MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

REPORT: RV CORYSTES 3b/92
(PROVISIONAL: Not to be quoted without prior reference to the author)

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DURATION: (overall Cruise 3, 14 February-16 March)

AIMS:

1. To recover the Tetrapod, Quadrapod and current meters deployed in the Irish Sea near Sellafield in February 1992.

2. To collect sediment cores for geotechnical analysis by A James (UMIST).

3. To complete a 24h anchor station in the Eastern Irish Sea.

ADDITIONAL AIMS:

4. To recover a Spar Buoy deployed by NERC (POL).

NARRATIVE:

CORYSTES left Lowestoft at 1600h on the 28th of February and made a quick passage to Sellafield arriving around noon on the 2nd of March. The Tetrapod and the current meters were recovered successfully and the Tetrapod was serviced.

On the 3rd of March a 24h anchor station was worked off Whitehaven (Th02) with the Tetrapod and Quadrapod (UC). CTD casts every hour collected surface and bottom waters for suspended load analysis and nutrient analysis.

On completing the anchor station on the 4th, the CORYSTES sailed south collecting a core sample from the Sellafield mud patch for geotechnical analysis (A James) and recovering a Spar Buoy anchored off Barrow-in-Furness.

A second anchor station was worked at Site Z, the Dredged Spoil dumping ground in Liverpool Bay, from midday on the 5th to midday on the 6th. A short deployment of the Quadrapod was then completed SW of Newcome Knoll, off the Wirral, overnight on the 6/7th. CORYSTES docked at 1300h on the 7th at Langton Dock, Liverpool.

RESULTS:

Aim 1: The Tetrapod recorded a total of 646 bursts of data over the 28 days of the deployment. Although it was only triggered into adaptive mode once, the significant waveheight at 2.51m was larger than any of the 6 adaptive events of the deployment in the Autumn/Winter. Fig 1 shows the Transmissometer record from the deployment showing a resuspension event around sequence 420. The new ABS data logger recorded 35 adaptive bursts but a software problem prevented transferring all the data to a shipboard PC. Six current meters were recovered with an initial data return of 100%.

The Cambridge Quadrapod has been recently upgraded and new hardware/software successfully tested included:

i) two new MAFF type acoustic releases;
ii) modified Master logger;
iii) Theodermic water sampler control nodes;
iv) three Theodermic water sampler syringes;
v) a novel optical infra-red pulse encoded trigger to the syringes.

On the two 24h anchor stations the Master logger recorded bursts of 600 scans at 1 sec every hour of tilt, compass and wave pressure. Syringes were triggered on the 1st and 6th burst of each deployment.

Aim2: Dynamical and static rheological experiments were performed on a series of sediments using a controlled stress rheometer connected to a PC. Three types of rheological experiments were undertaken:

i) Cruciform vanes were oscillated and the strain response measured to give an indication of G', the storage modulus of the sediment. Fig 2 shows an example of the development of the microstructure of the surface mud from Site Z in Liverpool Bay. The storage modules, G', rapidly increases in the first 200 seconds until a region of constant G' is reached. Towards the end of this constant region, the mud was observed to release its water. The increase in G' is probably related to the consolidation of the sediment.

ii) The Yield stress was determined using a quasistatic creep test showing the different rate of strain relationships with time.

iii) Oscillatory tests were performed to investigate the strain amplitude and frequency dependency of the sediment. The results indicate that the sediment shows linear visco - elastic behaviour and is amenable to simple modelling. Other unexpected results show that the storage modulus increases slightly to a constant value until 6 Hz, thereafter decreasing rapidly whereas it was thought that G' increased with frequency.

Aim 3. Two 25 hour anchor stations were completed at Th02 off Whitehaven and Site Z, the Liverpool Bay Spoil Ground. Water samples were preserved for nutrient analysis at the laboratory. Each Tetrapod deployment generated 52 bursts of velocity, pressure and MOBS data.

Additional Aim 4. The NERC Spar Buoy was recovered successfully.

J M Rees
SIC
17 March 1992

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