

I.O.S.

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RV SARSIA CRUISE 10/75

26 AUGUST – 11 SEPTEMBER 1975

TURBULENCE MEASUREMENTS
ON THE SEA BED OFF SOUTHERN ENGLAND

CRUISE REPORT No 38

1975

NATURAL ENVIRONMENT
INSTITUTE OF
OCEANOGRAPHIC
SCIENCES
RESEARCH
COUNCIL

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Institute of Oceanographic Sciences
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SHIP'S OFFICERS

E Dowell	(Master)
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OBJECTIVES

The main purpose of this cruise was to continue the preliminary measurements of the turbulence in the boundary layer close to the sea bed which were started on RV Sarsia in May-June 1975 (see IOS Cruise Report No 30). The programme was particularly aimed at studying the intermittency in the turbulent momentum fluxes, the Reynolds stresses and other turbulence parameters and to examine their variation with height above the bed for comparison with recently published laboratory work. In addition the response of the sediment to the intense instantaneous stresses was to be examined visually using an underwater television. Velocity profiles using an array of four rotor current meters would allow comparison between the shear stresses calculated from the profiles with the Reynolds stresses.

RESULTS

The cruise can be considered a complete success. After initial troubles with the electromagnetic flowmeters, mainly due to water entering the heads or head connecting cables, many days of excellent quality data were recorded with all instruments working well at the same time. Electronic noise was not so great a problem as previously experienced. At a number of stations measurements over three tidal cycles were obtained (Table 1). Over all except the last two days the weather was calm enough for the records to be unaffected by wave motion. The only stations where sediment movement was observed however were in Start Bay. There at a spring tide with surface currents of over $2\frac{1}{2}$ kts extensive sediment movement was observed and several cycles of measurement from no movement to a thick saltating load were recorded.

The results are worth extensive analysis and comparison with laboratory results published by other workers and should provide useful insights into the processes of sediment movement.

INSTRUMENTATION

The basic instrumentation was the same as set out in IOS Cruise Report No 30.

INSTRUMENT PERFORMANCE

After the experiences of the first cruise in 1975 considerable changes to the underwater rig had been made. These comprised a new mounting framework for the flow sensors and repositioning of the TV camera and the inclinometer. A compass and a small vane were positioned in the camera's field of view to provide additional information on the flow direction relative to the rig. These modifications were successful.

To overcome microphonic noise on the cable between the EM heads and the underwater electronic housing, non-microphonic cables had been fitted and the four heads made up in pairs to separate end caps, the cables being enclosed in watertight plastic hosing. This system appeared to work well as the electronic noise problems were far less on this cruise than previously. However sealing the plastic hose required care and on one occasion water leaked into one cable, necessitating changing to the spare set of heads. This occurred early in the cruise and will not affect the data obtained. It was found that the EM heads were much less noisy after immersion for a period than when freshly immersed in spite of meticulous cleaning and washing beforehand. In future it will be necessary to keep the heads damp at all times.

The other instrumentation worked satisfactorily.

SHIP PERFORMANCE

RV Sarsia again proved her suitability for this sort of experiment. The three point mooring was adequate even in 35m of water. However some difficulty was experienced in Start Bay in velocities of 2 $\frac{1}{2}$ kts from astern, when the stern anchor dragged and the vessel tended to broach to in the current. In future work in high currents it may consequently be necessary to reanchor each half tidal cycle.

Some difficulties were experienced with the scientific AC power supplies

which, because it also supplies some domestic requirements, had a variable output with switching transients.

Handling the rig over the side will be facilitated by construction of a platform on deck to the level of the starboard gunwale.

ACKNOWLEDGMENTS

We are extremely grateful to Captain E Dowell, the Officers and Crew of RV Sarsia for their help and unstinting co-operation in making the cruise a success. We are also grateful to Dr E Denton, Director of the Marine Biological Laboratory, for permission to carry out this work on RV Sarsia.

