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RRS JOHN MURRAY CRUISE 6/69 - TYRRHENIAN SEA

Southampton University

Summary

Lack of a suitable instrument prevented our investigation of the fine structure of temperature and salinity. It was replaced by a study of the drift of intermediate water, with results which were interesting but not unexpected.

A useful start was made on the geophysical work and the results will lead to a preliminary account of the sedimentation patterns. Further work will need a cruise with a coring winch.

1. Objects

We originally applied for seatime to work on two main topics: fine structure of temperature and salinity and the transport of sediment to and over an abyssal plain.

It transpired, at a late stage, that our request for TSD equipment had been overlooked. Professor Bowden kindly offered to lend his equipment but protracted correspondence with NERC Headquarters failed to produce an assurance that it would be replaced if lost. Professor Bowden nevertheless agreed to the loan, but bad communication between the RVU and the ship led to the TSD being landed at Gibraltar the day before our cruise started.

The temperature and salinity topic was therefore replaced, at short notice, by a limited study of the movement of the intermediate water, using parachute drogues and such hydrographic equipment as was available in JOHN MURRAY.

Further water sampling was done by Dr. Williams on passage from Salerno to Barry.

2. Personnel

The scientific party was made up as follows:

Staff	
M. M. Belliard	Museum d'Histoire Naturelle, Paris
Dr. S. E. Calvert	Edinburgh University
Prof. H. Charnock (Chief Scientist)	Southampton University
Dr. N. Hamilton	Southampton University
Dr. A. I. Rees	Southampton

Students	
Mr. D. Frederick	Southampton University
R. B. Kidd	Not affiliated
J. R. N. Lazier	Southampton University
K. Massie	Southampton
T. Steele	Edinburgh University
C. E. Vincent	Southampton University

I am grateful to the Master, Officers and Crew of RRS JOHN MURRAY and to Mr. S. Jones (RVU) for their assistance during this work.

Mr. J. Wenlock	Southampton University
S. J. White	Southampton University

NERC Representative

Mr. S. Jones	RVU

3. Proceedings

23 June to 29 June: Gibraltar to Salerno, on passage

30 June to 4 July: Salerno to Marina del Cantone, for bathymetry, structure and sediment sampling of the Naples canyon, together with some exploratory hydrographic work.

5 July to 11 July: Marina del Cantone to Marina del Cantone for coring on abyssal plain and exploration of central sea mount.

14 July to 24 July: Marina del Cantone to Salerno, for geophysical work on canyons off Salerno and for study of structure and drift of intermediate water.

24 July to 6 August: Salerno to Barry, on passage with some water sampling.

Of the 25 days in the area 19½ were spent at sea, the rest on taking stores and water, on recreation and in port or at anchor for engine repairs. Six hours were lost at Salerno when the ship could not be moved from a shallow muddy berth with the power of the only engine available.

Progress at sea was necessarily slow because high sea-temperatures restricted the maximum speed to less than 7 kt.

4. Safety at sea

The scientific party were not involved in any boat or fire drill during this cruise.

5. Navigation

Accurate navigation was needed for all our work. We asked for LORAN-C, which is known to work well in this area, in our original application. The set provided was a LORAN A/C which was incapable of providing useful fixes even when it and the LORAN-C network were fully effective.

We used radar fixes for the near-shore work but had to rely on dead reckoning, with a very few starsights, for work on the abyssal plain. Tracking of parachute drogues was done by radar relative to a moored buoy.

6. Bathymetry and Geophysical Observations

A detailed study was made, using the Pdr, of the submarine topography between the coast and the abyssal plain. Between three or four thousand

miles of track were covered.

The sparker was used over about 350 miles of track to supplement PDR records when buried topography was suspected. About 200 miles of track were covered towing a magnetometer for detailed study of an isolated sea mount in the abyssal plain.

7. Bed Sampling

Five samplers were used: the Reineck box corer, 4" gravity corer, 2½" gravity corer, free fall corers and Shipek grab.

The box corer was used successfully three times before the main winch failed, though the surface sediment was not generally suitable in the area initially investigated.

The fourth corer was used four times, three of which were successful. The main winch failed during a coring station with over 3000m wire out but was recovered, with core, after the wire had been spread by hand.

A set of 10 ft. long 4" diameter oriented cores was a principal object of the cruise and would have provided a unique knowledge of abyssal plain sedimentation. The failure of the spreading gear of the main winch was therefore most unfortunate.

The 2½" corer produced 26 cores of varying length but the spreader on the hydrographic winch became defective on 16 July and restricted its further use. About 2000m of 4 mm wire were lopped from the hydrographic winch to obtain wire good enough for gravity coring on the abyssal plain.

The Moore free-fall corers were used with moderate success, cores being obtained from 13 of 27 attempts. They would probably have been more successful if the proper launching ramp had been on board rather than at Barry.

