

NATURAL ENVIRONMENT RESEARCH COUNCIL

INSTITUTE OF GEOLOGICAL SCIENCES

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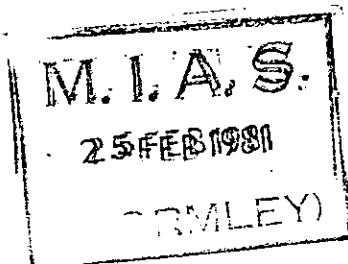
MGU

Report No. 106

Cruise Report on Project 80/11
A Gravity and Magnetic Survey in
the northern North Sea

Edited by

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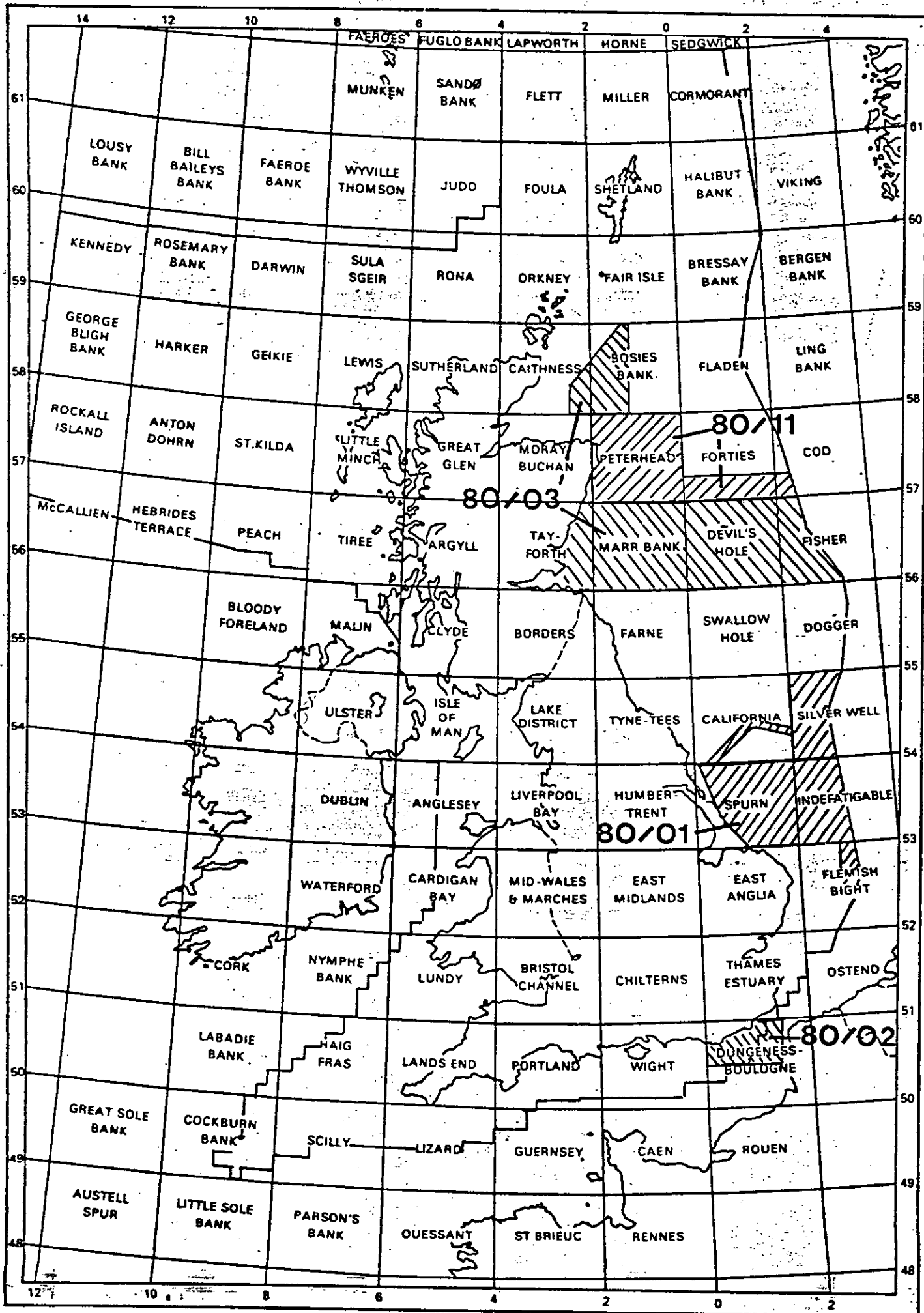
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1980 GEOPHYSICAL SURVEY AREAS

