

CRUISE REPORT ON 4TH LEG OF  
WHITETHORN, CRUISE NO 81/WH/08

15 - 27th May 1981

by

D Evans

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## 1. Introduction

The objectives of the cruise were to sample the Orkney 1:250,000 sheet as part of the IGS mapping programme. This included the proposal to drill solid rock at outcrop using the IGS 1m drill.

The weather was good during the leg and sampling in this area can be regarded as essentially complete, although further work with a 6m rock drill is needed. A survey log is presented in Appendix I and a time utilisation analysis shown in Table I.

## 2. Personnel

D Evans	IGS	MGLU	Party Chief
A Crosby	IGS	MGLU	Geologist
M Stoker	IGS	MGLU	Geologist
N A Ruckley	IGS	MGLU	Surveyor
P J Wiggins	IGS	MGLU	Chief Technician
A Bell	IGS	MGLU	Assistant Technician
J A Chesher	IGS	MGLU	Night Geologist
A Britton	IGS	MGLU	Night Assistant
A Davis	IGS	ACU	Geochemist

## 3. Equipment

20ft Vibrocorer system  
 1m drill system  
 Gravity coring system  
 Shipek grab.

## 4. Ship's Performance

The performance of the ship was good, and the co-operation of the officers and crew much appreciated. Some anchoring difficulties

were encountered, largely due to the frequently poor holding ground combined with strong tides. The general standard of catering and cleanliness was higher than in previous years, and it is hoped that this trend will continue to provide further improvements.

#### 5. IGS Equipment Performance

Most points under this heading are covered by the technician's report, although some additional comments are as follows:

- the poor recovery from the vibrocorer were due to the geological conditions, there being commonly very little drift cover.
- The 1m drill proved very effective on hard rock outcrop.

#### 6. Geological Results

The following stations were occupied:

Sheet No.	Total Stations	Shipek Grab	Rock Corer	Sediment Corer	Vibrocorer	1m drill
+59-03	129	125	107	41	13	3
+59-04	106	97	43	46	7	11

The work has provided good sample station coverage for almost all areas on the sheet, there now being about 450 stations occupied. This will provide a good data set for the seabed sediment map of the area. The area is dominantly one of shell sand and gravel, with finer sand in the west.

Rock core samples from the Orkney-Shetland Platform (north of the Orkneys) have provided some solid rock material which should prove useful for revision of the initial geophysical interpretation of the solid geology. The data is however of a relatively low reliability as the material may

not have been in situ, and further drilling work should be carried out.

1m drilling on the basement ridge has proved gneisses of probable Lewisian age. It now seems probable that the Moine Thrust runs to the east of this ridge.

#### 7. Conclusions

The leg successfully completed sampling of this sheet as far as was possible with the equipment available.

All systems on board worked smoothly with only minor breakdowns.

#### 8. Recommendations

1. The design and building of the proposed 6m drill should proceed with all speed so that areas such as Orkney can be assessed employing the most suitable equipment.
2. Rationalisation of aspects of the stores should be considered, particularly of chemicals. More than 20 gallons of Acetone is surely excessive.

TABLE I  
TIME UTILISATION ANALYSIS  
*Hours?*

DATE	IN PORT	ON PASSAGE	BETWEEN STATIONS	ANCHORING	ON STATION	DOWNTIME			NO. VE/DM STATIONS	NO. GS/GS/CR STATIONS	REMARKS	
						WEATHER	EQUIP'T	SHIP				
14 May	19	5	4.1	7.4	1.7			0.3	3	0	4	
15	0	10.5										
16	0	0	12.8	0.9	8.1		2.2		1	0	18	
17	0	0	13.2	3.7	5.9		1.2		2	0	20	
18	0	0	11.7	5.6	6.7				5	0	18	
19	0	0	12.6	6.4	5.0				5	0	19	
20	0	0	11.3	3.0	8.3		1.4		0	3	22	
21	0	0	11.9	3.9	8.2				0	3	17	
22	0	0	13.7	3.1	7.2				0	2	21	
23	0	0	14.2	4.1	5.7				3	0	26	
24	0	0	11.4	5.7	6.9				0	4	14	
25	0	0	13.6	3.2	7.2				0	2	27	
26	0	7.5	9.3	1.8	3.4				1	0	16	
27 May	17	7	0	0	0				0	0	0	
TOTAL	10	11	41	14.5	22		1.4	0.1	20	14	222	

