

I.O.S.

RRS DISCOVERY

CRUISE 113

6 - 13 October 1980

INSTRUMENT AND EQUIPMENT TRIALS

CRUISE REPORT NO 106

1980

NATURAL ENVIRONMENT
INSTITUTE OF OCEANOGRAPHIC SCIENCES
RESEARCH COUNCIL

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Institute of Oceanographic Sciences,
Brook Road, Wormley, Godalming,
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R. Lloyd	R.V.S.
G. Lodge	I.O.S.
S. Rusby	I.O.S. (Principal Scientist)
R.F. Wallace	I.O.S.
R.A. Wild	I.O.S.

NARRATIVE

Discovery sailed from Redhead's Yard, South Shields, at 1700 hours on the 6th October at the end of the 1980 refit. On leaving the River Tyne she turned north to carry out D/F calibrations and also EM log calibrations off the Blyth (Newbiggin) measured mile. After completion of this work, later that evening, the ship left the area and proceeded south in worsening weather on her way to the South West Approaches to carry out instrument and equipment trials. South westerly winds, force 7-8, reduced her speed in the Channel and the vessel finally arrived in the Bay of Biscay in water of a depth of 4000 metres on the morning of the 10th October. A number of instrument and equipment trials were then carried out, both in the deep water and, later, on the continental shelf during the return to Barry, and these are itemised below. Echo-sounding measurements were made over the edge of the continental shelf and in the deep water and the extent of these are shown on the track chart at the end of this report.

PROJECT REPORTS

EM LOG CALIBRATION

The ship was steamed at three different speeds over the Newbiggin (Blyth) measured mile in order to calibrate the two retractable EM logs fitted in the hull. Runs were made in each direction at 80, 120 and 160 RPM and the measured speeds averaged. Unfortunately the wind speed was high during the runs, typically 30 knots at 230^{OT}, so that there was a significant difference between the measured speeds in each direction, particularly at the two lower shaft RPM values. The averaged speeds were 5.78 knots at 80 RPM, 9.20 knots at 120 RPM and 12.18 knots at 160 RPM. The results showed that the starboard log was correctly set at the highest speed and was within 0.5% at the two other speeds, but that the port log was some 2% high at all speeds. The calibration of the starboard log was not altered, but the port log calibration was reduced by 2.2%. This new calibration was set in the IBM 1800 files.

(Harris and Rusby)

FORWARD HYDRAULIC MAIN

The hydraulic main was run up to assess the performance of the system after the modifications which had been made during the refit. These included the provision of flexible mounts for the motor/pump bedplate, flexible hose connections between the pump and deck piping, a new water pump and heat exchanger system, and the lining of adjacent walls and bulkheads with sound-absorbing material. Some 15 hours running time was accumulated and it was clear from this that the oil was now circulating at an acceptable temperature and that the noise level of the system had been significantly reduced. Measurements were made of acoustic level within the motor room and in adjacent spaces and these were compared with those previously made in March 1980 before the modifications had been carried out. It was found that sound level had been reduced by a maximum of 10 dB in the central frequency range from 500 Hz to 4 kHz where the ear is most sensitive. Towards the end of the cruise the double-barrelled capstan

was exercised under an overside load of 800 lb for about 1½ hours. It is believed that the relatively low noise level at the capstan operator's position, compared with that radiated by the diesel power pack, will make the operator's task more acceptable, with better communication.

(Lodge, Wallace and Rusby)

32 KHZ NEAR-BOTTOM ECHO-SOUNDER

A 32 kHz echo-sounder for near-bottom use was wire-tested in three depths of water, including a depth of 4200 metres on the last occasion. The 10 kHz telemetry system performed well, but the maximum range of the 32 kHz HF transmission to the sea-floor, some 25 metres, was disappointing.

(Harris)

BENCAT (BENTHIC CURRENT AND TEMPERATURE SENSOR)

The aluminium instrument and buoyancy sphere of Bencat was lowered on the main warp to test the operation of the acoustic command system fitted. It was checked that the transponder and release modes responded to acoustic command at 1000 metres depth, and at 2000 metres the puffers, simulating the pyro-release devices, were fired successfully. The weather was poor during the lowering, and the forecast bad, so it was decided not to continue lowering further to 4000 metres for fear that the deteriorating weather would put the recovery at risk.

