CRUISE REPORT

POSEIDON 200, leg 7

Brest - Oporto
(23.06.93 - 04-07-93)

OMEX: Subprojects:
Biological Processes
Benthic Processes

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POSEIDON 200/7 (Brest to Oporto: 23.06.93 - 04.07.93)

On 23.06.93 the Poseidon left Brest with an all-OMEX contingent of scientists from the Subprojects Biological Processes and Benthic Processes. The ship was laden with mooring equipment as this was to be the first OMEX cruise to deploy the sediment trap moorings and a NIOZ bottom lander, as well as to register marine snow profiles and across- and along- slope zooplankton distributions. We headed for the first station at 49° 11´N; 12°44´W at a water depth of 1300 m to set out the bottom lander which had been fully assembled prior to departure. Although our main working area was to be on the Goban Spur we first steamed away from the slope to test the ships newly loaded deep-sea wire at a water depth of 4800 m (see cruise track, Fig. 1) We used this opportunity to have a deep CTD cast at this station and to register across-slope surface temperature and conductivity with the ships thermosalinograph during our return to the working area. The most prominent feature in surface temperature was the sharp increase from 15°C to 15.7°C at around 14°30´W, about 40 sm off the slope at the Pedragon Escarpment (Fig. 2). On the slope itself several small-scale fluctuations in temperature were registered which may be attributable to local eddy structures.

