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R.R.S. "SHACKLETON"

REPORT ON CRUISE 6/72

NOVEMBER - DECEMBER, 1972

Mediterranean

APPLIED GEOCHEMISTRY - RESEARCH GROUP

IMPERIAL COLLEGE OF SCIENCE & TECHNOLOGY

C O N T E N T S

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LEG 1.	Sailed Piraeus	p.m.	16th November, 1972
	Arrived Iraklion	a.m.	25th November
LEG 2.	Sailed Iraklion	a.m.	26th November
	Arrived Iraklion	a.m.	3rd December

SHIP'S OFFICERS

Name	Rank/Rtg.
G. H. Selby Smith	Master
E. M. Bowen	Ch Off
P. H. Warne	2d Off
J. E. Hagan	3r Off
R. Griffiths	Extra 3r Off
J. J. Smith	Ra Off
D. B. Lintern	Ch Eng
P. Jones	2d Off
H. J. C. Peck	3r Eng
P. Maguire	4t Eng
B. J. Winchester	Electr

SCIENTIFIC OFFICERS TO JOIN IN PIRAEUS

J. S. Tooms A. Horowitz L. Downs R. Bignall R. Williams A. Bee P. Smith	Applied Geochemistry Research Group IMPERIAL COLLEGE of Science & Technology London, S.W.7.
J. Papadakis S. Tassos C. Giavos	Institute of Oceanography and Fisheries
D. Charalambous	Institute for Geology and Sub-Surface Research
G. Souras	Royal Hellenic Navy
J. Price	RVB, NERC.

CRUISE INTENTIONS

The aim of the cruise was two-fold:-

(a) To carry out a sampling programme in order to investigate the concentration of trace elements in sediment and waters in the vicinity of various islands of the Aegean and to determine whether such variations as were detected could be related to the occurrence of various types of mineralization on the adjacent land masses and in the underlying rocks.

(b) To collect cores and water samples both within the deeps and from the adjacent areas of the sea floor in the general vicinity of Crete, in order to determine the variations in trace element concentration and their relationship to environment and bedrock geology and structure.

NARRATIVE

The imperial College of Science and Technology (IC) scientists joined the ship in Piraeus on the evening of 13th November, 1972. During the following three days equipment was checked, repaired and modified (see equipment comments section) and replacements were obtained for materials and equipment not available on board or previously consumed. In this latter connection, the usage of all the deionised water and 1 plus boxes of storage bottles caused considerable inconvenience. These stores had been placed on board by IC and had we been informed in good time that they had been used, it would have saved considerable problems. Much time was spent by the crew in attempting to locate these stores, until it was observed that the bottles in which the deionised water had been stored had been used by Leeds University for storage of samples. It was discovered that the storage bottles from 1 missing box and from another box which had been broken into and partially emptied had also been used by a previous scientific party. Due to the good offices of J. Catsoulis, Chemistry Director at the Ministry of Industry, the deionised water was replaced. The replacement of storage bottles was more difficult and no completely suitable bottles could be obtained in Athens. Makeshift bottles were purchased.

The replacement pingers airfreighted by RVB had unfortunately been sent by mistake to Cyprus instead of Athens. A further pinger sent by RVB when this had been established was not loaded on the flight requested and arrived too late to be cleared before the ship sailed. Fortunately, IC had taken the precaution of obtaining another pinger from UMEL and taking this with them to the ship, so that one operational pinger was on board.

On 16th three scientists from the Institute of Oceanography and Fisheries (IOC), one from the Institute for Geology and Sub-surface Research (IGSR) and one ensign from the Royal Hellenic Navy joined the ship. The "Shackleton" sailed at 1600 hours on 16th November on completion of all dockyard work.

During the period from 16th through 24th November, work was concentrated in the vicinity of Sourion (Greek mainland) and the islands of Andros, Kithnos, Serifos, Naxos, Paros and Thera. Some deep water samples were also collected, for example, in the vicinity of Phalconera Island. A total of 331 grab stations, 24 gravity core stations and two hydrological stations were occupied during this period. In addition, bottom waters were collected on 108 of the grab and gravity core stations.

One scintillometer station was undertaken off Andros, during which the equipment was lost due to (a) soluble links parting after 90 minutes instead of the rated 4 hours and (b) the nylon recovery line purchased by the agent in Piraeus being poor quality plastic and not nylon rope. After the weak links and plastic line parted, the scintillometer was accurately located, but due to its being fairly rapidly pushed along the bottom by currents, recovery was not feasible.