PREFACE

1980 Geophysical survey - overall cruise summary

The 1980 geophysical survey programme was divided into eleven legs, comprising four projects, as follows:

	Dates	Project No.	Area	Port	
Mobilisation	9 Apr-20 Apr	-	-	South Shields	
Leg 1	80/01 PART I	80/01	S. North Sea	Hull	
Leg 2					21 Apr-6 May
Leg 3					7 May-20 May
Leg 4	80/02	80/01	S. North Sea	Gt Yarmouth	
Leg 5	80/01 PART II	80/02	English Channel	Gt Yarmouth	
Maintenance period	19 June-30 June	80/01	S. North Sea	Sunderland	
Leg 6	30 June-4 July	-	-	Sunderland	
Leg 7	80/03	80/03	N. North Sea	Dundee	
Leg 8					5 July-16 July
Leg 9					19 July-30 July
Leg 10					31 July-13 Aug
Leg 11					15 Aug-26 Aug
Leg 11	80/11	80/03	N. North Sea	Dundee	
	28 Aug-8 Sept	80/03	N. North Sea	Dundee	
	10 Sept-22 Sept	80/11	N. North Sea	South Shields	

Projects 80/01, 80/02 and 80/03 were full regional surveys utilising multi-system seismics together with gravity and magnetics. Project 80/11 consisted only of gravity and magnetic surveying.

Cruise reports for the other survey projects carried out from RRS Shackleton during the 1980 field season are listed below:

Project 80/01 Report No. 103

Project 80/02 Report No. 104

Project 80/03 Report No. 105

INTRODUCTION

This report covers the operation of Project 80/11, a gravity and magnetics survey in the northern North Sea.

The objective was to resurvey the Peterhead and Forties sheets of the IGS 1:250,000 map series. The area had been surveyed previously in 1972 (Project No. 72/4, MGU Report No. 34). During the 1972 cruise there were considerable technical problems with the gravity meter and much of the data were of only moderate quality. Since 1972 subsequent surveys in adjacent areas further emphasised the inadequacies of the data and it became apparent that the area needed to be completely resurveyed.

The vessel used was the NERC research ship, RRS Shackleton which has an overall length of 61m, beam of 11m, draught of 4.4m and displacement of 1658 tons.

Geophysical methods employed were gravity and magnetics, together with bathymetry.

The senior scientist, geophysical, navigation and technical reports for the survey, summary lists and log sheets on which this report is based, are held on open file in the Marine Geophysics Unit, Institute of Geological Sciences, Murchison House, West Mains Road, Edinburgh. The authors of the reports are given in Table 1.

Excellent co-operation was received from the Master, Officers and Crew of Shackleton throughout the cruise and a total of 2583km were surveyed in the 13 days dedicated to this project.

NARRATIVE

The vessel sailed from Dundee early on 10 September, proceeded directly to the survey area and started the first line later the same morning. Two long E-W lines, to the median line and back, were completed before very poor weather forced a 36 hour shutdown over 12-13 September. Thereafter the weather remained moderate and to maintain the required data quality it was necessary to reduce survey speed for much of the time.

It became clear that the overall programme could not be completed in the remaining time available and effort was concentrated on completing the survey of the Peterhead sheet. This objective was achieved but no further data were acquired in the Forties sheet area. On 16 September the vessel stood off Fraserburgh for an exchange of survey personnel by small boat. Survey operations were terminated on 21 September and the vessel headed for South Shields.

All scientific equipment used operated well throughout the survey period, there being no significant technical problems.

Satellite coverage was generally good but with an occasional gap of up to four hours between updated fixes. Post-processing navigational accuracy is estimated to be within 200m.