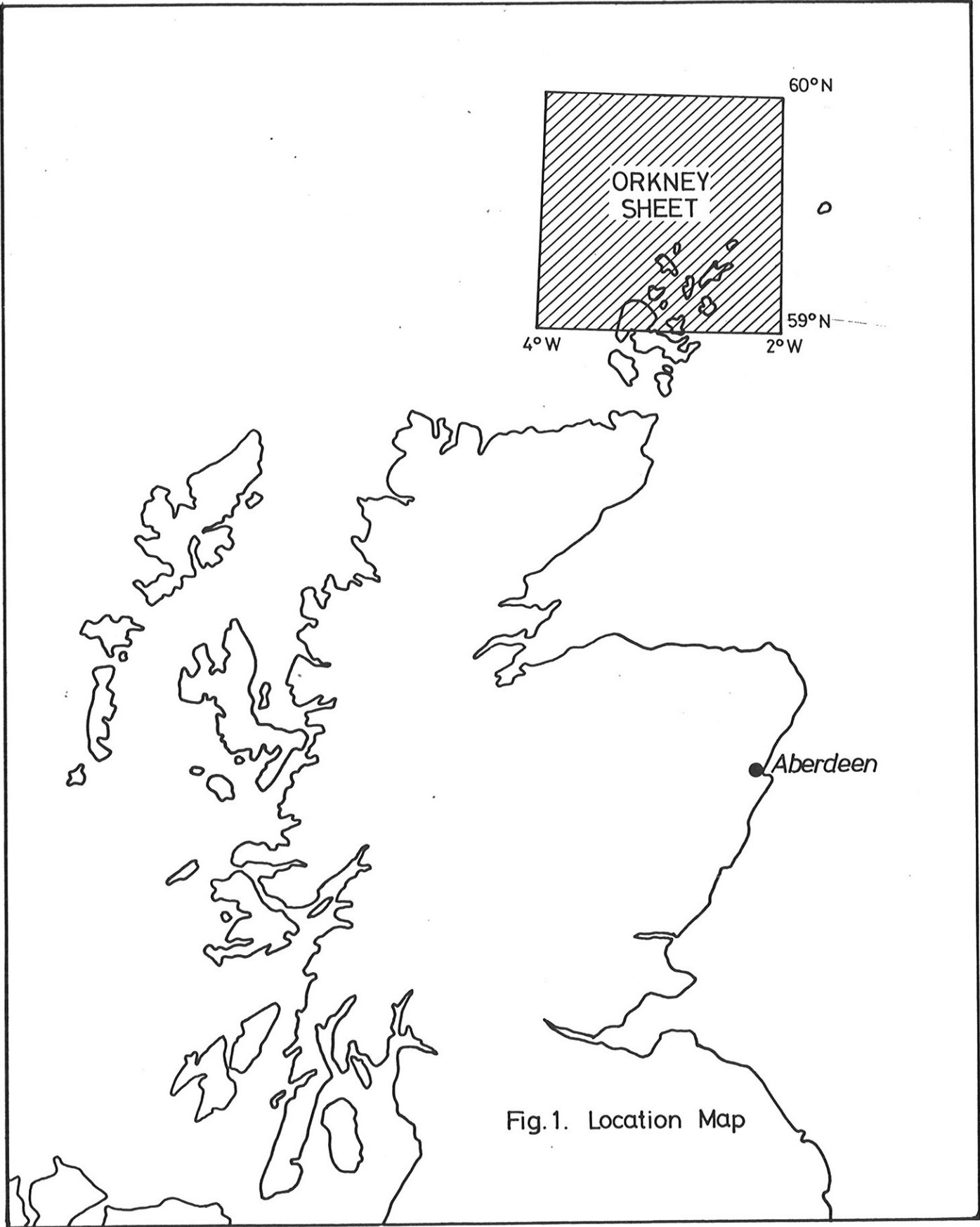


Fig.1. Location Map

## Appendix I Log

Thurs 14 May

1615 Move to bunkers  
1900 Leave Aberdeen, steam for Orkney sampling area

Fri 15 May

0000 Steaming for Orkney  
1030 On site north of N Ronaldsay. Anchoring on VE.  
4 sites occupied during day which included problems  
in getting anchors to hold. 2 were relaid.  
2340 Anchors lifted - begin night sampling. 9 sites occupied,  
with breakdown of shipek winch at 0415 (sat).

Sat 16 May

0910 Anchoring on 1st VE site, but problems with earth trip  
1310 Anchors aweigh on site, but no success with VE. Proceed  
with bombing while technicians work on VE, following repair  
of shipek winch. Continue all day while working on VE  
electrics

Sun 17 May

0000 Night sampling. Continues through much of the day with  
regular testing of VE. Eventually got to work after  
changing all cables.  
1545 VE site occupied but movement on anchors. Repeat successfully.  
2125 2nd VE site  
2320 Anchors aweigh, begin night sampling.