Fig. 2

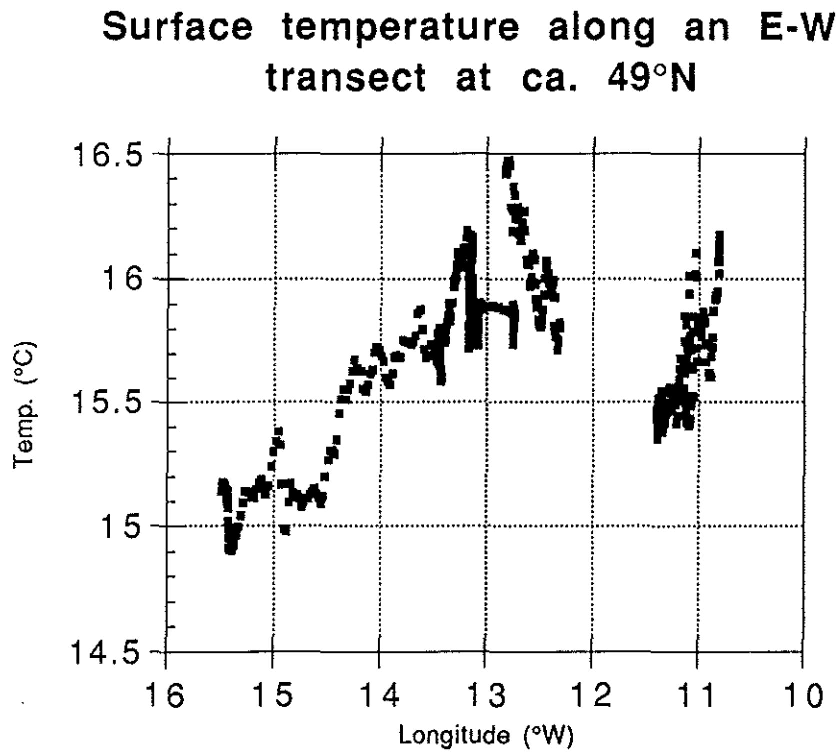
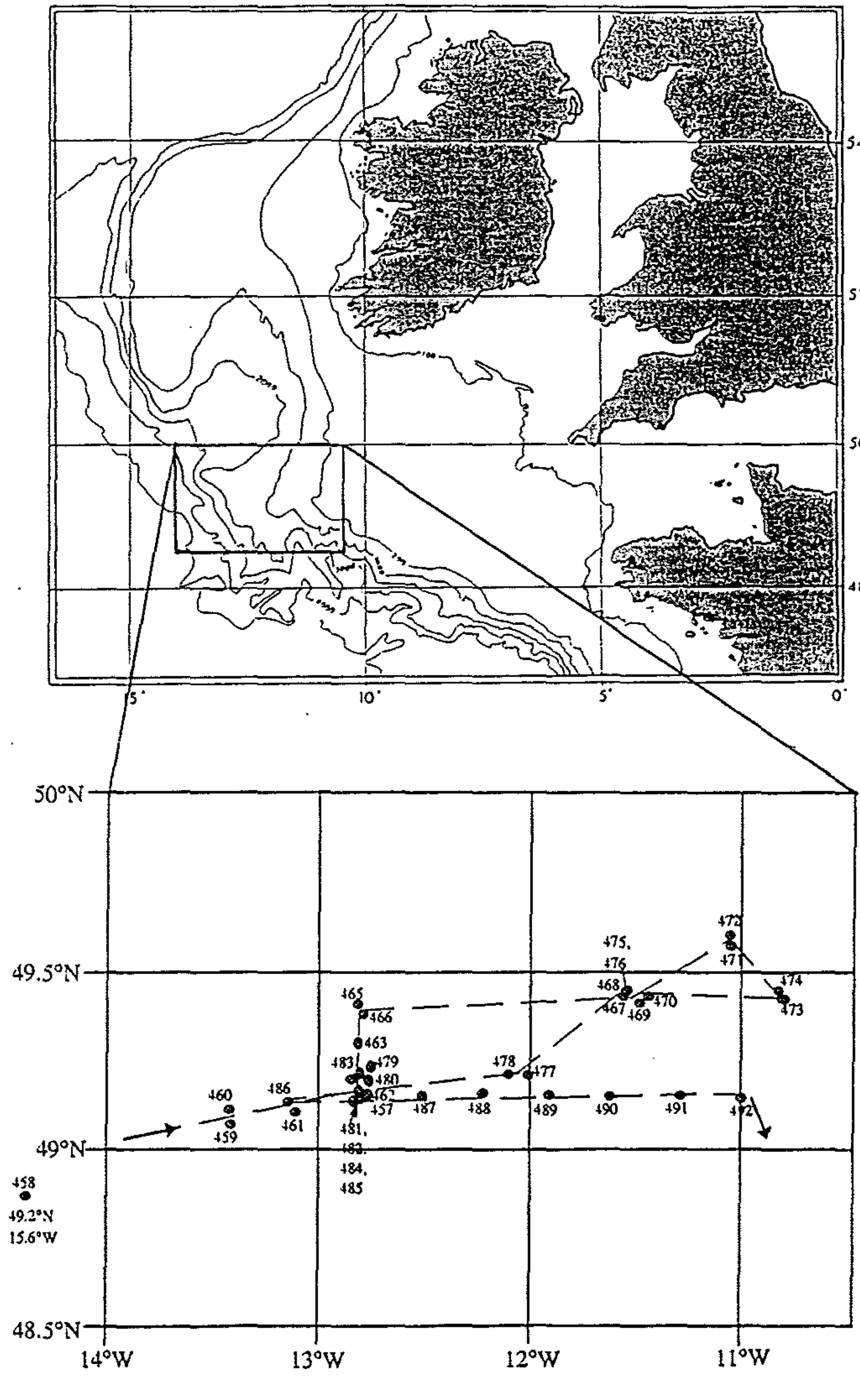


Fig. 1 POSEIDON 200/7 CRUISE TRACK AND STATION POSITIONS



The east-west transect during our cruise between ca. 15°W and 11°W at approx. 49°N overlapped with the mooring and lander positions and crossed the bottom countours of between 4800 and 150 m. along the slope (see cruise track). This transect also connects stations where benthic investigations will be carried out within OMEX. Along this transect a number of CTD casts were taken with conductivity, temperature, pressure and light transmission sensors and marine snow profiles with the camera mounted to the CTD frame. The Longhurst Harvey Plankton Recorder was towed on several occasions both along- and across-slope to record zooplankton distributions and migration patterns.

Sediment trap moorings

B. v.Bodungen, A.N.Antia, T.Kumbier, G.Lehnert & P. Wassmann

Continental margins are known to be areas of high biological productivity, but the sources and sinks of biogeochemically important elements at the european continental margin have as yet not been quantified. The ultimate role of the ocean margin (shelf and slope) and its interaction with the open ocean in terms of retention and export of these elements remains an open question. Sediment traps provide an effective way to measure transport of material both vertcally by sinking and laterally through tracer analyses in collected material. We have deployed three moorings with a total of six sediment traps, six current meters and four transmissiometers on the Goban Spur at water depths of 600, 1300 and 3600 m The Goban Spur is characterised by lower current speeds than otherwise measured on the continental slope, making it amenable to sediment trap work. A major factor in the decision to place the moorings past the shelf break was the intensive fishery activity on the shelf which would greatly diminish chances of recovery of our equipment.

