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CRUISE REPORT ON FINAL LEG (14)
OF WHITETHORN, CRUISE NO. 81/WH/08

1-19 October, 1981

by

D Evans

No. 81/16

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1. INTRODUCTION

The object of the cruise was to use the IGS 1m drill to help solve a number of mapping problems on the Argyll and Tiree sheets (see Fig. 1), as well as to carry out gravity coring and grabbing.

The weather was very poor during the leg, with only a few days at the end of the leg which did not suffer strong winds. Furthermore exceptionally strong spring tides caused much difficulty with anchoring in the more sheltered areas around the islands. Consequently little work was done in the more exposed western areas, but good results were obtained in the east.

A survey log is presented in Appendix I.

2. PERSONNEL

D Evans	IGS	MGLU	Party Chief
J Pheasant	IGS	MGLU	Technician
W Lonie	IGS	MGLU	Technician
N A Ruckley	IGS	MGLU	Surveyor
J McGuigan	IGS	MGLU	Laboratory
R T R Wingfield	IGS	MGLU	Geologist (1-16 Oct)
M Dorkins	IGS	ACU	Geochemist

3. EQUIPMENT

- IGS, 1m drill system (2 drills)
- Gravity corer system
- Shipek grab
- Vibrocorer (but partly dismantled on the deck to allow DM to be deployed from platform).

4. SHIP'S PERFORMANCE

The sampling abilities of the ship are by now well known and need no further comment. It should however be said that several aspects of domestic cleanliness in the ship need to be improved, in particular toilets and showers.

Once again the cooperation of the ship's officers and crew has been greatly appreciated.

5. IGS EQUIPMENT PERFORMANCE

The performance of the 1m drill improved as the leg progressed and was eventually quite reliable. Some damage was caused to the drill due to the inevitable rough handling on the seabed - the retraction hydraulic pipes being particularly prone to being ripped off. The BX barrel proved

most successful and provides a much better core than the rather narrow EX.

Other systems were reliable and were successfully operated, although one Shipek grab was lost.

6. GEOLOGICAL RESULTS

The following sample stations were occupied.

<u>Sheet No.</u>	<u>Total Stations</u>	<u>Shipek</u>	<u>Rock Corer</u>	<u>Sed. Corer</u>	<u>1m Drill</u>
56-06	3	3	-	-	3
56-07	76	76	25	35	19
56-08	14	14	7	8	-
57-06	16	16	-	16	-
57-07	6	6	4	2	-
TOTAL	115	115	36	61	22

a) 1m Drill

The results of the 1m drill work will provide valuable data for finalising the interpretation of the Tiree and Argyll solid geology maps. Of the 22 sites occupied, no outcrop was identified at 4 sites, while at a further 6 sites no sample was obtained either due to mechanical problems or an inability to position the drill on the outcrop.

Regretably the weather did not allow many sites to be occupied, but good information is now available in the region of the Inner Hebrides Basin and Skerryvore Fault. The most common rock drilled was basalt but two ?Mesozoic, one Torridonian and two other igneous rocks were recovered.

Pictures from the TV system were most instructive and provided a good impression of the seabed, which is almost everywhere coated with sediment,

even on outcrop where a thin film is often present.

b) Others.

Good Shipek coverage has now been obtained in the eastern part of the Tیره sheet, along with a number of sediment cores. The rock corer was not notably successful although a few good basalt samples were obtained.

7. IGS DECK LAYOUT, STORES, ETC.

During downtime due to weather much work was done in tidying up the stores, laboratory, 40ft and workshop containers. All materials but one totepan rack have been removed from the stores and either redistributed or returned to Edinburgh as redundant.