Mon 18 May

0000 Night sampling  
0800 Anchoring on 1st VE site. 5 sites occupied during day, as well  
as 3 bomb sites. Sample recovery disappointing  
2300 Anchors aweigh on final VE site, begin night sampling



Tues 19 May

0000 Night sampling

0725 Anchoring on 1st VE site difficulties with holding and tides throughout day.

2200 Lift anchors on final VE site, having taken 2 bomb samples before trial site. Begin night sampling.

Wed 20 May

0000 Night sampling

1310 Anchoring on Midi drill site. Successfully occupied and drilled

1600 Anchoring on 2nd site. Found outcrop but drill failed to operate.

1910 Anchoring on 3rd site. Sample lost

2320 Anchors lifted, begin night sampling

Thurs 21 May

0000 Night sampling

1055 Anchoring on 1st DM site. Outcrop not found

1535 Anchor on 2nd DM site. Outcrop located after lengthy search, and drilled

1945 Anchoring on 3rd site. Successfully sampled.

2200 Begin night sampling

Fri 22 May

0000 Night sampling continues

1210 Anchoring on DM site

1515 Anchors aweigh, continue gravity coring

1940 Anchoring for DM

2250 Anchors aweigh, begin night sampling

Sat 23 May

0000 Night sampling continues

0830 Anchoring for VE site. Four sites occupied in day. Weather deteriorating.

1700 Gravity coring in sheltered area, Westray Sound.

Sun 24 May

0000 Night sampling

0820 Anchoring for DM site. Outcrop not found, but further echosounder traverse gave new site which was successfully occupied.

1505 2nd DM site occupied, successfully, followed by a 3rd

Mon 25 May

0000 Anchors aweigh, begin night sampling

0930 Anchoring on DM site, no outcrop found.

1225 On 2nd DM site, Devonian successfully drilled

1500 Begin bombing

Tues 26 May

0000 Night sampling continues

0735 Anchoring on VE site, but tide too strong did not use equipment due to tilt

1000 Continue gravity coring

1410 At anchor to put midi drills and samples in hold

1630 Anchors aweigh, on passage to Aberdeen

Wed 27 May

0000 On passage

Alongside at Aberdeen

## Appendix II Technician's Report

by P J Wiggins

Gravity Coring

The system worked well producing good samples, albeit at the cost of many damaged NX barrels. A possible solution would be to have a thick walled version of NX diameter. The one thing in the system that gave trouble was the metering of the winch.

Shipek

Some problems were encountered whilst shipeking mainly catching the grab on the bilge keel. A pin sheared in the main control unit, and the metering is giving erratic readings.

Vibrocoring

At the start of the leg some electrical problems occurred. These were finally eliminated by changing all the bottom and external wiring. The main power cables gave some trouble mainly earth trips and faulty penetrometer readings. The cables were cut back and repotted. As deeper sites were anticipated a 300m length of new cable was prepared and put onto the cable reel. The leads from the electrical container to the deck reels were replaced.

The one area which needs some attention is the deck reel junction boxes, these were found to have water in them again.

A Hayward Tyler FB series submersible pump was mounted on the VE frame. Deck trials showed a good flow of water through 6 radially drilled holes  $5/32 \text{ } \emptyset$  approx. 8" up from the cutting shoe. One noted that when the ring of holes was taped the water tends to jet parallel to the barrel both up and down its length. The power for the pump is obtained by forming a

Y joint in the junction box to VE pot lead. Thus we can only have water to the barrel whilst it is vibrating.

#### Penetrometer

The system worked well with only one problem, a PCB in a bottom end unit went down.

#### Midi Drill

The midi drill performed very well since the fitting of a Hayward Tyler FB series Submersible Pump. The new bit (Van Moppes impregnated diamond) gave very good results in the hard materials giving a drilling ratio of 1cm/min average. Two areas need attention:

1. Water flushing. If the core fragments in the barrel while drilling it is possible for the water flow to the bit to be restricted, thus effectively stopping any further penetration. Possibly a double wall barrel could help this problem.
2. Core Retention. On two occasions all the core was seen to drop out of the barrel showing that the core spring is not effective, if the core is already broken off at the base of the hole.

#### Television

The SSS TV system performed well, the only problem is on Video Tape Replay. This is possibly caused by an unstable frequency supply.