VESSEL R.V. SARSIA

CRUISE PERIOD 21 October - 31 October 1977

PERSONNEL

R.L. Soulsby	HSO	Senior Scientist	21 - 31 Oct.
K.R. Dyer	PSO		24 - 27 Oct.
A.P. Salkield	SSO		22 - 27 Oct.
J.A. Crabb	HSO		27 - 31 Oct.
A.J. Marks	HSO		27 - 31 Oct.
P.M. Hooper	SO		27 - 31 Oct.
M.R. Lees	SO		21 - 31 Oct.
G.P. Le Good	SO		21 - 27 Oct.

ITINERARY The stations occupied are shown in Fig. 1.

Friday	21 Oct.	RLS, MRL and GPLeG, travelled to Plymouth and unloaded equipment.
Saturday	22 Oct.	Set up equipment. 1500 Vessel moved to outer basin. APS joined ship.
Sunday	23 Oct.	Handling tests of multicore cable and tests of instruments while berthed. 1630 Proceeded to Start Bay, anchored inside Skerries Bank. Test of instruments on sea bed.
Monday	24 Oct.	3 - point anchor at Stn. SB 7. Commenced CUVW experiment. 1520 Port anchor lost while weighing anchor. Put into Kingswear. 2015 KRD joined ship.
Tuesday	25 Oct.	0800 Proceeded to Stn. SB 1 and anchored. Continued CUVW experiment. 1300 MBA divers arrived and recovered port anchor. 1745 continued CUVW experiment.
Wednesday	26 Oct.	Continued CUVW experiment.
Thursday	27 Oct.	0000 Proceeded to Weymouth. Berthed at 0830. KRD, APS, GPLeG left; JAC, AJM, PMH joined ship. Loaded and set up gear for Reference experiment.
Friday	28 Oct.	0830 Proceeded into Weymouth Bay and 3 - point anchored at Stn. WB 3. Poor holding ground. Moved to Stn. WB 2. Commenced Reference experiment.
Saturday	29 Oct.	1000 Proceeded to Lyme Bay, anchored at Stn. LB 2. Continued Reference experiment.
Sunday	30 Oct.	Grab sample taken and echo-sounder survey made over Stn. LB 2. 0845 Proceeded to Plymouth and docked at 1830. Stripped down equipment.
Monday	31 Oct.	Unloaded equipment and returned to Taunton.

OBJECTIVES This cruise was made as part of a study of the processes of sand movement by tidal currents. The detailed aims were:
a. Handling trials and shakedown of new multicore cable.
b. Sea trials of sand transport probe.
c. To make simultaneous measurements of the turbulent components of velocity and suspended sediment concentration, to allow turbulent sediment fluxes to be calculated (CUVW experiment).

OBJECTIVES contd.

d. To make turbulent velocity measurements under known simple conditions, as a basis for comparison with the more complicated conditions encountered when sediment is moving over a duned sea bed (Reference experiment).

PROCEDURE AND METHODS

a. Various configurations for leading the multicore cable over the ship's side were tried, and a satisfactory one found in which the cable led over two 20 in. sheaves slung from the peak of the derrick and the port derrick boom.
b. and c. Measurements of the horizontal and vertical turbulent components of velocity were made at two heights using electromagnetic (E/M) current meters, with 10 cm diameter sensors, mounted as shown in Fig. 2. The results were recorded on an analogue tape recorder and a chart recorder. Shrouds were mounted over the sensors at slack water to establish zeroes. The mean velocities at four heights were measured with Braystoke rotors mounted on the rig and recorded every minute in printed form and on punched paper tape controlled by a PDP-8 computer.
The sand transport probe (STP) was mounted low down on the turbulence rig, and its output recorded in analogue form on the chart recorder and simultaneously as one minute or 10 s counts of impacts using the PDP-8 computer. Pumped suspended sediment samples from the same height as the STP were taken every 5 minutes for subsequent comparison with the corresponding STP output.
Video tapes of the STP and surrounding sea bed were taken when sediment was moving.
d. The sites in Weymouth and Lyme Bays were chosen as having a flat horizontal bed with deep water to avoid disturbance from the ship's hull and fast currents to minimise surface wave effects. Measurements with the E/M current meters and Braystoke rotors were made as in (b) and (c). In addition the E/M outputs were recorded in digital form every 0.2 s using a second PDP-8 computer in an effort to circumvent drift of the analogue tape recorder. Background information was collected as follows:

i) Current velocity and direction profiles were measured every 30 minutes throughout the water depth.
ii) Profiles of temperature and salinity were made simultaneously with the above.
iii) Water depth was recorded every 30 mins.
iv) Photographs were taken of the sea bed as seen on the TV monitor.

