VESSEL — RRS FREDERICK RUSSELL

CRUISE PERIOD — 26 June - 7 July 1985

PERSONNEL
R M Warwick (Principal Scientist)
J M Gee
I T Gillson
I R Joint
M B Jordon
A J Pomroy

ITINERERARY

Tuesday 25 June: Loaded equipment

Wednesday 26 June: Departed Plymouth 1120. Set course for Station 1 (see chart).

Friday 28 June - Monday 1 July: Benthos and phytoplankton studies at Station 1 (49°28.5'N 14°47.5'W, depth 4,500 m) and Station 2 (50°04.0'N 13°22.5'W, depth 2800 m)

Monday 1 July: Set course for Station CS2 at 2015.

Tuesday 2 July - Saturday 6 July: Benthos, phytoplankton and zooplankton studies at CS2 (50°30.0'N 7°00.0'W, depth 106 m). Set course for Plymouth at 1845.

Sunday 7 July: Docked Plymouth 0900.

OBJECTIVES

1. To investigate benthic invertebrate community structure (macrobenthos and meiobenthos) at Shelf, Slope and abyssal stations as it relates to production and sedimentation processes in the water column. To collect and process a series of replicate benthic samples from three stations, completing the depth range of sampling started of FR 7/84.

2. To determine the community structure of pelagic organisms (particularly species body size distributions and species abundance patterns) at one station (CS2), for comparison with the benthos.

3. To measure in situ and on deck primary production at all three stations and to partition production into different size-classes of phytoplankton: to measure the abundance and vertical distribution of phytoplankton, bacteria and flagellates: to measure bacterial production throughout the water column.

4. To relate light penetration with particulate load at all three stations.

PROCEDURES AND METHODS

1. a) Four replicate samples with USNEL 0.25 m^2 box-corer (Stations 1, 2) and eight replicates at CS2. Samples sieved at sea to 0.5 mm, preserved in formalin.

b) Eight replicate samples with Craib corer (CS2 only). Samples preserved unsieved in formalin. Stations 1 and 2 were sampled for meiofauna by subcores from box samples.

c) One twenty-minute haul with the Naturalists dredge (Station CS2 only).

2. Zooplankton and necton samples were taken with 0.5, 1.0 and 2.0 m plankton nets of varying mesh size, a Lowestoft 30" high speed plankton sampler and a Macer near-bottom plankton sampler.

3. a) At all Stations the in situ ^{14}C incubation rig was deployed at dawn and recovered at dusk: on deck incubations were carried out in parallel.

b) Water bottle casts were made to determine vertical distribution of primary producers; 9 depths at dawn each day at Stations 1, 2 and CS2.

c) Bacterial production was measured at each station with ^{3}H-thymidine uptake techniques.

4. Recording light-meter string was launched and recovered as in 3a. Water samples for analysis of spectral absorbtion characteristics of particulates were taken.

SUCCESS OF CRUISE

All the objectives of the cruise were achieved.

GEAR ON LOAN FROM RVS

1) Radio direction finder

It was intended to install a four whip-aerial and direction finding module, constructed by RVS, at the beginning of the cruise. However, this proved to be unoperational due to a lack of the specific crystal for our transmission frequency and was returned to Barry. We therefore relied on IMER's hand-held set for direction finding.

2) USNEL deep-sea box corer

Working

(a) The corer was used successfully on mud bottoms in 4,500 m and 2,800 m of water and on a sand bottom at 100 m depth. On this cruise the corer sustained little damage as a result of ideal operating conditions (wind strengths of less than force 5 and relatively calm seas). The main problem encountered was with the vent doors and their closing mechanism. On two occassions the vents, particularly the lower ones, failed to close and came up lying flat in in the open position, probably as a result of having been hit by the free swinging frame, either during launching or on the way down.

(b) The trolley on which the box and lower spade rest for extraction of the sample was not provided by RVS and we were expected to operate without it. Fortunately we rendevouzed with the "Challenger" and obtained the trolley from the stainless steel box corer.

It is our considered opinion that a trolley is essential for the safe operation of the box corer at sea and on no future occassion should anyone be expected to use this equipment without a trolley being made available. The trolley is an integral part of the equipment and RVS should have one trolley for each corer.

(c) In 4,500 m of water the combination of weight of wire, weight of sampler and suction effect required a pull of about 6 tons which was too much for the winch on the Frederick Russell and equalled the safe working load of the wire.

Repairs and alterations

(a) One outer gimble stop was rewelded in position.

(b) The outer vent doors were disconnected from the closing mechanism and kept permanently shut with two bolts through the lower part of the upper door hinge supports.

(c) The upper doors were prevented from opening further than the vertical with bolts through the upper part of the door hinge plates.

(d) One screw in one hinge of an upper vent door sheared off and was replaced with a larger screw.

(e) The shape of the left-hand slot in the vent release catch was altered to facilitate the simultaneous and complete release of the doors on both sides.

Suggested alterations and improvements

Most operating failures of this equipment are associated with the malfunctioning of the vent doors. This is due to both the weakness of the wire closing mechanism and damage to the doors as a result of excessive swing of the frame. We suggest therefore, that:-

(a) Doorstops should be put on all hinge plates to prevent the vents being pushed back further than the vertical.