(Collins, Grohmann and Harris)

HEAT PROBE TELEMETRY SYSTEM

The heat probe was lowered on the main warp to a depth of 1000 metres in poor weather conditions with winds of 25-30 knots. Due to the short length of cable provided it was only possible to get the hydrophone to a depth of 15 feet, with the aid of Lucas weights. Bearing these factors in mind the returned, telemetered, signal had an unacceptably high error level.

(Harris)

HIGH POWER FLASH AND CAMERA SYSTEM

The opportunity was taken to carry out a preliminary trial of the camera surveying equipment being developed for the examination of possible radioactive waste sites. The frame was fitted with two completed flash units (out of a total of eight), the Benthos camera, a pinger and a modified net-monitor. The frame will also carry the 32 kHz near-bottom echo-sounder when this has been fully developed. When first lowered on the main warp it was clear that there was insufficient weight on the frame to overcome the considerable buoyancy provided by the glass spheres plus the drag of the system. After attaching an additional 140 lbs of Lucas weights the frame could be paid out at a maximum of 0.2 metres/second. Even at this slow speed there was considerable cable snatch. The camera system was lowered to within 7 metres of the sea floor, at a depth of 90 metres.

The test showed that the modified net-monitor was operating the camera and flash units at the correct repetition rate, it was also telemetering depth and temperature but was not providing the required film transport indication. The opportunity was taken during the lowering to monitor the rise time of snatch loading peaks using a digital storage oscilloscope to display the load waveform. Maximum observed rise times were equivalent to 4 tons per second, so that a pen recorder with a full-scale response of 500 msec. would give a correct record. The present form of output, by meter or LED display, gives no real indication of these peak levels.

(Collins and Hart)

SATNAV REPAIR

The magnavox satellite navigator system failed early in the cruise, and the symptoms indicated a full-scale lock-up on both channels. This was found to be caused by the scan circuits not being reset due to the failure of a 'power-on' reset signal (marked $\overline{\text{POCR}}$ in the manual) from the power supply. The power supply was replaced, and after the programme had been reloaded the system worked correctly for the remainder of the cruise.

(Barnes)

NEW DYNAMOMETER MONITORING SYSTEM

A new dynamometer monitoring system was installed in the after rough laboratory in parallel with the existing system. It is planned to mount displays in the plot, electronics laboratory and the bridge, and cables for these stations were installed during the cruise. As mentioned above, it was found possible to use the load output from this system to drive a digital storage oscilloscope and so monitor the fast rise snatch load peaks which are not normally observed.

(Kirk)

SHIPBOARD COMPUTER AND BATFISH INTERFACING

The IBM 1800 shipboard system was commissioned after the refit, with initially meteorological data and navigation by dead reckoning only being filed. After the Magnavox satellite system had been repaired, satellite fixes were used for navigation. CTD/Batfish interfacing work, in preparation for Cruise 114, continued during the cruise but was hampered by system reliability caused by poor air conditioning. Installation of the new air-conditioning units had not been successfully completed by the time the ship sailed. Bad weather delayed software development for the PDP 11/34 system.