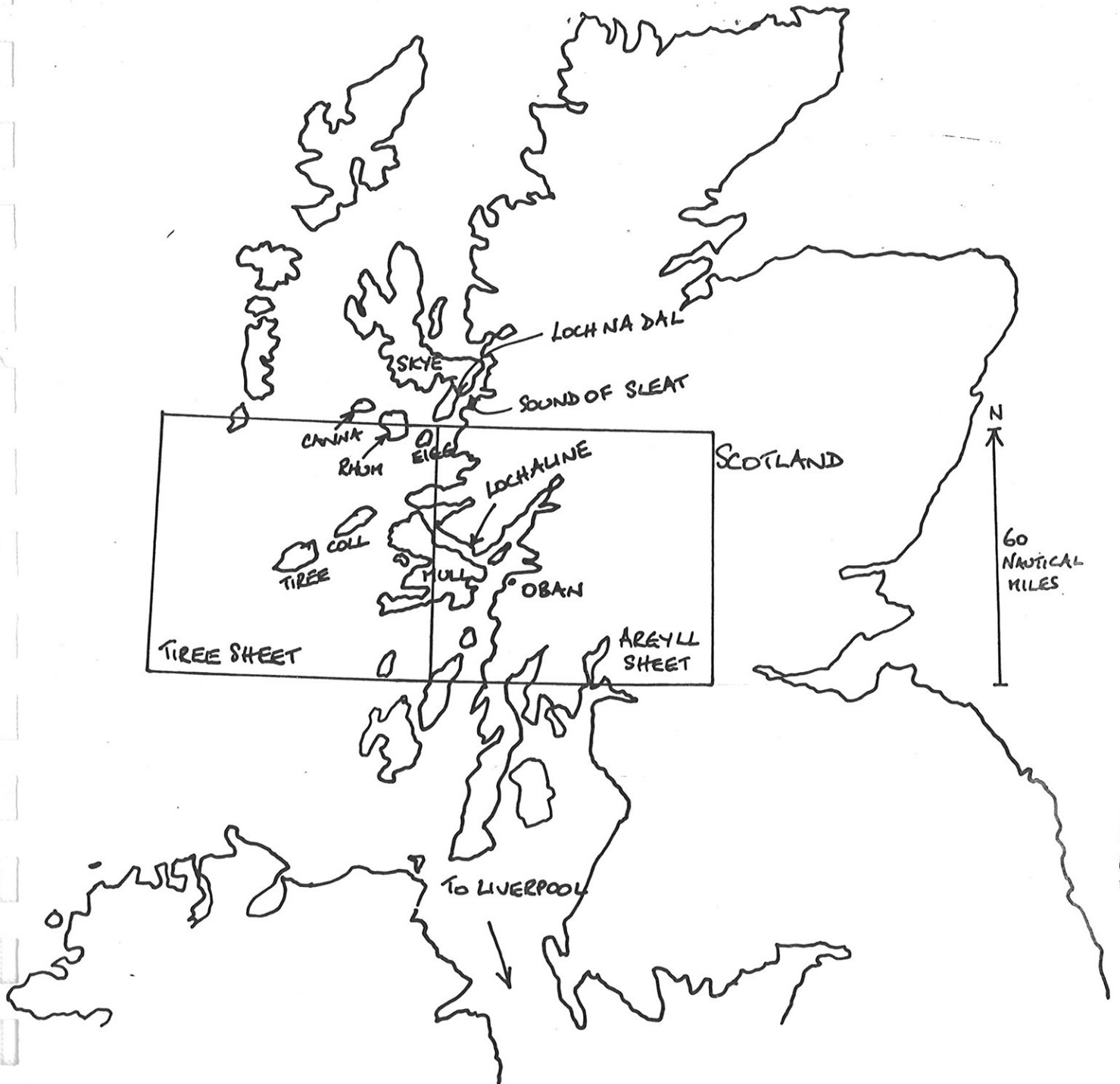
8. CONCLUSIONS

1. Despite problems of weather and tides, much useful information was collected. Periods of weather downtime were gainfully employed rationalising and tidying the contents of the containers.
2. The 1m drill system is suitable where good outcrop is known and the BX barrel is a welcome improvement.
3. The stores container will in future be unnecessary, allowing the deck space to be used to house two 8ft containers for core sample storage.
4. The contents of the stores and other areas included an excessive quantity of certain items, and others which were totally redundant. As regards 'geological' stores none of the following will be required prior to next years sailing: Formalin (totally unnecessary anyway), Acetone (we were carrying 30 gallons!!), HCl, Borax, Rose Bengal, Sodium Bicarb, Teepol, Pentel pens, 1m cardboard boxes, layflat tubing.

