Natural Environment Research Council

Institute of Oceanographic Sciences
Crossway, Taunton, Somerset. TA1 2DW

PROVISIONAL CRUISE REPORT

VESSEL: MFV Devonian

LOCATION: Channel Islands

CRUISE PERIOD: 19-28 September 1981

PERSONNEL:
R H Wilkinson (Principal Scientist)
E J Moore (Diving Officer)
B M Norman)
A J Marks) Diving Team
L Whitlock (Wormley))

OBJECTIVES: Wave boundary layer flow vizualisation by time exposure photography of neutrally buoyant particles oscillating near the seabed under the action of surface waves in the absence of significant tidal current. The near bed velocity profile will be deduced from the lengths of the streaks on the photographs.

PROCEDURES AND METHODS: A lightweight pyramidal frame, holding a TV camera, photographic camera and lights mounted in a parabolic reflector is lowered to the sea bed and oriented by divers so that the water motion is perpendicular to the optical axis of the cameras. The parabolic reflector produces a fan of light so that only particles in this plane are visible, and so measurements can be taken from a single photograph. Neutrally buoyant particles (chopped polystyrene rod) are introduced into the flow in small quantities by the attendant divers. The TV camera is then used as a view finder and, when the particles are suitably distributed, time exposure photographs are remotely triggered on the other camera.

EQUIPMENT PERFORMANCE: The new U/W light bulbs blew when the rig hit the side of the ship. As they are physically stronger when cold, it is recommended that they are switched off on raising or lowering the rig.

The picture on the 'Sony' TV monitor lost contrast, but was fully repaired.

RESULTS : Twenty four 12 frame films were exposed under a variety of conditions. At times, the relative sizes of the tidal current and the wave action were about the same - undesirable for wave boundary layer studies. The opportunity was taken for some preliminary wave current interaction investigations. The sea conditions were not ideal for the wave boundary layer investigations, as the waves were too local (and thus short and steep) & hence the sea surface became unworkable before there was a great deal of action at the sea bed. A swell sea provides ideal conditions.

The Channel Islands proved to be a very successful area for this type of experiment, providing the very good U/W visibility anticipated, together with a great variety of bottom types and bays exposed to different wave directions. The bottom type observed on the U/W television did not always correspond to that marked on the chart.

RESULTS: (Contd)

As previous experience had shown that the parabolic reflector produced a slit of light bright enough for the contrast between the illuminated phase and the surrounding region to be sufficient to be able to take photographs in day light, activities were confined to daylight hours and nights were spent in port. Both St Peterport,Guernsey and St Helier, Jersey, were used as bases, the former being far more satisfactory from considerations of accessibility to suitable experimental sites. The best sites found were La Grande Grève on Sark (4) and Belvoir Bay (3) on Herm, though the latter is prone to tidal effects also.

ITINERARY:

19 September: Transferred scientific equipment etc via inflatable from Upper Ferry Slip, Dartmouth to Devonian mid river. Torrential rain and gale force winds prolonged loading and prevented departure.

20 September: Wind abated. Made passage to St Peterport, Guernsey. Tied up at 2330 hours.

21 September: Rig assembled and tested on deck. Proceeded to Fermaign Bay (Station 1) and performed experiment, exposing 3 films. Conditions not good, as sea bed is a fine, not very clean, sand which took some time to clear after diver disturbance. Little wave action at bed. Night at St Peterport.

22 September: Proceeded to Icart Bay (Station 2) and performed experiment. Depth (18 m) greater than indicated by chart (12 m). Poor visibility due to plankton and little water motion at this depth. One film exposed. No safe, shallower anchorage.

Proceeded to Belvoir Bay, Herm (Station 3). Very good visibility ($\sim$ 10 m) resulting from medium clean shelly sand, but little water motion at bed. Two films exposed.

Proceeded to La Grande Grève , Sark (Station 4). Ideal conditions; considerable bottom motion (possibly as a result of standing waves) giving intermittent suspension of medium sand bed with good visibility. Six films exposed.

Put into St Peterport overnight.

23 September: Proceeded to St Ouen Bay, Jersey (Station 5) in order to perform experiment. The fine sand bed marked on the chart transpired to be a kelp bed. Considerable bottom water motion, but diver and echo sounder surveys revealed no flat sand bed.

Proceeded to St Audin Bay (Station 6). Medium visibility ($\sim$ 3 m), some bottom wave action, but also tidal stream whose strength was about twice the wave surge. Nine films exposed at various rig orientations to waves and tide as both decayed.

Put into St Helier overnight.

24 September: Gale bound. Attempted to return to Guernsey in evening, but turned back by heavy weather. TV monitor found to be unservicable.

