

**I.O.S.**

**RRS FREDERICK RUSSELL**

**CRUISE 2/83**

**14 JANUARY – 8 FEBRUARY 1983**

**MOORING AND CTD WORK ALONG THE  
CONTINENTAL SLOPE OFF THE HEBRIDES AND SHETLAND ISLES**

**CRUISE REPORT NO. 158**

**1984**

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**NATURAL ENVIRONMENT  
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INSTITUTE OF OCEANOGRAPHIC SCIENCES

BIDSTON

RRS FREDERICK RUSSELL

Cruise 2/83

14 January - 8 February 1983

Mooring and CTD work along the  
continental slope off the Hebrides and Shetland Isles

Principal Scientist

J.B. Rae

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#### CRUISE OBJECTIVES

The main objectives of this cruise were to recover and redeploy current meter and thermistor chain moorings along the Hebrides and Shetland continental slope between 57°N, 10°W and 62°N, 00°, previously deployed during RRS Challenger cruises 12/82 and 15/82 as part of the CONSLEX programme. Additional objectives were to carry out CTD and bathymetric surveys in the vicinity of the moorings and along the shelf edge, to deploy an SMBA deep current meter mooring, to redeploy an offshore pressure recorder, and to recover two medium frequency wave recorders off South Uist.

#### SCIENTIFIC PERSONNEL

N G Ballard	IOS (Bidston)
D Flatt	" "
C Griffiths	SMBA
M J Howarth	IOS (Bidston)
A G Kerr	" "
D L Leighton	" "
R I R Palin	" "
J B Rae	" "

#### ACKNOWLEDGEMENTS

The co-operation, help and patience of the Master (P Warne), his officers and crew is greatly appreciated. Despite very poor weather and sea conditions, every opportunity was grasped in an attempt to accomplish as much as possible of the planned programme.

NARRATIVE

After some delay to rectify mechanical and electrical malfunctions RRS Frederick Russell sailed from Millbay Dock, Plymouth at 1655 on 14 January 1983. A 35 knot NW wind had generated a heavy swell in the Celtic Sea making an uncomfortable passage across the Bristol Channel and into St. George's Channel.

In the Irish Sea the wind decreased to 30 knots from the west and the ship hove to in the North Channel at  $54^{\circ}43N$ ,  $05^{\circ}15^{\circ}W$  to carry out wire tests on acoustic release units in 260 metres of water. Seven units were successfully tested down to 200 metres using the hydrographic wire and hull transducer. The acoustic tests were completed by 1720 on 16 January, when the overside CTD pump was deployed and secured in the port side shoe. The ship was underway again by 1815, but at 1830 it was noted that the overside pump was loose, and this was retrieved.

Passage continued through the North Channel to the Mull of Kintyre in worsening conditions. The wind had increased to 40 knots from the west, the sea was rough, and the forecast was for continuing high winds between force 8 and 10. The passage continued through the Sound of Islay, but by 0400 on 17 January the wind was gusting up to 50 knots and the ship had to drop anchor in Loch Staosnaig off Colonsay. High winds with gusting up to 70 knots prevented sailing until 0915 on 19 January. By 1345 the Sound of Mull passage was completed and the ship proceeded across the Sea of Hebrides with a 35 knot NW wind. At 2006 the medium frequency wave recorder site was reached, off South Uist at  $57^{\circ}18.20N$ ,  $07^{\circ}38.01W$ , and the PES fish was deployed.

The instrument was contacted acoustically, put into the release mode at 2100, and the release fired at 2242. There was some indication that the instrument had moved from the sea bed, but a thorough search on the surface in worsening conditions revealed nothing. The search continued with acoustics and searchlight until 2400 when the rough sea and increasing swell made ship handling impossible. The instrument was returned to the acoustic command mode and the ship proceeded in a westerly direction towards position A1.

By 0600 on 20 January the wind had increased to 45 knots from the west and speed was reduced due to a heavy swell. By 0900 the ship was still 25 miles from position A1 and the speed was only 2 knots with worse conditions forecast. There was no immediate prospect of doing any mooring work on the A or B lines and it was decided to head for Stornoway, taking the opportunity to return to the medium frequency wave recorder site on the way. This site was reached by 1240 when an

acoustic search was started for the instrument at position  $57^{\circ} 18.39N, 07^{\circ} 37.49W$ .