The free fall corers were usually inferior to standard 2½" gravity corers and their use saved little, if any, time. They were, however, sometimes useful in getting cores where using the gravity corer would have been difficult or time consuming.

The Shipek grab worked well in shallow water but we were unsuccessful in water deeper than 1000m.

Sediment samples and replicates, were also taken from selected beaches and rivers at twelve places along the Italian shore of the Tyrrhenian Sea.

8. Hydrographic work

Parachute drogues laid at the depth of the salinity maximum associated with the intermediate water were tracked by radar. One was followed for four days early in the cruise and a further four were tracked for four days, relative to a moored buoy, towards the end.

Thirty-four shallow hydrographic stations were worked in the area of current measurements. The maximum depth was restricted by the failure of the hydrographic winch spreading gear and by the lack of a suitable unprotected reversing thermometer.

Five further stations were worked on passage from Salerno to Gibraltar, for Dr. Williams's biochemical studies. Others planned for the Gibraltar to Barry passage were abandoned when the hydrographic winch developed an electrical fault which the Chief Engineer thought it prudent not to attempt to repair. Surface samples were taken underway. Salinities were determined on board.

9. Sample distribution

Samples from five hydrographic casts and four cores were taken by Dr. S. E. Calvert, some for on board chemical analysis and the remainder deep frozen to Edinburgh for subsequent work. The other sediment samples were stored in the wet laboratory or on deck until JOHN MURRAY reached Barry. They were then moved to Southampton where they are now in cold storage awaiting initial description.

The number of samples of each type is as follows:

Box cores	4" gravity cores	2½" gravity cores	2½" free fall cores	Grabs	Coastal samples
3	3	26	13	19	32

A number of samples were taken from core noses, the outside of core barrels, etc. Where no good core was obtained these samples are included above as "grabs".

A preliminary track chart is appended (Appendix). It shows the positions of the samples and stations and the lines of geophysical measurement. Copies of the initial core description will be sent in due course to those known to be interested.

Comments and Suggestions

The main difficulties in working from RRS JOHN MURRAY arise because she is used by many different sets of people to do many different sorts of things.

Efforts should be made to have somebody on board who knows what is available and where it is. It would be of great assistance if investigators could be told in good time what will be available on board, so as to ensure that they have what they need without unnecessary duplication.

RRS JOHN MURRAY is not, at present, suitable for work in deep water and is too slow for economical operation if long passages are needed, especially through areas of high surface temperature. It might be sensible to use the ship entirely for studying the U.K. continental shelf and in this case the following should be considered:-

1. Make efforts to improve winch reliability. Scrolls and travellers of spreader mechanism are known to give trouble and spares should be provided. Lack of these made it impossible to complete our main project: if, as I was

told, spares are held in Barry they should be stored on board.

The consoles for both winches should be enclosed against the weather and better communication arranged between winches and PDR. The winch dynamometers and repeaters in the main laboratory need overhaul, as does the hydro-winch meter-wheel. It seems to be reading in yards.

2. The crane on the quarter-deck does not seem to be sufficiently securely fastened to allow it to be fully used. It would be better sited on the starboard quarter, behind the coring winch console, where it would be used to retrieve bulky gear like box corers.

3. It would be useful to cut a section from the stern and mount a strong wheel to allow heavy corers to be run in and out.

4. The stern gantry should be made higher if possible. The box corer we used needs more headroom: it will not be possible to use it often around U.K. Bigger samplers are to be expected.

5. The purchase of an airgun might be considered: it would be safer than the sparker if the results were acceptable. A digital recorder for the magnetometer would be useful and/a winch for the cable would save time and effort.

If, however, it is decided that JOHN MURRAY must be capable of physical, chemical, biological and geophysical work in deep water, the problems are much enlarged. For example:

6. The air conditioning should be extended to the chemistry and biology laboratories, a small still installed and a salinometer fitted. A small coldroom would be useful. The wet-lab should be rearranged and adequate drainage for excess water samples provided. The scuttle should be enlarged so that water bottles can be handed through it.

7. The hydro-davit needs extending outboard to clear the platform, the chains of which are dangerously low.

There is need for reversing thermometers (one unprotected (-2 to 30°C) thermometer is not enough!) for sample bottles, for more reversing bottles and for various other items.

The two bathythermographs need servicing and recalibrating after being stored at too high a temperature. Some anti-social user has been allowed to go off with the calibration grid of the deep BT. Perhaps there is a spare at Barry or on board, and if so it should be made available.

Conclusions

Our programme was much restricted by shortcomings of the ship's equipment but useful observations were made.

The physical work was useful, though not exciting, and the geophysical observations will allow a preliminary description of the sedimentation in the Tyrrhenian abyssal plain and its contributing canyons.

Another cruise, with better gear, will be needed if the work proves worth completing.

Some suggestions are made as to the future role of RRS JOHN MURRAY and for alterations and additions to her equipment.