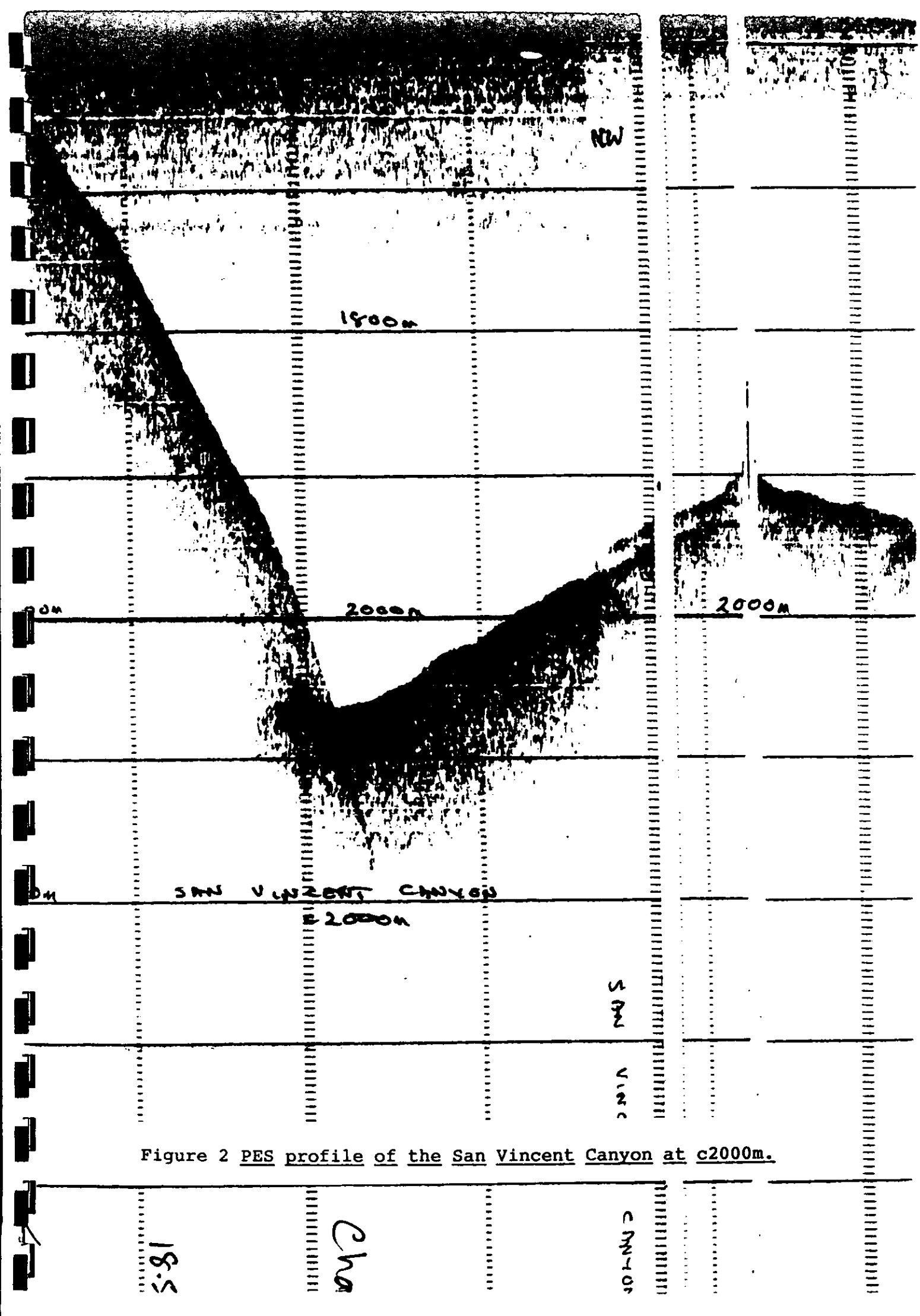


Figure 2 PES profile of the San Vincent Canyon at c2000m.

Figure 3 PES profile of the San Vincent Canyon at c1000m.

