Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

CRUISE REPORT

S.M.B.A., P.O. Box No. 3, Oban, Argyll, Scotland.

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Cruise Report

R.R.S. CHALLENGER

Challenger Cruise 2/1984

JUNE
23 ~~July~~ - 8 July 1984

R.R.S. CHALLENGER, Cruise 2/1984

Duration: 1235 h 23 June to 0800 h 8 July 1984. All times BST.

Locality: Scottish continental shelf and Rockall Channel, 57°-59°N.

Staff:

D.J. Ellett	(23 June - 6 July)
R. Bowers	(" ")
D.T. Meldrum	(" ")
Dr. J.M. Graham	(" ")
N. MacDougall	(" ")
Miss J. Lennon	(Marine Biology Station, Portaferry)
P. Johnston	(Marine Biology Station, Portaferry)
Miss B. Economides	(Chemistry Dept., Glasgow University)

Aims:

1) To lay three current meter moorings (LE, LF and LG) across the North Channel at the start of the cruise, to recover all three towards the end of the cruise and re-lay LF for recovery by r.v. CLIONE in September.

2) To make CTD transects across the shelf between the Mull of Galloway and the North Minch and to collect surface and sub-surface radiocaesium samples on the transects for analysis by Glasgow University.

3) To collect surface, mid-water and near-bottom radiocaesium samples at ten standard positions between the Sound of Mull and the shelf-edge for the Fisheries Radiobiological Laboratory.

4) To collect nutrient, chlorophyll and phytoplankton production data on the outer shelf and slope areas for the Marine Biology Station, Portaferry.

5) To lay mooring Y in the Tiree Passage.

6) To visit current meter sites F, M, V and W to recover any surviving moorings, and to re-lay F.

7) To search for the Dundee University satellite-interrogated buoy (Kraksat).

8) To work the Anton Dohrn Seamount CTD section if time permits.

Narrative:

CHALLENGER was prepared for sailing from Ardrossan at 0900h 23 June, but was delayed until 1235h awaiting the delivery of carboys from Lowestoft. Course was set in quiet weather for the sites of the moorings off Portpatrick, and the first (LE) was laid at slack water between 1938 and 2011h. Whilst mooring LG was wound onto the winch, stations 1Z-3Z were worked from Donaghadee eastwards, and at the following slack water an attempt was made to lay LG between 0216 and 0312h, 24 June but this was abandoned when the weight of the first anchor caused turns to foul on the winch. Gear was retrieved and the wire payed out over deep water to provide tensioning, and deployment on the next tide between 0737 and 0830h was successful. Stations 6Z-4Z were worked to complete the section at 1320h, and mooring LF was laid at 1354 to 1438h.

Surface samples and two CTD lowerings were taken (Stations 1Y-5Y) en route to the Mull of Kintyre for section A. This was worked between 2211h and 0218h 25 June. Westerly winds of forces 6-7 slowed the passage to the Sound of Jura, and section B was worked between 0703 and 1040h. Winds fell to force 5 during the morning and section D, west of Islay, was worked in conditions of moderating swell during 1505h 25 June to 0434h 26 June. Although course had been set for the Firth of Lorne section (E), at 0840h this was altered in order to take advantage of daylight slack water for the Tiree Passage mooring. Time in hand allowed the working of station 1G in the Sound of Mull, and the collection of mail from RRS FREDERICK RUSSELL, also working in the vicinity. Mooring Y was laid between 1727 and 1740h, and CHALLENGER continued working westwards from station 2G in force 5 south-west to west winds and a moderate swell.

The shelf-edge was reached after the completion of station 16G at 2011h 27 June and stations Q to N of the Anton Dohrn Seamount section were worked. Between 0630 and 0800h 28 June an acoustic search was made for mooring M, but without result. The section was continued with stations M to F. An acoustic search was made for mooring F from 0136 to 0310h 29 June, and again no response was obtained from the release. However, investigations into the poor reception of the precision echo sounder after leaving the mooring vicinity showed that the single element of the transducer used in the two searches was misconnected and that it would therefore be necessary to repeat the searches.

The Anton Dohrn Seamount section was continued with stations E to B, being terminated at the latter at 1149h 29 June. Winds were northwesterly, force 5, but a long swell had slowed progress. The ship returned to the site of mooring F and another box search was made between 1600 and 1730h without locating or releasing the mooring laid in May 1983. A replacement was laid between 1946 and 2053h and the ship steamed for the position of mooring M for a final search. This was made from 0425 to 0542h, 30 June but produced no signs of the mooring laid in August 1983. In quiet weather with force 4 northwesterly winds stations from the shelf-edge towards the Monach Is. (BN9-BN2) were worked between 1050 and 2400h and were followed by a section northwestwards from Loch Resort (1J-8J) at 0520-1554h 1 July.