EQUIPMENT PERFORMANCE

The E/M current meters behaved satisfactorily, but one head leaked on 26th Oct. and had to be rewired.
On 24th Oct. the pumped sampling solenoid cable broke at a previous repair joint and had to be remade.
The direct digitization of the E/M outputs failed completely due to a fault in the tape deck. This was only detected on return to the laboratory. At the same time the back-up analogue tape recorder became faulty and could not be

EQUIPMENT PERFORMANCE contd.

repaired on board.
All other equipment performed satisfactorily.

RESULTS

a. The multicore cable and the Kevlar lifting rope proved very successful.
b. Subsequent analysis of the STP output and pumped samples showed a good correlation. It was shown that the STP responded to grains larger than 125μm, but that the sampling cross-sectional area was only 1/30 the area of the ceramic disc sensor. This meant that the frequency response was poorer than hoped for. The STP output was in reasonable agreement with the observations of sediment movement from the video tapes.
c. A reasonable quantity of data was obtained, though the poor frequency response of the STP will limit the kinds of analysis which can be performed. The Braystoke current profiles and video tapes have given information on the threshold of movement of sand, and the pumped samples have shown the functional dependence of concentration on bed shear stress.
d. The failure of both the direct digitization and the tape recorder meant that no turbulence data was recorded for the Reference experiment. The full depth velocity profiles have shown evidence of Ekman-like veering of the tidal currents. The T-S profiles have been used to estimate stratification for earlier turbulence measurements at the same site and time of year.

STATION LIST

Station	SB 1	50° 14.3' N	3° 37.9' W
	SB 7	50° 14.7' N	3° 37.8' W
	WB 2	50° 34.4' N	2° 20.4' W
	WB 3	50° 33.5' N	2° 16.4' W
	LB 2	50° 31.5' N	2° 31.4' W

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APPROVED BY : K R Dyer (K R DYER)
DATE : 22nd Feb 1980 22 February 1980