25 September: Returned to Guernsey. Put into St Peterport for TV repairs. Proceeded to Belvoir Bay (Station 3). Quite a rough sea at anchorage, but very short and hence little bottom action. Three films exposed.

Put into St Peterport overnight.

26 September: Wind dropped after very stormy night, but unsuitable for return to Dartmouth. Proceeded to Belvoir Bay (3) to catch end of swell, but conditions unsafe for anchoring. Returned to St Peterport.

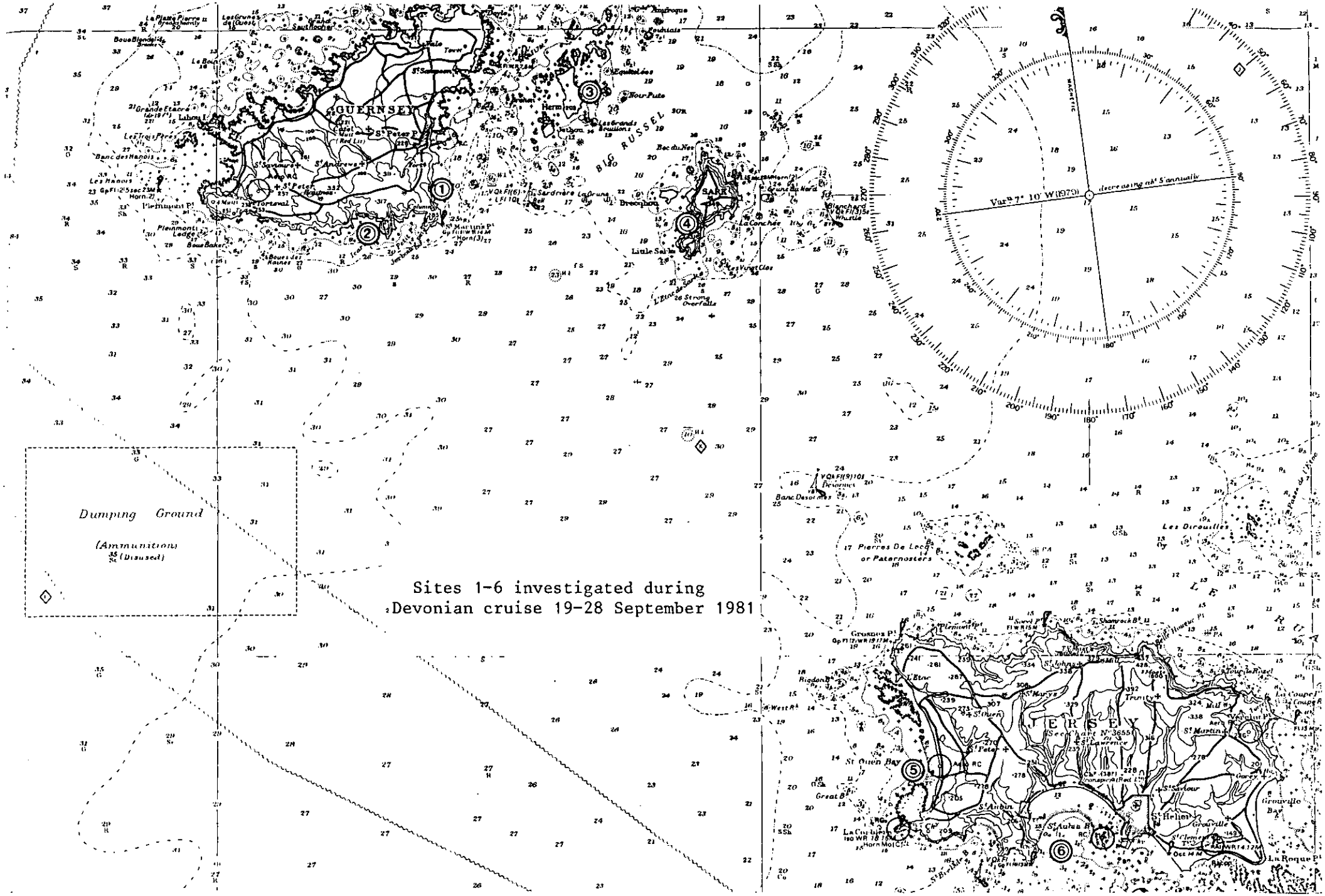
27 September: Returned to Dartmouth, arriving 1945 hours.

28 September: Unloaded equipment and returned to Taunton.

PREPARED BY: R. H. W. Wilkinson — R H WILKINSON

APPROVED BY: — A P CARR

DATE: 2/11/81



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