Each sediment trap has a programmable rotating plate which enables sample colection in 20 time intervals. Additionally, we have deployed current meters approx. 20 m below each trap to obtain a record of current speed and direction, as high current speeds are known to bias trap collection efficiency both in quantity and selection in terms of particle size and sinking characteristics. The current meters (except the shallowest in the moorings at 1300 and 3650 m) are equipped with 25 cm path length transmissiometers to register relative particle concentrations during the deployment periods at each depth. Table 1 lists the depths and positions of deployment for the three moorings.

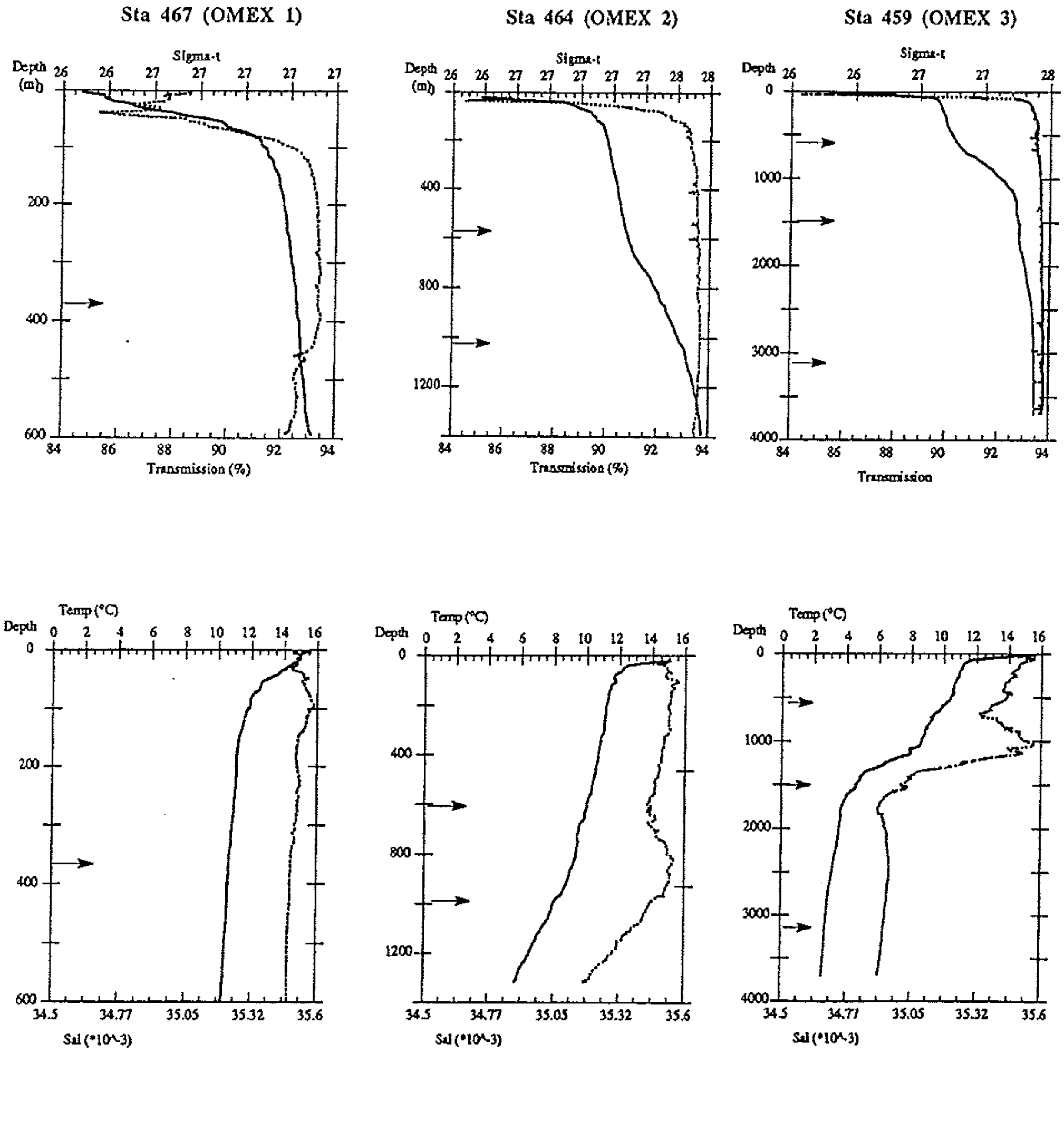
Table 1: Positions of sediment trap moorings and depths of instrument deployment.