9. RECOMMENDATIONS

1. In view of the long periods at which the ship is anchored for drilling, it would in future be beneficial if such work could be carried out in a time of year when the weather is likely to be more moderate, and when the tides are not at their strongest.
2. In future there needs to be a closer control over the stores carried on board, and a tighter control established over the materials brought on board at port calls.
3. The stores container will in future be unnecessary as its contents will in future be held more economically in the revamped 40ft container, the workshop and the laboratory.
4. Much greater use can be made of the hold, particularly for liner tube, barrels, layflat tubing, caps (only a very limited number should be on deck) etc.
5. The deck space presently occupied by the stores container could be taken up by two 8ft containers for storing core. Turning the stores container into an extension of the laboratory would be unsatisfactory and would greatly underutilise the space available as the freeze dryer can go in the 40ft container. In this context the photographic system needs a complete rethink and the desirability of photographing the core on a regular basis must be critically assessed.
6. We should in future adopt a more environmentally conscious attitude to rubbish disposal. All plastic and polythene (including liner offcuts) and other pollutants should be stored in a pallet for offloading in port. This has been done to some extent during the year, but a general policy in this direction should be adhered to.

FIG. 1. LOCATION MAP



APPENDIX I

SURVEY LOG

SURVEY LOGThurs 1st Oct

- 1530 Sailed from Oban to Lochaline to take on water
- 1730 Alongside at Lochaline. Take on water and prepare deck for drilling. Remain tied up at night.

Fri 2 Oct

- 1100 Sail for Oban to pick up transmission belts and ship's supplies, having completed drilling preparations. Unable to carry out transfer due to strong winds, so head for drill site in Sound of Mull.
- 1400 Anchoring on 1st DM site in Sound of Mull.
- 1830 Anchoring on 2nd DM site farther north in Sound. Hydraulics broken on seabed and core lost. Great difficulty in retrieving anchors due to very strong wind.
- 2230 Move to anchorage overnight.

Sat 3 Oct

- 0815 Lift anchor, having attached to stern anchor which had tangled last night. Head for Oban.
- 1130 In Oban Bay pick up parcel and stores, head out to west of Ardnamurchan for drill site.
- 1630 West of Ardnamurchan, weather having deteriorated appreciably, no work possible, wind N-NW 9+. Head for anchorage in Loch na Dal, Sound of Sleat.
- 2030 An anchor in Loch na Dal.

Sun 4 Oct

- 0800 Lift anchors, begin bombing in Sound of Sleat. Finish at 1150 and head for drill site south of Rhum.
- 1400 Anchor on site. Drilling unsuccessful.
- 2300 Begin night sampling.

Mon 5 Oct

- 0820 Begin anchoring of DM site, west of Ardnamurchan. Successful.
- 1200 Anchoring on second site, no good outcrop found.
- 1900 Anchor on 3rd DM site (old Pisces site) no core recovered on 3 attempts.

2315 Off site, head for night sites via deep water to correct spooling on shipek.

Tues 6 Oct

0150 On 1st night site.

0650 Finish night sites, weather deteriorated too much for work, head for Ardnamurchan area, then to site off Tobermory.

1145 On site, begin anchoring.

1715 Lift anchors. Delay at start due to leaking of TV light lead. No rock encountered. Lift anchors head for second site NW of Mull. Weather marginal and oncoming darkness militate against anchoring - head for night sites.

2100 Begin night sampling after steaming.

Wed 7 Oct

0000 Night sampling.

0658 Abandon work due to deteriorating weather. Head for Sound of Mull.

1530 Begin anchoring on site. Not drilled due to inability to get drill on the little outcrop seen.

2240 Anchors lifted, head for anchorage overnight, awaiting weather improvement.

Thurs 8 Oct

0850 Anchoring on 1st drill site, delay in lifting anchors at anchorage due to mechanical problems. Three sites successfully occupied during day.

2050 On first night site.

Fri 9 Oct

0000 Night sampling. At daybreak weather threatening, continue bombing.

1315 Anchoring on DM site west of Ardnamurchan. Successfully drilled.

1840 Anchors up in rapidly deteriorating weather. Head for anchorage in Loch na Dal - Sound of Sleat.

2230 At anchor.

Sat 10 Oct

0000 At anchor, Loch na Dal.

Sun 11 Oct

0000 At anchor Loch na Dal.

1210 Begin bombing in Sound of Sleat

1630 Return to anchorage

Mon 12 Oct

0200 Lift anchor, head for Passage of Tiree.

0815 Anchoring of Goat Bay. Outcrop not found by DM.

1400 Anchors aweigh, head for 2nd DM site but too windy, begin bombing at 1530

1630 Abandon bombing due to very strong wind head for Goat Bay for sheltered anchorage.

1800 At anchor.

Tues 13 Oct

0715 Lift anchor, head for DM site.

0810 Begin anchoring. 3 sites occupied, one successfully.

1625 Anchors upon 3rd site, tides too strong for further anchoring, so head for night sites.

2050 On station.

Wed 14 Oct

0800 Anchored on DM site, but tide and wind too strong to hold, so abandon and head for bombing sites around Canna.

1830 Begin anchoring on DM site off Rhum. Site successfully occupied, although drill damaged and had to be repaired on site.