The instrument was contacted in position at 1308 and put into the release mode by 1450. All attempts to release the instrument in worsening conditions proved fruitless. By 1700 the ship was rolling and pitching heavily in a 45 knot westerly wind, and handling became almost impossible. The attempt was abandoned at 1712 when the instrument was returned to the acoustic command mode. The PES fish was brought inboard and the ship proceeded towards Stornoway. The passage to Barra was very uncomfortable with winds up to 60 knots and the ship rolling heavily in a very rough beam sea with a heavy swell.

After a more comfortable passage through the Minches the Stornoway pilot was on board at 0903 and the ship was docked in Stornoway harbour by 0930. Work proceeded on the unloading and loading of mooring equipment, and this was completed by 1200. At 1230 the ship had to move berth and it was possible to deploy the overside CTD pump and to ensure that it could be correctly positioned and fixed.

Sailing from Stornoway was delayed by gales, severe gales, and poor sea conditions forecast in the proposed working areas. On 29 January improved conditions were forecast and the ship sailed at 0935, heading for station G1, north of Shetland. At 0950 the overside CTD pump was deployed, and the EM log which had been repaired in Stornoway, was extended. Off Cape Wrath conditions worsened to severe storm force 10, with 65 knot winds and 10 metre waves, but after returning to shelter off Lewis it was possible to resume the passage at 2300. By 1500 on 30 January the ship was off Fair Isle and by 1700 to the east of Sumburgh Head.

At 0815 on 31 January the PES fish was deployed a few miles south of position G1, and an acoustic search was started for the thermistor chain mooring. This was located at 1010 and the acoustic release fired at 1034. The mooring was brought onboard by 1053 at position  $61^{\circ} 29.94N, 00^{\circ} 01.50E$  with a depth of 190 metres. The bottom pressure recorder at this site was contacted acoustically at 1056, and its position fixed at  $61^{\circ} 30.14N, 00^{\circ} 02.09E$ . An acoustic search was started for the current meter mooring, which was contacted and released at 1421. This mooring was onboard by 1443 at position  $61^{\circ} 30.72N, 00^{\circ} 02.53E$ .

A CTD profile was started at 1500 and completed by 1530. Deployment of the replacement current meter mooring was started at 1647 and completed at 1720 in position  $61^{\circ} 31.12N, 00^{\circ} 03.00E$  with a depth of 190 metres. The thermistor chain

mooring deployment was started at 2002 and completed by 2012 in position  $61^{\circ}29.58N$ ,  $00^{\circ}02.08E$ . CTD and PDR surveys were started along the 200 metre contour towards position F1.

By 0500 on 1 February conditions had again deteriorated with 50 knot winds and a heavy swell from the north. The CTD survey was discontinued and the ship was hove to near position F1. On the morning of 2 February conditions had not improved and the ship was a considerable distance to the north of F1. It was decided to head for the E and D lines in the hope that conditions would improve to allow further mooring work. A westerly course was set towards the Faeroe Isles and PDR records were resumed until 1700. The course was changed to the south, but by 0330 on 3 February the westerly course was resumed due to heavy rolling in the northerly swell. At 0830 a southerly course was taken towards position D1, and PDR records were resumed. The D1 position was reached at 1440 and a bottom pressure recorder was deployed at 1443 in position  $59^{\circ}37.80N$ ,  $06^{\circ}00.50W$ . The southerly course was continued towards Stornoway, and PDR records were completed at 1500. The CTD overside pump and PES fish were recovered at 2200 before docking in Stornoway harbour.

Sailing from Stornoway on 4 February was delayed by bad weather until 1600, and the ship anchored in Ardmucknish Bay near Dunstaffnage on the morning of 5 February to transfer scientific equipment and personnel to RRS Challenger. The transfer was completed by 1130 and the ship set sail for Plymouth where scientific equipment was off loaded at Millbay Dock by 1700 on 8 February.