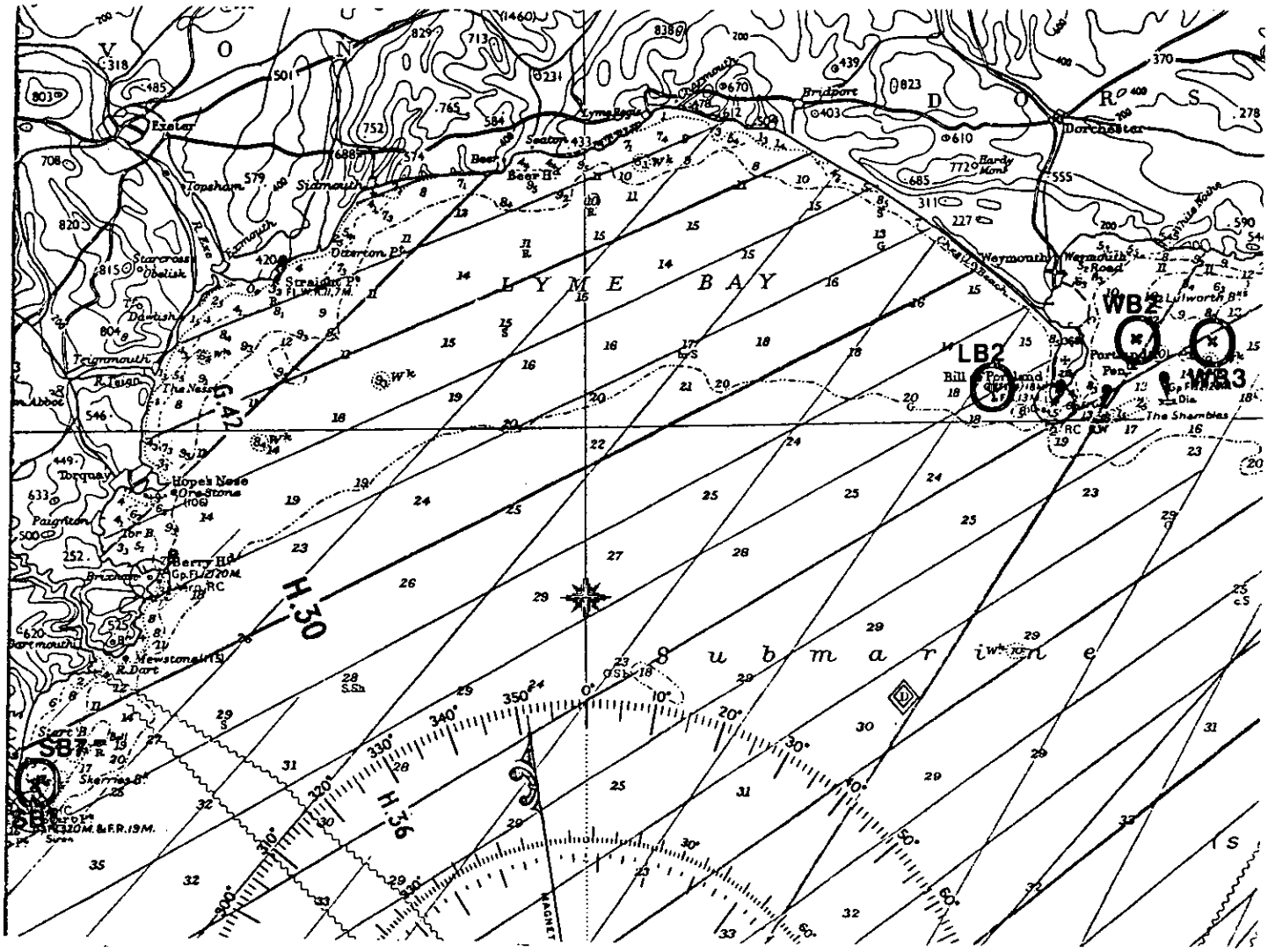

Fig. 1 Location of Stations

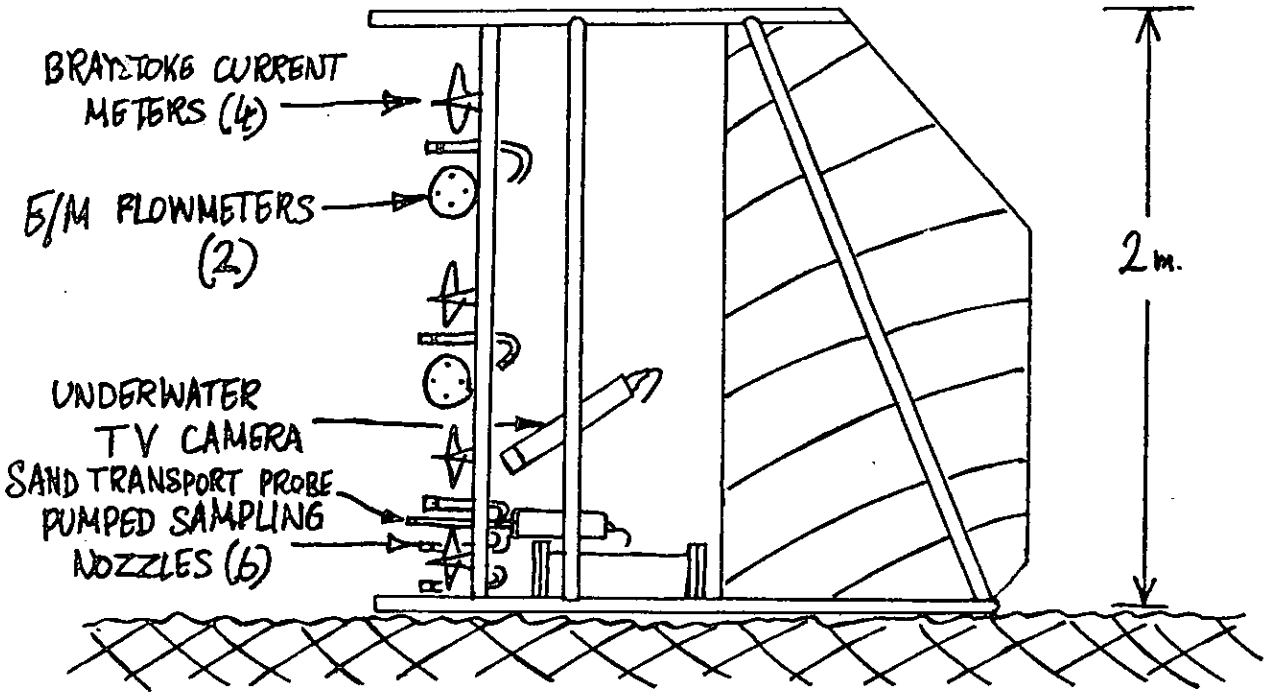

Fig. 2 Turbulence Rig