On 24th November an attempt was made to operate a piston core station. Regrettably the wire supplied to the ship by the RVB for lowering the recovery frame was too short to allow the frame to be fully lowered. Accordingly, the station was abandoned and it was decided to enter Iraklion to re-rig the frame and also to collect equipment forwarded from Athens and Famagusta. Iraklion was entered on the morning of 25th November and the ship sailed again at 0700 hours, 26th November.

On leaving Iraklion, work was commenced on the deep water stations east and south of Crete. The stations planned for north of Crete as well as several stations to the east were abandoned, due to the time lost in Iraklion. Two gravity core stations were occupied on 26th between Crete and Karpathos, after which the ship proceeded to the area south east of Rhodes. Three gravity core (plus bottom tripping water bottle) stations were occupied in this area by 1600 hours 27th November. By this time the weather had deteriorated markedly and the Captain decided that conditions were such as to be hazardous to the safety of the crew. Further stations were abandoned.

In an attempt to obtain better working conditions, it was decided to make a course for the station immediately south of Crete and to work towards the east and to abandon the most westerly line of stations south of Crete. Station work was resumed at 0133 on 29th November and three gravity cores (two with bottom tripping bottle (BTWB)) were occupied successfully during this day. Two gravity cone (plus BTWB) stations were completed on 29th prior to undertaking the first piston core station. Only a 20 ft. core barrel was used in order to gain experience in the operation of the recovery cradle with the minimum of complications. The system worked successfully, despite its very makeshift nature (see equipment section) and an 18½ foot core was recovered. The core was one of the most interesting recovered in that it came from an extremely reducing environment. During 30th November, apart from 4 more gravity core stations, another piston core station was occupied. A 60 ft. barrel was used and the system worked successfully, except that the thin walled liner fractured and prevented the piston from returning up the barrel (see equipment section).

From 29th November till the end of the cruise much time was lost due to the breakdown of the satellite navigator. Despite long hours spent by the RVB technician, J. Price, with assistance from the ship's engineering staff, it was not found possible to repair the equipment. This was only one of several ship's equipment failures or malfunctions, and it was fortunate that Price had not been scheduled to take any scientific watches.

A further piston core station was occupied on 30th, again using a 60 ft. barrel. To avoid collapse of the liner, somewhat loose leathers were used on the piston and from this viewpoint the station was successful. However, the corer hit a hard layer (ash?) at about 1½ metres and the corer bent through 90°. This made recovery rather difficult.

Apart from the third piston corer station, 15 gravity core stations and 1 hydrological station were successfully occupied during the period from p.m. 29th to a.m. 3rd.

The cruise was completed on arrival off Iraklion at 1000 hours on 3rd December.

It should be emphasised that the success of this cruise was due in no small part to the co-operation and assistance received from the officers and crew, for which we are most grateful.

OPERATION OF SCIENTIFIC/NAVIGATIONAL EQUIPMENT

Gravity Corers

Three gravity corers were used -

(1) a modified UMEL with flap valve (made in Piraeus) and tulip core catcher

(2) a modified UMEL with flap valve single leaf core catcher and venturi system

(3) A RVB corer with baffle valve and tulip core catcher.

No barrels for (1) were on board and, therefore, modifications to existing barrels had to be made before sailing. In addition, parts of the weight stand were missing and were fabricated in Piraeus.

Gravity corers (1) and (2) operated with equivalent efficiency. That is to say, the venturi system as rigged produced no appreciable advantages.

Gravity corer (3) gave shorter cores (at a given station) than (1) and (2) even when additional weights were used.

It can be concluded that the flap valve gives an appreciable advantage over the standard baffle valve.

Piston Corer

Only three piston core stations were occupied (see appendix and narrative). Basically the system operated well and the recovery prototype cradle was shown to be sound in principle, although requiring major modifications (see separate section).

On the first station a 20 ft. barrel was used and an 18½ ft. core obtained. A 60 ft. barrel was used on the second P.C. station. Launching and recovery went well. However, the core liner is thin walled and in 20 ft. lengths. Accordingly, the joins of the liner lengths could only be butted and in practice due probably in part to a rather tight piston washer, the liner shattered and jammed the piston about 18 ft. from the core.

Another 60 ft. barrel was used on the third station and with a relatively loose piston, no problems were encountered with the liner.

Long Core Recovery Cradle

This was designed by RVB on the basis of discussions with scientists from Imperial College to permit the collection of long piston and box cores.
(A facility for the collection of long cores is essential if British marine sedimentology and geochemistry is to continue to make a worthwhile contribution to the advancement of science in the future.)