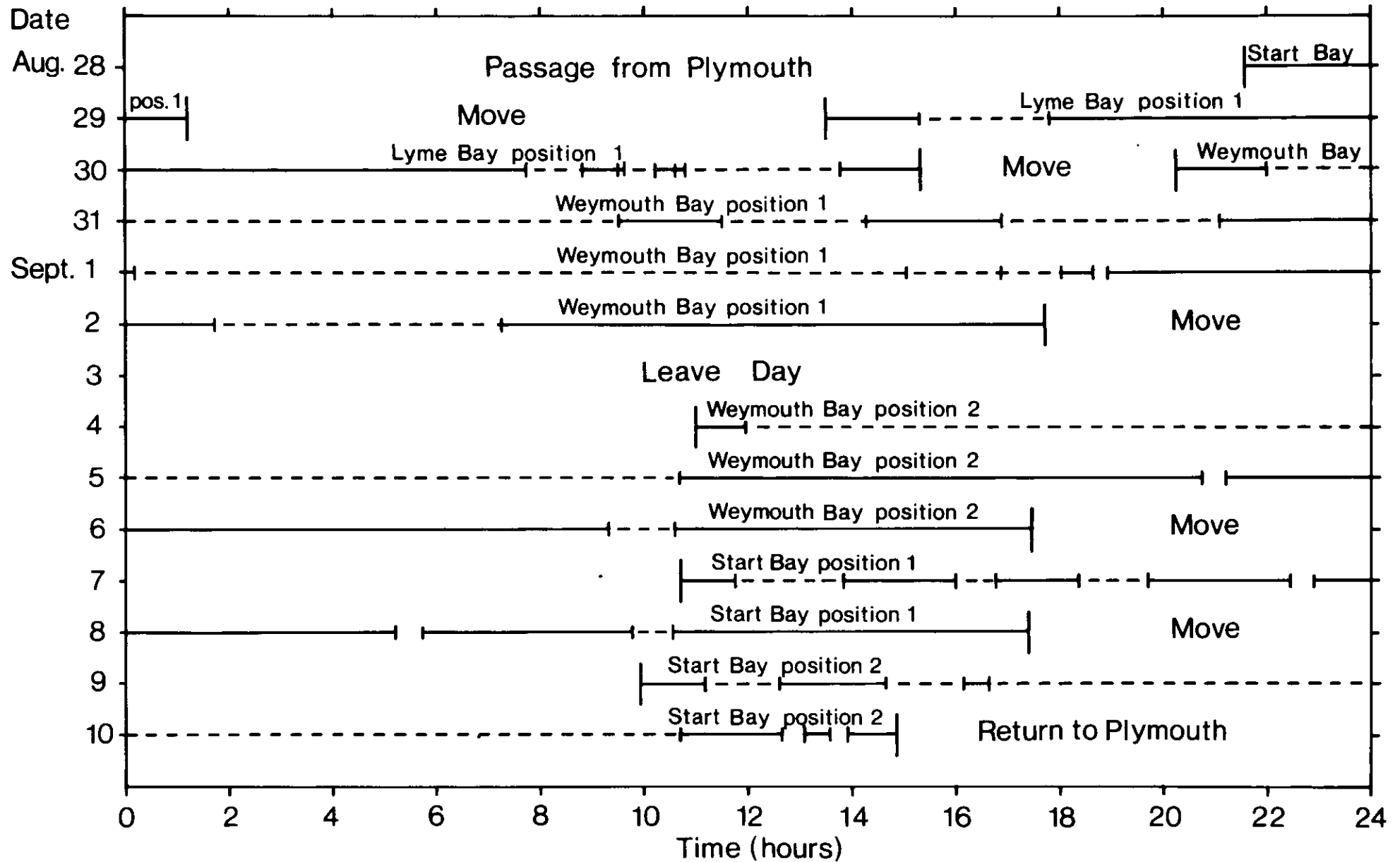


TABLE 1 Synopsis of Experiment Times