Thurs 15 Oct

0110 Anchors aweigh, begin night sampling.

0730 Anchoring on DM site. 3 sites occupied during day, 2 successfully.

2110 Begin night sampling.

Fri 16 Oct

0810 Anchoring on DM site. Successfully occupied.

1040 Head for Tobermore to put Robin Wingfield ashore with severe toothache and swelling.

1720 Anchoring on DM site, successfully occupied, but drill damaged.

2335 Begin lifting anchors. Standby in sheltered water for drill repairs.

Sat 17 Oct

0800 Begin anchoring on DM site. Open hold while on site to allow for work on passage to Liverpool. Site successfully occupied.

1320 Anchors up, steam for Liverpool.

Sun 18 Oct

0000 Steaming for Liverpool.

Mon 19 Oct

0300 Alongside at Liverpool, Nelson Dock.

1159 End of Contract.

Leg 14 TECHNICAL REPORT

- Equipment - Shipek Grabs
- Grab Handling System
 - Gravity Corers
 - Gravity Coring Handling System
 - 1 Metre Rock Drills
 - Rock Drill Control Gear

Grab Sampling Equipment:- Continued use was made of the grab sampling gear during the leg without any major problems. As a result of heavy usage over the season the handling davit is showing signs of excessive wear on the worm/wheel mechanism suggesting that replacement of this drive may be necessary prior to the 1982 season. The grab sampling winch also requires a major service to the bearings, drives, hydraulic and electric control gear including minor repairs to the start relays and warning lights. It is recommended that the hoist wire be replaced prior to the 1982 season.

Gravity Coring Equipment:- This system continued to give reliable service during the leg. Although failure did occur late in the leg of the drive to the metering counter. Whilst temporary repairs could have been carried out it was felt that a safer end of season solution was to disconnect the chain transmission with a view to replacement of the extremely worn drive sprockets and the transmission chain which exhibited signs of excessive stretching probably due to the shock loading sustained on stopping the winch after free falling of the corer while sampling. As with the grab sampling winch service is required on the power system, transmission system and braking system.

Rock Drilling Equipment:- The active and standby rock drills were handled from the main working platform, the uppermost leg of the vibrocorer being removed to permit handling through the 'A'-frame using the 28mm nylon

line suitably reeved.

Minor problems were identified early in the cruise mainly due to a period of inactivity and superficial corrosion. Continued usage and attention to the power transmission and carriage release gave rise to a high degree of reliability.

The early sites occupied made use of a single wall EX barrel and acceptable penetration and core recovery was achieved in the majority of sites where drilling was attempted, bit selection being from diamond surface set, impregnated or Tungsten Carbide. Subsequent to the coring work using the EX equipment coring was attempted using new thin wall BX equipment incorporating a non-rotating inner barrel protecting the cored material from the drill flush pressure and flow. During the coring work using TBX equipment penetration rates of up to 1 metre/hour were achieved, (where bad faulting of the rock did not cause core jamming), bit weight and peripheral speed being optimum for EX but approaching the threshold of acceptable limits for the BX core barrel.

The final site of the cruise highlighted a retraction force consideration where high current demand occurred indicating high tensile loading on the rock core. Full retraction was only achieved by the drill carriage, the safety joint at the water swivel having released (under a load lower than that required to fracture the BX core) leaving barrel and core locked in the seabed under the action of the core spring. In this instance successful core recovery was achieved by a snatch pull on the main lift nylon line. It is suggested by this occurrence that much higher recovery force allowances should be designed into drilling gear coring with BX equipment.

A singularly useful advantage within the drilling equipment was the independent switching of the electric water flushing pump which allowed a degree of jetting on the seabed permitting easier identification of outcrop or near outcrop material particularly where a thin veneer of sediment was present. This facility was achieved by using a vibrocorer style umbilical dedicated to use on the rock drill, the power conductors selecting drill or retract (by change of phase rotation), the signal conductors linking to the pump facility with fully independent switching.

J B Pheasant
W G Lonie