The present equipment should be viewed as a first prototype that will require major modifications. However, even with the present makeshift equipment and rigging, it has been shown to be possible to launch and recover 60 ft. corers. It can be stated, therefore, that the prototype equipment has been fully justified, but a considerable number of more or less major modifications are required to overcome problems encountered during the present cruise. These are summarised below:-

(1) Structure of Cradle. It is questionable whether the weight of the structure is not excessive even for the handling of long box cores. Certainly, the sides of the frame could usefully be made lighter weight (see (2)).

(2) Stowage. It would be advantageous to have sides which could be folded (or removed) so that the main (bottom) structure of the cradle could be folded up alongside the ship.

(3) Forward Arm. As designed, this arm prevents the operation of the 'A' frame when the cradle is in the inboard position. This makes launching and recovery difficult and, under certain conditions, possibly hazardous, in that the main warp during these operations is leading inboard from the top of the corer. Furthermore, the length of the arm is insufficient to enable the cradle to be brought round the corer during recovery.

(4) Hydraulics for For'ard Arm. The present system is defective due to mis-assembly.

(5) For'ard Rigging. Recovery of the trigger corer of a piston corer presently involves leading a wire to the windlass through an awkward series of lead blocks. This is a time and labour intensive operation and such operations always involve some risk, due to communications problems (see also note on ship's internal communications). A small winch on the for'ard deck near the crane would overcome this difficulty. Of course with box coring, a trigger corer is not involved and the problem does not arise.

(6) Aft Rigging. The use of the ship's aft capstan to raise and lower the cradle is also labour intensive. Furthermore, the system is inefficient in that the wires have to be led well aft and considerable strain is placed on the motive power of the capstan. The effect of the strong strain aft also affects the forward end of the cradle and this tends to cause the vertical pin by which the cradle is attached to the forward arm to open. These problems could be overcome by having a winch on the boat deck (near the ship's side so that the operator could see the movement of the cradle) positioned so that when in the fully raised position, the lift was vertical. Positioning of a boat deck winch might well make it desirable to extend the length of the cradle. A slightly longer cradle would also facilitate rigging and de-rigging of the piston corer.

A number of minor but extremely critical aspects of the present cradle have been ignored above, in that it is considered essential that a meeting be called of a working party to discuss the recovery cradle. Most of the minor points will be solved if the points mentioned above are adequately dealt with. Essential members of the working party are:
(1) Ship's First Officer (E. M. Bowen) (2) Ship's Boatswain (L. A. D. Haggis)
(3) Ship's Chief Engineer (D. B. Lintern) and one IC scientist.
Preferably, the meeting should be held before Christmas and the working party should be kept as small as possible (the writer would suggest a maximum of 6 people).

Grabs

Three grabs were operated; (a) Shipek, (b) Dietz-Lafonde and (c) RVB?.
The Shipek grab worked well, although there was the usual problem of washing of the sample during recovery, which could only partially be avoided by slow wire recovery rates.
The Dietz-Lafonde grab also operated efficiently but gave only a very small sample.
Unfortunately, the RVB? design grab has a basic design fault which will prevent its operation on at least a majority of stations and probably on 95%+ of all attempts to use it.

Water Bottles and Thermometers

Both N10 and Niskin water bottles were used with essentially 100 per cent success. Failures were due to bad rigging. The thermometers (protected and unprotected) also operated well.

The Niskin water bottle was re-rigged to its original design, i.e., to operate as a bottom tripping water bottle, and this permitted it to be used on grabs and corer stations.

Pingers

Only UMEL pingers were used and these operated well. These pingers also have the marked advantage over the Plessey pingers of being much smaller and lighter.

Scintillometer

Good results were obtained with the telemetering scintillometer prior to its loss.

Eh Meters/Salinometers/Filtration Equipment, etc.

All operated effectively.

EQUIPMENT ON BOARD

To avoid duplication of equipment purchases (generally from NERC funds) by several organisations, it is most desirable that standard equipment needed for the different types of scientific work likely to be carried out from a ship should be available on board. Deficiencies in this respect on the present cruise included:-

(1) shortage of small shackles

(2) lack of stainless steel swivels.

This did not affect the programme largely due to the co-operation of the boatswain and netman and because the deficiencies were noted before leaving Piraeus. In addition, the absence of computer calculated Mathews' tables (or any Mathews' tables apart from the Bridge copy of the booklet) and of any drafting equipment could cause difficulties, in that some NERC ships have these items. In practice, IC had their own equipment on board, so that no problems arose.

GENERAL COMMENTS ON SHIP

The officers and crew are quite exceptional in their willingness (indeed insistence) to take part in all equipment handling operations and in terms of their general cheerfulness and efficiency. The standard of messing was also abnormally high.