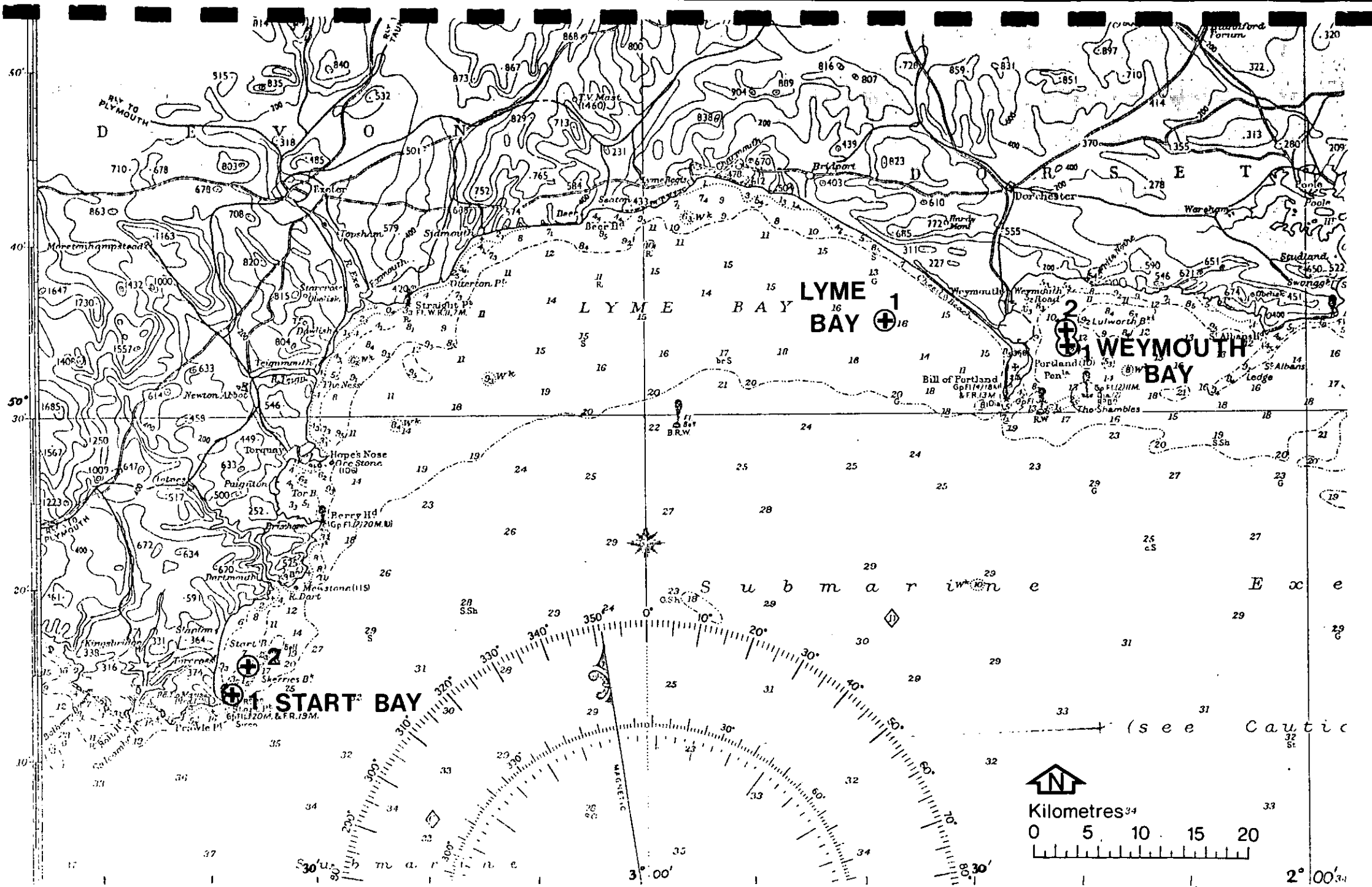


FIG.1

Location of Experimental Sites