MOORING	LATITUDE	LONGITUDE	WATER DEPTH	DEPTH (m)	INSTRUMENT
OMEX 1	49°24.72'N	11°31.86'W	670 m	383	Sed. trap
(Sta 468)				407	RCM+Transm
OMEX 2	49°11.20'N	12°49.18'W	1445 m	595	Sed. trap
(Sta 463)				618	RCM
				1052	Sed. trap
				1076	RCM+Transm
OMEX 3	49°05.0'N	13°25.8'W	3650 m	556	Sed. trap
(Sta 460)				580	RCM
				1465	Sed. trap
				1489	RCM+Transm
				3260	Sed. trap
				3284	RCM+Transm

CTD profiles were taken at each station prior to trap deployment. The shallowest trap were hung below the surface mixed layer in depths of between 400 and 600 m. The deepest traps in the moorings 2 and 3 were 400 m above bottom to avoid direct collection of resuspended material from the benthic nepheloid layer, and to quantify pelagic input to the benthos (Fig. 3) Sampling intervals have been set at between 7 and 10 days till January 1994 when the traps will be recovered and the cups changed.

The positions at which our moorings are deployed will be sampled repeatdly during the OMEX programm to yeild maximum seasonal coverage of water column parameters. As a note of caution, though, we request other cruise participants to maintain a 5-mile radius from the exact positions to prevent inadvertant recovery of our equipment!

Fig. 3: Water column profiles at stations adjacent to the mooring positions. Arrows indicate depths of instrument deployment.



Marine Snow Studies

Richard Lampitt

Marine snow are particles loosely defined as inanimate and with a diameter >0.5mm. They are thought to be the principal vehicles by which material in open ocean environments sinks through the water column.Their role in shelf slope environments has not been established and the profiles obtained during this cruise are probably the first from the European continental slope.

The Marine Snow Profiler (MSP) is a photographic device for recording *in situ* images of marine snow particles. It can be attached to a CTD frame to provide vertical profiles or attached to a mooring to provide time series data. The device photographs 40 litres of water illuminated orthogonally by a collimated beam of light. The light is produced by a 300µsec Metz flash gun directed at a bank of Fresnel lenses. The central plane of the light slab is 80cm from the camera lense and has a cross section of 30 x 30cm. Up to 400 frames can be taken during any one deployment to a depth of 5000m. Due to an electronic problem with the camera, during this cruise the normal frame interval of 15sec was extended to 30sec thus reducing vertical resolution.

The frames will be analysed using a Kontron image analyser which measures each particle for maximum and minimum dimension to calculate abundance and volume concentration of particles in each of six size categories in each frame. Profiles of these parameters are then merged with other data from the CTD taken simultaneously such as those of light attenuation and water density.

During this cruise particular attention was paid to the nepheloid layers recorded by the transmissometer (benthic, mid-water and subsurface) which characterised most of the deployments (eg Figure 4).

Fourteen profiles (Table 2) were made and all but the first one (MSP 51) appear to have functioned correctly. Six of these were designed to determine diel variability at one site (1300m) although unfortunately the higher winds which occurred during most of this work (Figure 5) (30.6.93 day 181) may have reduced data quality due to rapid movement of the water in the light slab relative to the camera.

Table 2: CTD casts with Marine Snow Profiler (MSP) attached.