Comments on 'read outs' in the scientific laboratories, etc., are made below. The laboratory space is limited but for the purposes of this leg was more than adequate.

A matter for some concern (although strictly non-scientific) is the crew messing and recreational accommodation and particularly the lack of any separate facilities for the P.O's. It cannot but be felt that with a crew, possibly including a number of difficult seamen, the present facilities would be very detrimental to efficient ship and scientific operation. In this period, when scientists can be readily flown to and from the ship to join specific legs, it is the writer's opinion that the sacrifice of two scientific berths would be justified to provide improved facilities for the crew.

CREW SAFETY

Attention should be drawn to one item of crew safety.

The winch operators working on the side of the ship: if a wire parts during a dredging station, for example, the operator has no protection at all and his life and limbs are at risk. This risk could be markedly decreased by having an open frame about the winch operator position.

SHIP'S INTERNAL COMMUNICATIONS

The fixed communication boxes operate very efficiently. However, for many operations it is most desirable to have a mobile system. It is suggested that 3 battery operated short range walkie-talkie radios should be available on the ship.

WITHIN SHIP INFORMATION DISSEMINATION

The availability of information at critical locations on the ship is completely inadequate and, under certain circumstances, could cause serious risks to the safety of the ship and personnel. In particular -

(a) No log read out in laboratory. Log readings are required at frequent intervals by the scientists when manoeuvering to come on to a station, etc. These can only be obtained by disturbing the sole occupant of the bridge from his other duties.

(b) No 'wire out' or tensiometer read out in the laboratory, winch room or bridge. Particularly when stations using pingers are being occupied, the scientist in charge must be able to have all essential information available at one point, i.e., in the laboratory where the PDR is situated. The delay in receiving (or mishearing) information on wire out, tension, etc., during dredging and coring could result in the loss of equipment and injury to personnel.

(c) No computer satellite fix slave on bridge. Information on position should be automatically available to the water keeping officers.

EQUIPMENT FAILURES

Heading Readout

This broke down but was repaired by J. Price.

Log

This broke down but was repaired by J. Price.

Satellite Navigator

This broke down but could not be repaired.

P.D.R.

The MS38 PDR is in need of a major overhaul. Running repairs and minor adjustments (such as taping down the paper finished alarm) enabled good results to be obtained. However, on occasion the transmissions would cease at frequent intervals and sometimes could only be restarted with difficulty. It is no doubt purely fortuitous that these breakdowns always appeared to occur when depth readings were of critical importance, e.g., when in shallow water approaching land.

APPENDIX

REPORT ON STATION REFUSAL

A fourth piston core was programmed for the afternoon of 2nd November. This was postponed four hours at the suggestion of the Captain. One hour before the station was due, the Captain expressed concern about the weather and stated that his crew did not wish to undertake a piston core station. This had already been made clear by the crew, who did not wish to have to rig and de-rig the necessary sheaves, tackle, etc., in the last twenty-four hours of the leg. (They had been prematurely stripped down on the morning of the 2nd, whilst the senior scientist was turned in after a night watch.) The senior scientist was unable to agree that the weather was deteriorating or likely to deteriorate markedly before completion of the station (the barometer had fallen from 0900 to 1020 bars at 1630 and was steady at 1020 bars from 1630 to 1930 (the time of the request) the wind strength was 12 knots gusting to 17, sea moderate; the weather forecast was wind strength 3 - 4). The senior scientist further stated that in the event of a marked deterioration of weather during the station, he would take responsibility for stopping off and cutting the wire to the corer. At 0200 hours, 3rd November, at which time the station was due to be completed, at latest, the wind strength was 10 knots, gusting 14 knots, and at 0900 6 knots gusting 10 knots. The senior scientist indicated that if the requested cancellation of the programme was on grounds of ship and crew safety, he would be happy to acquiesce, even though considering the decision mistaken. He did not feel able to agree to cancel the station on the grounds of the crew not wishing to rig for a piston core station, particularly in that he had previously given up on the Captain's request twelve hours' working time, so that the crew could have an extra night in Iraklion. The Captain then confirmed that his request was on safety grounds and the senior scientist immediately agreed to cancel the station.

It should be explained that apart from this one difference of opinion on whether the ship's safety was likely to be hazarded (on which obviously only the Captain can decide), relations between scientists and crew were consistently excellent and the co-operation given by the crew was exceptional. Indeed, the disagreement on the course of the weather over the period 2100, 2nd to 0200, 3rd was purely an amicable difference of opinion. However, the principle that a scientific programme continues through the last leg of a cruise is important.

This report has been read and agreed by Captain Selby-Smith.