#### MOORINGS AND PRESSURE RECORDERS

Both the bottom mounted medium frequency wave recorder instruments deployed off South Uist were contacted acoustically and put into the release mode. One instrument appeared to release, but did not surface, the other did not release. Both instruments were returned to the command mode when sea conditions became too bad to continue work. Problems may be associated with acoustic transmission effects in very shallow conditions, and with the buoyancy units used in these instruments.

The thermistor chain mooring and the current meter mooring at position G1 were successfully recovered and redeployed. Some corrosion was evident on a link between buoyancy units of the thermistor chain mooring, and on some of the wire of the current meter mooring. The bottom pressure recorder deployed at this position was contacted acoustically, and its position confirmed.



A bottom pressure recorder was deployed at position D1. Only three minutes were spent on this deployment due to a very heavy northerly swell, but good satellite fixes were obtained before and after deployment. The very poor weather and sea conditions prevented the ship reaching any of the other planned mooring positions.

#### CTD MEASUREMENTS

CTD stations and underway surface measurements were made using the Bidston 9040 Grundy equipment. Samples of temperature, pressure, conductivity, and Decca coordinates being recorded on a Rapco data logger every second during a cast and every 3 minutes whilst underway. The overside pump for surface sampling was deployed on 16 January in the Irish Sea, but was brought inboard shortly afterwards when one of the fixing brackets failed. The bracket was repaired when the ship was sheltering in Stornoway, and surface measurements were recorded between leaving Stornoway on 29 January and returning there on 3 February. Six CTD profiles were taken between stations G1 and F1, along the 200 metre contour, before bad weather and sea conditions prevented any further overside work. Calibration samples were taken on each cast using a water bottle clamped above the CTD fish and triggered by a messenger in a well mixed region of the profile.

#### NAVIGATION AND ECHO SOUNDING

Decca navigator chains 3B and OE were used. The moorings to be recovered at position G1 were deployed on RRS Challenger using chain 6C, but these charts were not available on the ship. All mooring positions were fixed by satellite navigation before and after deployment, and a DR position calculated.

The precision depth recorder with overside fish was used at all mooring positions, and records were taken on passages between stations G1 and F1, and on passages across the continental slope.

Table 1

Moorings and pressure recorders

<u>Date/Time</u>	<u>Site</u>	<u>Depth(m)</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Equipment</u>	<u>Operation</u>
19-1-83/2100	SU3	45	57°18.20N	07°38.01W	MFWR	recovery
20-1-83/1300	SU2	45	57°18.39N	07°37.49W	MFWR	recovery
31-1-83/1034	GT1	190	61°29.94N	00°01.50E	Thermistor chain(SS)	recovery
31-1-83/1108	GP1	190	61°30.14N	00°02.09E	Pressure recorder	position
31-1-83/1435	G1	190	61°30.72N	00°02.53E	Current meter(SS)	recovery
31-1-83/1720	G1	190	61°31.12N	00°03.00E	Current meter(SS)	deployment
31-1-83/2012	GT1	190	61°29.58N	00°02.08E	Thermistor chain(SS)	deployment
03-2-83/1443	DP1	200	59°37.80N	06°00.50W	Pressure recorder	deployment

Notes:

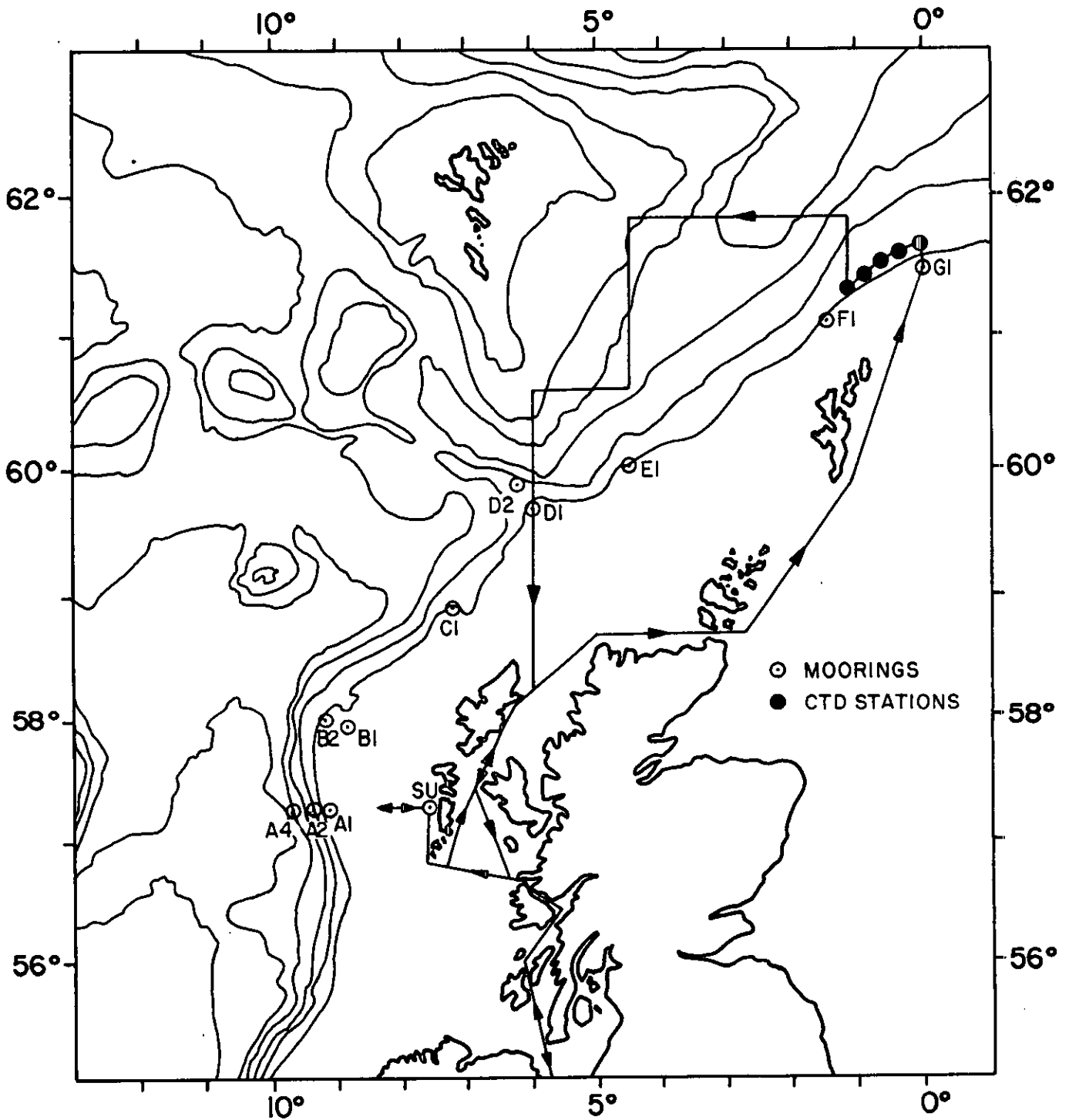
1. MFWR is a bottom mounted medium frequency wave recorder
2. SS is a single strand subsurface mooring
3. The current meter mooring was deployed with Aanderaa meters 5523 (top) and 4968 (bottom), acoustic unit 221C, release 32, and sub-surface buoy 16.
4. The thermistor chain was deployed with a Sea Data logger, Aanderaa chain, acoustic unit 2326, and release 31.
5. The pressure recorder deployed was a bottom mounted Teleost instrument (No.6), with acoustic unit 236, and release 29.

Table 2

CTD Station Positions

<u>Date/Time</u>	<u>Station No.</u>	<u>Water Depth(m)</u>	<u>Latitude</u>	<u>Longitude</u>
31-1-83/1500	CTD18	190	61°31N	00°03E
31-1-83/2142	CTD19	200	61°40N	00°02E
31-1-83/2309	CTD20	200	61°39N	00°22W
01-2-83/0026	CTD21	200	61°37N	00°40W
01-2-83/0146	CTD22	200	61°30N	00°54W
01-2-83/0259	CTD23	200	61°23N	01°07W

FIGURE 1



TRACK CHART FOR RRS FREDERICK RUSSELL CRUISE

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