NB: Water depths are soundings in uncorrected meters

MSP	DATE	POS STATION	IOS STATION	TIME (GMT)	WATER DEPTH (M)	LAT. (N)	LONG.(W)
51	25.06.93	458	52901#1	1617-?	4758	49° 07.3	15° 36.1
52	27.06.93	462	52902#1	0407- ?	1296	49° 11.3	12° 43.9
53	27.6.93	465	52908#1	1823-1935	1417	49° 22.9	12° 49.4
54	28.6.93	467	52910#1	0421-0521	622	49° 24.6	11° 30.4
55	28.6.93	469	52912#1	0846-0918	400	49° 24.1	11° 23.7
56	28.6.93	471	52914#1	1342-1408	200	49° 34.4	11° 02.8
57	28.6.93	473	52916#1	1825-1837	157	49° 26.8	10° 48.8
58	29.6.93	475	52917#1	0415-0500	589	49° 24.9	11° 29.3
59	29.6.93	477	52920#1	1034-1133	1001	49° 12.3	12° 06.3
61	30.6.93	480	52914#1	0013-0130	1290	49° 11.3	12° 43.8
62	30.6.93	481	52924#1	0610-0735	1293	49° 11.4	12° 44.4
63	30.6.93	482	52925#1	0805-0915	1293	49° 11.5	12° 43.7
64	30.6.93	484	52927#1	1520-1636	1286	49° 11.6	12° 43.8
65	1.7.93	486	52929#1	0416-0650	2580	49° 07.7	13° 09.0

Fig. 4. Station 461. Example of CTD profile exhibiting various types of nepheloid layer.

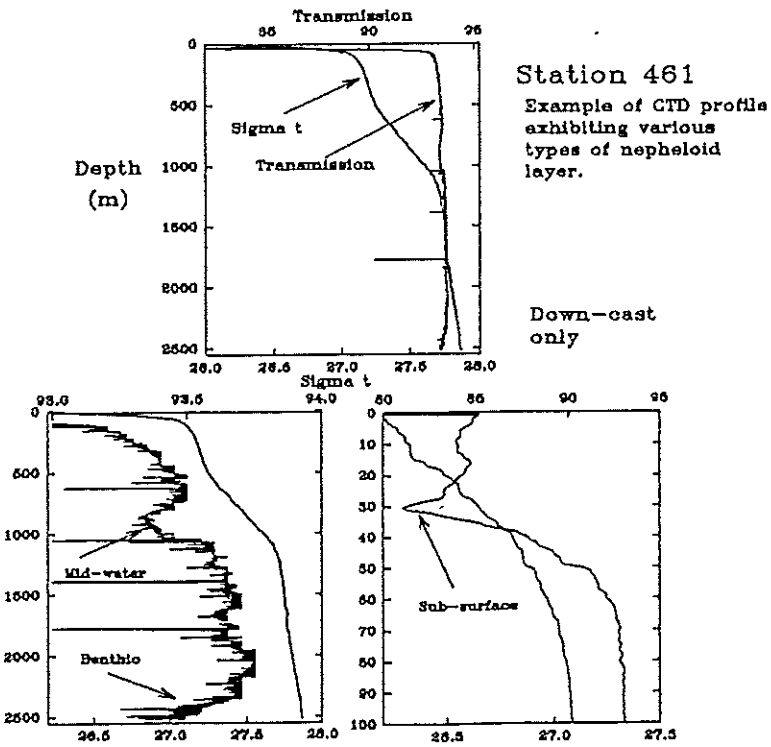
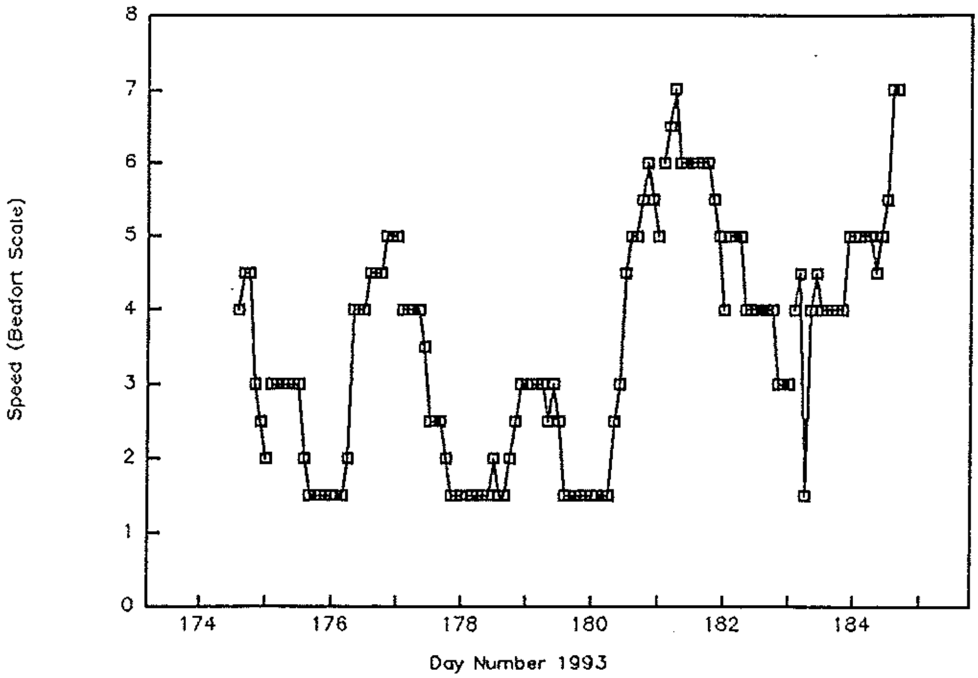