Gravity results were good with an RMS cross-tie of 0.9mGal based on 108 values including cross-ties with data from Project 80/03 collected earlier in the season. On average the results were 4-5mGal below previous results, but with a variation of 2-10mGal in places. The Peterhead sheet was recontoured at 2mGal intervals.

TABLE 1

Personnel on Project 80/11

		<u>Leg Report</u>
M C Tully)		Senior Scientist/Gravity
E J Armstrong)		Navigation
J Taylor-Brown)	IGS MGU	
S Paynter)		
S Jones)		Technical
R Robinson)	RVS Barry	
J Tulstrup	IGS MGU (10-16 September)	
R McQuillin	IGS MGU (16-22 September)	

LINE NO.	LAST FIX	START Day Time	END Day Time	LINE LENGTH KM.	NAVIGATION		BATHYMETRY ATLAS DESO 10 EDIG 10	GRAVITY LACOSTE & ROMBERG S75	MAGNETICS BARRINGER	DATA LOGGING		SONAR			SEISMIC					
					SATNAV - DOPPLER SONAR	OTHER				DECCA-IGS	MONITOR LABS 9400	UDI AS350 DUAL CHN. SIDE SCAN	KELVIN HUGHES MS 47	PINGER EDO WESTERN	BOOMER HUNTEC DEEP-TOW	EG & G	SPARKER	AIRGUN BOLT 600B	WATERGUN SODERA MICA-T	
1	95	254 0920	255 0100	263	✓		✓	✓	✓	✓	✓									
2	88	255 0250	255 1720	249	✓		✓	✓	✓	✓	✓									
3	22	255 1922	255 2252	44	✓		✓	✓		✓	✓									
4	16	257 0810	257 1040	32	✓		✓	✓		✓	✓									
5	71	257 1400	258 0140	121	✓		✓	✓		✓	✓									
6	56	258 0320	258 1230	122	✓		✓	✓	✓	✓	✓									
7	55	258 1520	259 0030	121	✓		✓	✓	✓	✓	✓									
8	48	259 0150	259 0940	122	✓		✓	✓	✓	✓	✓									
9	48	259 1110	259 1900	121	✓		✓	✓	✓	✓	✓									
10	44	259 2310	260 0620	125	✓		✓	✓	✓	✓	✓									
11	23	260 0740	260 1120	30	✓		✓	✓	✓	✓	✓									
12	58	260 1610	261 0140	125	✓		✓	✓	✓	✓	✓									
13	46	261 0420	261 1150	126	✓		✓	✓	✓	✓	✓									
14	44	261 1320	261 2030	116	✓		✓	✓	✓	✓	✓									
15	44	261 2210	262 0520	106	✓		✓	✓	✓	✓	✓									
16	20	262 0650	262 1000	28	✓		✓	✓	✓	✓	✓									
17	49	262 1200	262 2000	125	✓		✓	✓	✓	✓	✓									
18	71	262 2210	263 0950	120	✓		✓	✓	✓	✓	✓									
19	61	263 1220	263 2220	123	✓		✓	✓	✓	✓	✓									
20	43	264 0010	264 0710	121	✓		✓	✓	✓	✓	✓									

LINE SUMMARY

TABLE 2

TABLE 3

Corrected Gravity Base Ties

Date Day Time GMT	Place & Berth	g at main base mGal	g at main corrected for tidal effects mGal	Meter reading corrected for tidal effects meter divs	Drift mGal
10.9.80 254 0145	Dundee Camperdown Dock	981630.7	981632.0	12434.0	+0.2
22.9.80 266 1311	South Shields Redhead Dock	981507.0	981509.4	12309.5	

APPENDIX 1

Equipment Carried

Navigation

1. Magnavox satellite navigation system integrated with MX610/MX600 doppler sonar and Arma Brown Mk I Mod 5 gyro compass.
2. Decca Mk 21 main chain receiver - optional integration with above.

Gravity

LaCoste and Romberg S75 air-sea gravity meter. World Wide land gravity meter for base ties.

Magnetics

Barringer proton magnetometer - two tow cable/sensor assemblies.