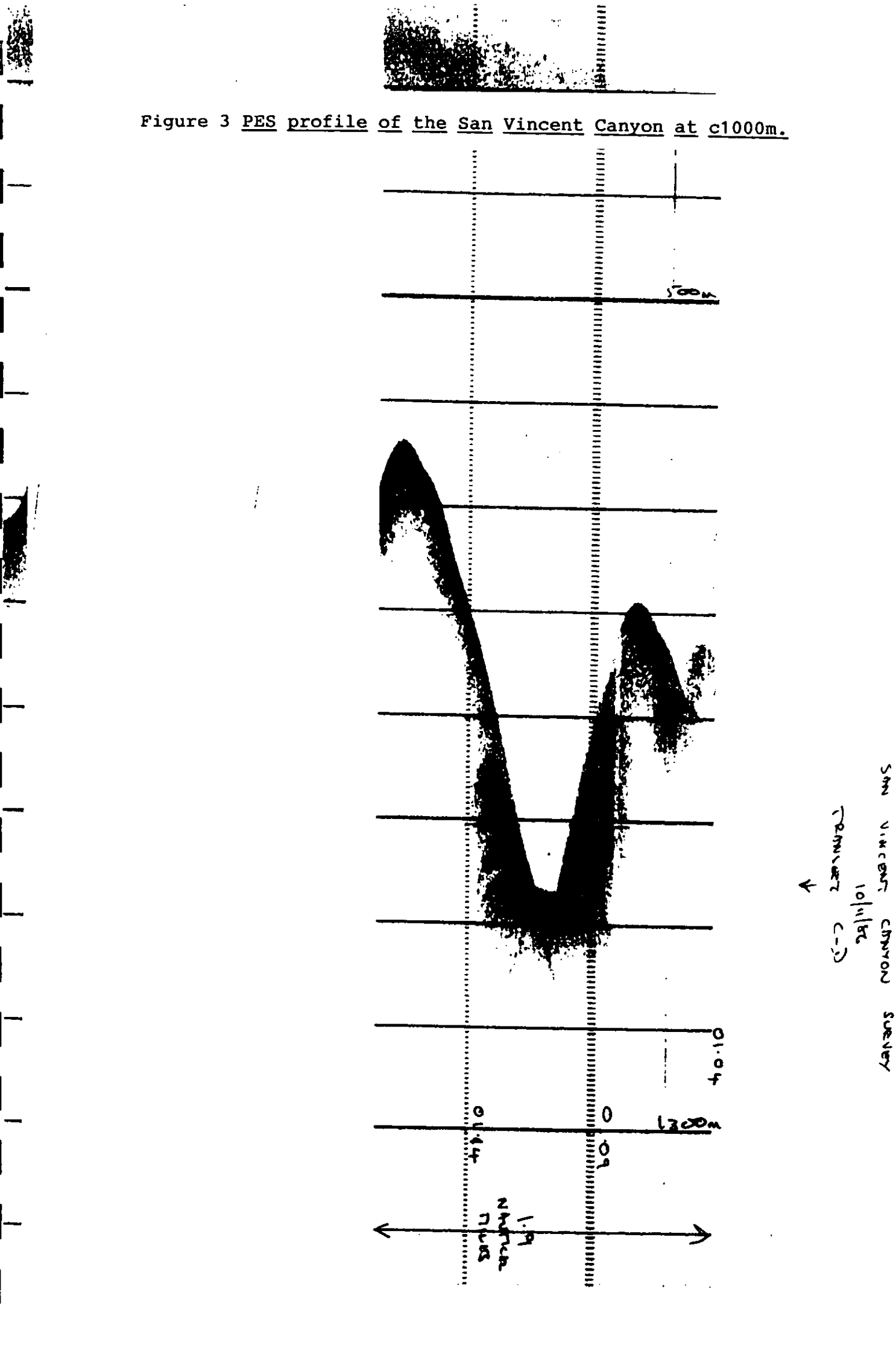


Figure 4 PES profile of the San Vincent Canyon at c700m.