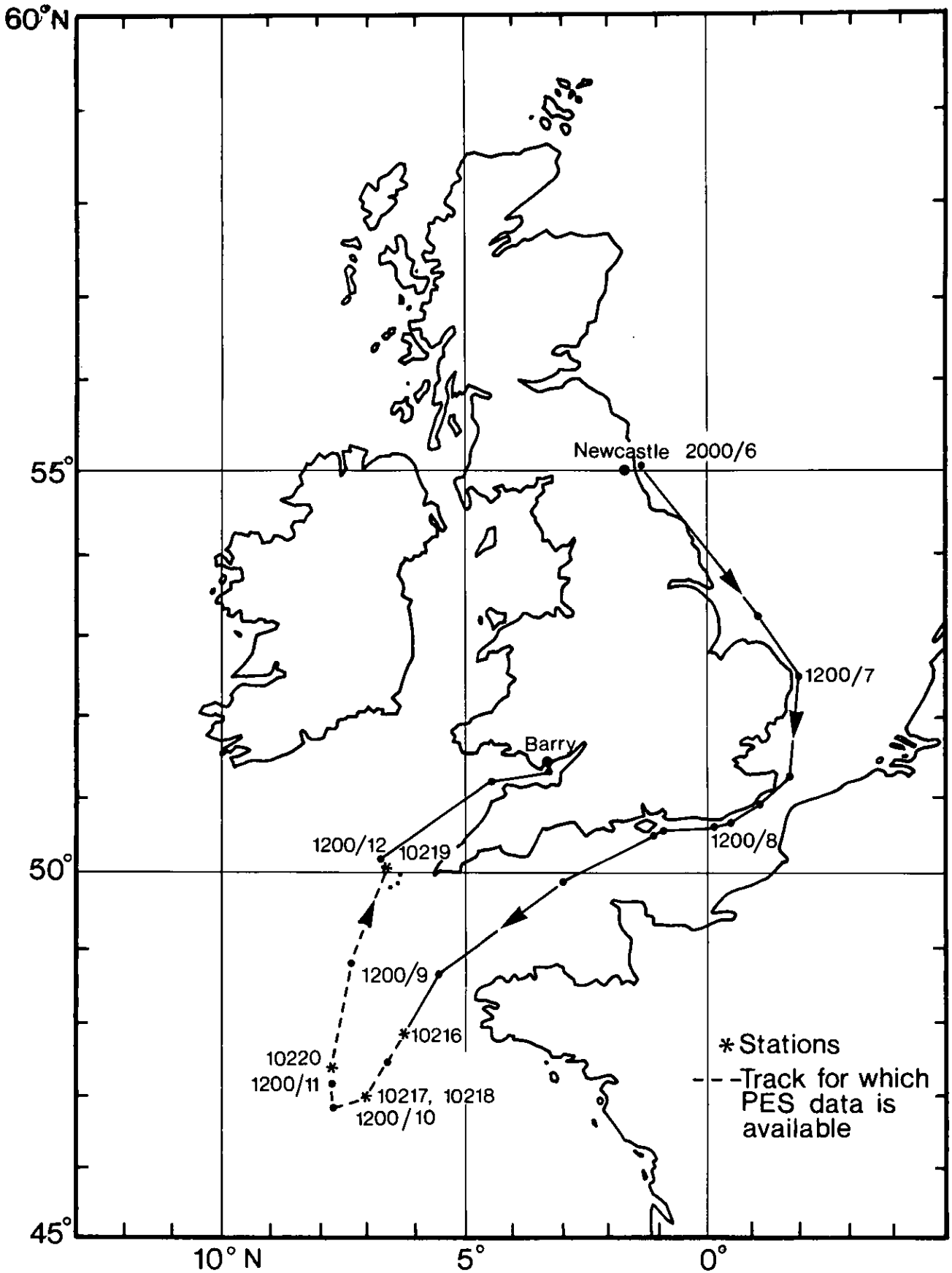
(Burnham, Lloyd, Cooper, Collins)

ACKNOWLEDGEMENTS

Thanks are due to the Master of Discovery, Captain Peter Maw, and the officers and crew for their co-operation and skill during a week of rough weather.

STATION LIST

Station	Date	Position	Gear	Depth deployed
10216	9/10	47°50.5'N 06°18.0'W	10 kHz PES deployed 32 kHz E/S trial	- 150 m
10217	10/10	46°53.9'N 06°58.8'W	Bencat release trial	2000 m
10218	10/10	46°52.0'N 07°00.0'W	32 kHz E/S trial Heat probe telemetry trial	4000 m 1000 m
10219	12/10	50°02.2'N 06°30.2'W	D/b capstan load test	50 m
10220	12/10	50°09.3'N 06°36.0'W	Survey camera trial 10 kHz PES inboard	90 m -



TRACK CHART-DISCOVERY CRUISE 113