Bathymetry

Atlas Deso 10 echo sounder with hull mounted transducers (33 and 210KHz) and Edig 10 digitiser unit.

Data logging

1. Decca/IGS data logger.
2. Monitor Labs 9400 data logger.

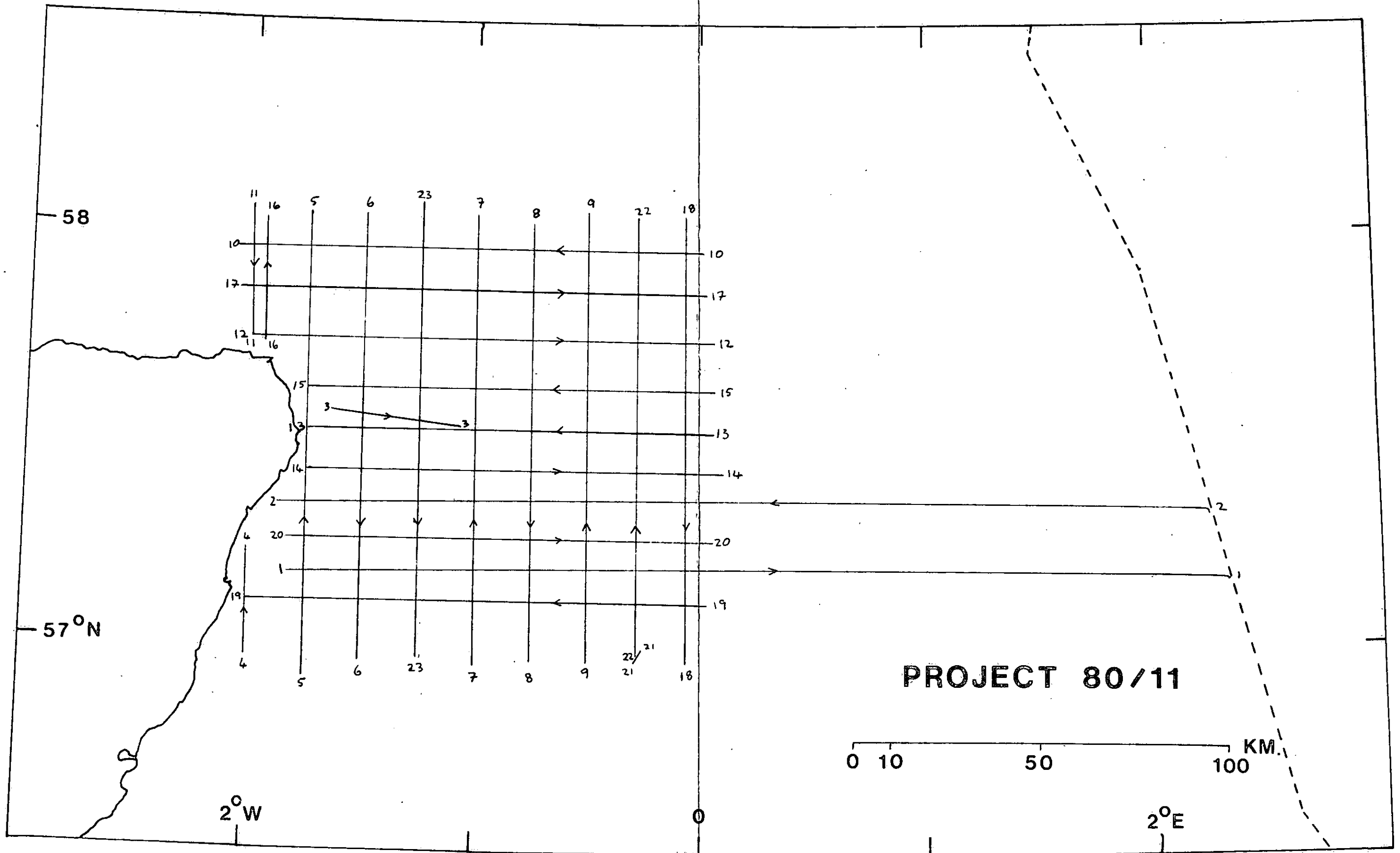


FIGURE 1