Fig. 5. Wind Speed during POSEIDON 200/7 (derived from ships log)



Plankton Distribution

Greg Phillips, Phillip Pugh, Ben Boormann

The distribution of plankton across the continental slope was examined using a Longhurst Hardy Plankton Recorder (LHPR). It was used on ten deployments although mechanical problems restricted the usefulness of some of these. Three were towed at a constant depth near the thermocline to investigate diel migration. Seven were operated during daylight hours as slow oblique tows to investigate vertical distribution. The ships Acoustic Doppler Current Profiler (ADCP) was operated simultaneously with these deployments. The plankton records will be compared later with the acoustic records. This comparison will be used to investigate the usefulness of the ADCP as a tool for routinely mapping plankton distribution.

The LHPR is a net which collects zooplankton on a sandwich of 200 micron gauze in the cod end. The gauze is wound on every two minutes trapping the sample and presenting fresh sampling surfaces to the waterflow. The mechanical winding mechanism jammed on several occasions restricting the sample obtained. At a towing speed of 4.5 knots this represents a sampled track distance of 270 metres. Flow, temperature, pressure and operation were logged on a paper chart recorder. This was housed with the control electronics and batteries inside a pressure case mounted on the frame.

To enable the LHPR to fish the required depth profiles an IOS acoustic net monitor was also mounted on the frame. The acoustic signals were received at the ship using a single IOS PES mk3 acoustic transducer mounted in a small towfish and connected to an IOS mk4 deck control unit. This combination was also used simultaneously to echosound. The signals were displayed on a PC based Waterfall Display for real time control and a Dowty 3700 thermal recorder for hard copy record.

The ship mounted Acoustic Doppler Current Profiler was run continuously throughout the cruise apart from the first few days and two unexplained system crashes. In addition to mapping near surface currents it is hoped that the intensity information will be useful to map plankton distribution. Sixty four bins of eight metre length were used. One ping was transmitted every second and two minute ensembles of pings were averaged. For most of the cruise good quality returns were obtained to depths of at least 350 metres. Many ensembles indicated the presence of strong scattering layers.