(b) The present gimble stops should be replaced with ones 3 - 5 mm higher and the same length as the outer gimble frame (ie about 4 times longer than the present ones).

OTHER OPERATIONAL DIFFICULTIES

The original Station 2 (see cruise programme) at 3000 m proved unsuitable for benthic sampling due to a rocky bottom. An alternative station at 2,800 m was therefore worked.

RESULTS All results await sample analysis and data processing at IMER.

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Approved by: B.L. Bayne
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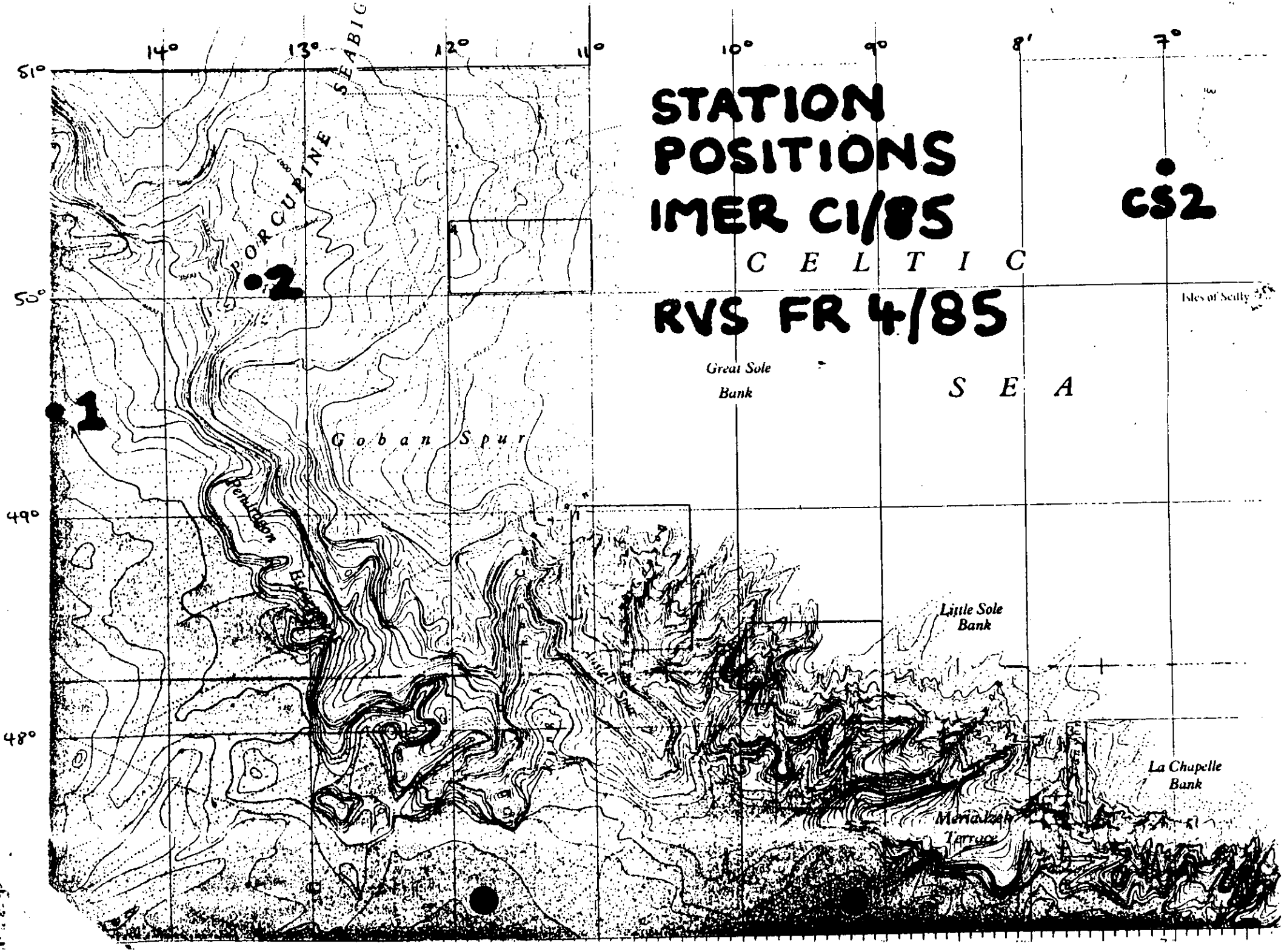
Circulation List:

Internal: B L Bayne, G A Robinson, All Cruise Personnel, Notice Board, File.

External: NERC Foxton (Swindon), RVS Skinner, Fay (Barry), IOS Dr M Angel, Dr A Rice, Dr M Thurston (Wormley), MBA Denton, DAFS Dr A D McIntyre (Aberdeen).


STATION
POSITIONS
IMER C1/85
RVS FR 4/85
CS2
1
2
14°
13°
12°
11°
10°
9°
8°
7°
51°
50°
49°
48°
PORCUPINE SEABIGHT
Goban Spur
Great Sole
Bank
CELTIC
SEA
Isles of Scilly
Little Sole
Bank
La Chapelle
Bank