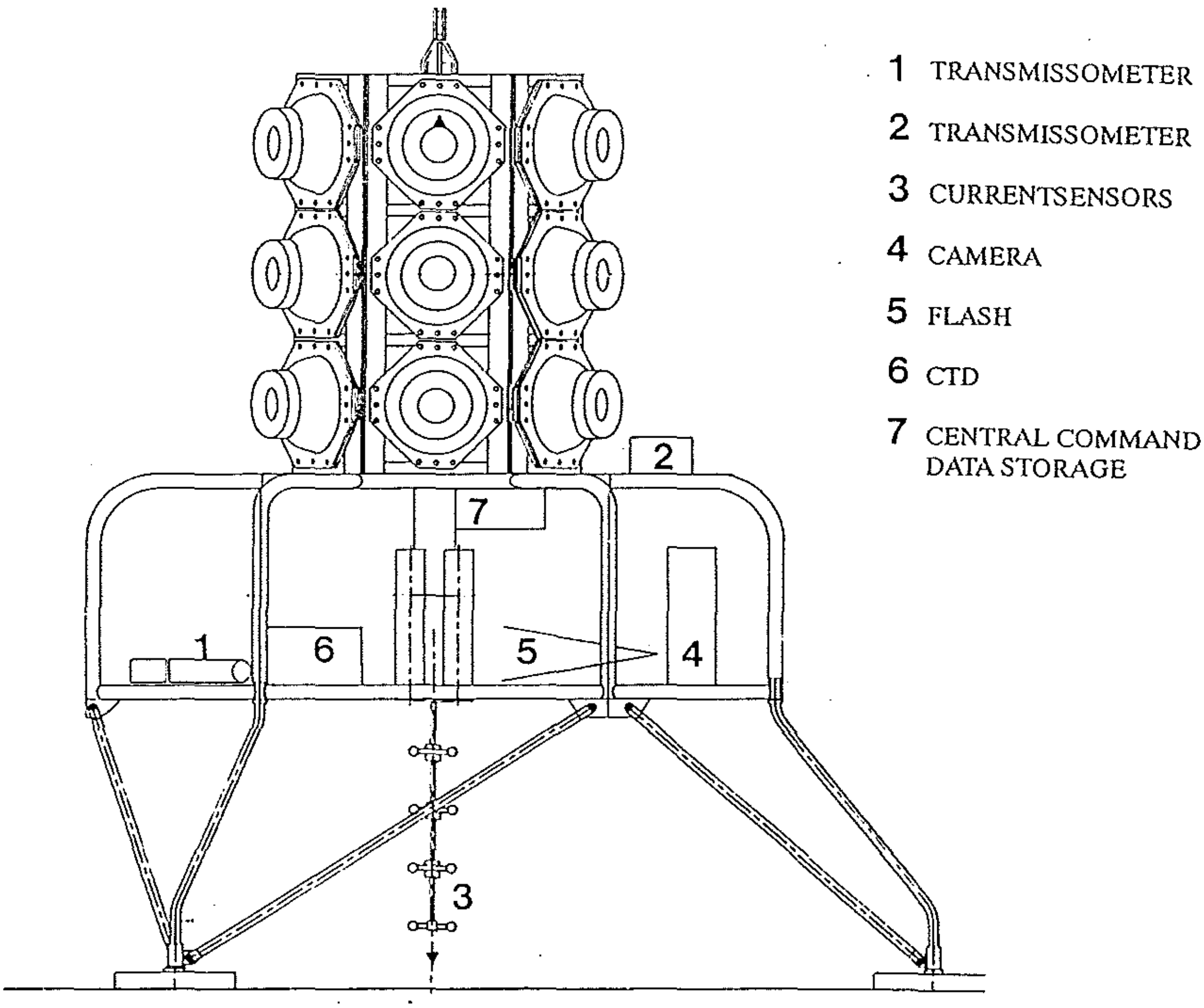
At the start of the cruise considerable difficulty was experienced with the PC computer controlling the system. Eventually after removing the GPIB interface, modifying the computer and operating through the serial interface a usable system was concocted. For unknown reasons a heading offset of 90 degrees had to be used to bring the displayed heading to within a few degrees of the ships Gyro reading although this was the source of the raw data. Similarly the navigation information was incorrectly displayed although the data logged to file was correct.

BENTHIC LANDER

Henk Franken

On 24/06/93 a benthic lander from the Netherlands Institute for Sea Research was deployed at station 457, 49 11.31 N 12 44.00 W, at a depth of 1296 meters. The instruments on this lander will be collecting data on sediment transport and near bottom currents for about one year. The lander has a tripod construction with glass spheres for positive buoyancy and steel footweights that are released by two acoustic releases (Fig. 6). The lander is equipped with a CT recorder - for measuring and logging temperature and conductivity- , two transmissometers, two cameras, and an acoustic currentmeter to measure and log horizontal and vertical current speeds at four different heights above the seabed. The main power supply is a 12 volt lead acid battery, and the instruments are controlled by a central datalogger with a storage capacity of 20 Mbyte. To back-up the central datalogger all instruments, except the transmissometers, have their own logging system and battery. The acoustic releases are also used to acoustically relay an instrument status report to the surface. In this way the correct insitu operation of each device can be checked before leaving the site. At the top of the lander a flashing light and radio transmitter are mounted to aid relocation after surfacing.

Fig. 6. Schematic illustration of the NIOZ Bottom Lander



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