CHALLENGER next steamed for the mooring positions at the shelf-edge in 59°N. Acoustic and visual searches in fine weather and excellent visibility between 2120h 1 July and 0445h 2 July revealed no trace of moorings, V, W or the Dundee University spar buoy. A section inwards from these positions to the Butt of Lewis (9M-1M) was completed at 1132h, and was followed by stations between Broad Bay and Eddrachillis Bay (6L-1L) during 1434-2015h. In continuing calm, clear weather the section between Loch Gairloch and Loch Seaforth (9K-1K) was worked from 0127-0730h 3 July. An additional set of CTD stations was taken between Loch Boisdale and Loch Moidart (DN1-DN9) at 1310-1934h en route for the Sound of Mull. The Firth of Lorne section was begun at station 5E at 0305h 4 July and completed at station 1E by 0610h, after which the ship steamed for the North Channel via the Sound of Islay. All three moorings were sighted and LF was raised at slack water between 1552 & 1634h, and LG between 2200 & 2306h at the following slack. At this, the deepest mooring in 242 m depth, the sub-surface float was found to have been split in two, only one half of the Balmoral float remaining attached. Wires were wound upon the winches in readiness for re-laying LG and in the interval to the next slack water a repeat section of line Z was commenced by working stations 1Z-4Z. Mooring LG was laid at 0412-0459h 5 July and stations 5Z & 6Z completed by 0650h. The third mooring, LE was raised at 1024-1103h without incident, and in the interval before CHALLENGER was due to berth in Campbeltown two CTD and radiocaesium sections were worked in the Irish Sea, P1-5 from Wigton Bay to the Point of Ayre, and P6-10 from Jurby to Luce Bay, these being completed at 2258h, when courses were set for Campbeltown, the weather continuing fine and hazy with occasional freshening winds resulting from land breezes.

CHALLENGER moored alongside at Campbeltown at 0859h 6 July and after offloading Oban staff and gear sailed for Falmouth at 1130h. Six radiocaesium surface samples were collected en route between the Calf of Man and Anglesey, and after a fine passage the ship berthed in Falmouth at 0800h 8 July.

Results:

Aim 1)

Details of the three MAFF/SMBA moorings laid in the North Channel between 23 June and 4-5 July are included in Table 1. Moorings LE & LF performed satisfactorily and appear to have produced valid data, but examination of the data from LG shows that the sub-surface float collapsed immediately after deployment. The mooring was re-deployed with a MAFF metal sub-surface float on 5 July for retrieval by r.v. CLIONE in September.

Aim 2)

A summary of the CTD sections and the sampling thereon is given in Table 2, and their positions are shown in Figure 1. The fine weather allowed the full set of stations to be worked, together with three additional sections and a repeat of the section across the North Channel in the vicinity of the moorings. The latter is of interest in relation to possible future use of the Beaufort Dyke as a dumping site, as it shows that changes had taken place throughout the water column during the ten days separating the two sections (Figure 2).

Aim 3)

Surface, mid-water and near-bottom samples were collected for the Fisheries Radiobiological Laboratory during 26-27 June at the eight easternmost standard positions west of the Sound of Mull, and at surface and near-bottom at the two western stations, where 50 l samples were collected, the remainder being of 25 l.

Surface samples were also collected for MAFF between the Isle of Man and Luce Bay at CTD stations P6 to 10 on 5 July, with a near-bottom sample from station P9.

Aim 4)

Extensive sampling was again carried out for the Portaferry programme. At each CTD station on the D, G and BN sections a fluorometer lowering was made, water bottle samples were collected at five depths for NH_3, SiO_4, NO_3 and O_2 determination, and phytoplankton samples were preserved from three depths. Surface chlorophyll was continuously measured along the ship's track. Algal growth experiments were made over periods of 4 days at four locations on the shelf to investigate response to nutrient additions; daily sampling monitored changes in chlorophyll, phytoplankton, NH_3, NO_2 and SiO_4 during the experiments. C^{14} carbonate uptake experiments were made at 16 locations in the Minches, the N. Channel and the outer shelf using a range of light intensities and 3-hour incubations. Fluorometer lowerings were made on the E, K, L, P & Z sections.

Aim 5)

Mooring Y, in the Tiree Passage, was laid between 1727 and 1740h 26 June.

Aim 6)

None of the deep moorings laid during spring and summer 1983 were located, the long servicing interval having been dictated by the November 1983 breakdown of CHALLENGER. Two searches were made for F(both on 29 June) and M(28 & 30 June), and others for V(1 July) and W(2 July). Fishing was taking place by Norwegian vessels in the vicinity of the two latter sites, and it was found subsequent to the cruise that a sub-surface buoy and two current meters landed in the Spring at Egersund were from mooring W, set in 515 m depth. Mooring F was redeployed between 1946 and 2053h 29 June.

Aim 7)

No trace was found of the Dundee University satellite-interrogated buoy, laid on 21 August 1983 in the vicinity of moorings V and W, despite a search between 0350 and 0445h, 2 July.

Aim 8)

The Anton Dohrn Seamount section was worked from the shelf edge to Rockall Bank (stations B to T) during 1254h 27 June - 1149h 29 June.

Miscellaneous

Plankton samples were collected and frozen at five offshore stations for Miss Sandra Muirhead, Dept. of Zoology, Glasgow University for investigations of pesticides affecting seabirds.

Table 1. Moorings deployed during RRS CHALLENGER Cruise 2/1984

Mooring	Depth m.	Lat. N. o '	Long. W o '	Dates deployed 1984	No. of current meters	Remarks
LE	135	54 44.9	05 08.1	23 June-5 July	2	Surface toroid.
LG	242	54 42.3	05 13.0	24 June-4 July	2	Surface toroid.
LF	147	54 43.9	05 11.0	24 June-4 July	2	Surface toroid.
Y	47	56 37.3	06 23.8	6 June-	1	Surface spar. For recovery in Nov. 1984.
F	1810	57 30.6	12 13.3	29 June-	4	Sub-surface. For recovery in Nov. 1984.
LG	248	54 42.4	05 13.0	5 July-	2	Surface toroid. For recovery in Aug. 1984.

Lowestoft Woodhead Sea-bed Drifters numbers 38950-38999 released at mooring LE

" 38850-38899 " " " LG

" 38900-38949 " " " LF

Table 2. Sections worked during RRS CHALLENGER Cruise 2/1984

Stations	Location	Dates	Observations
1Z-6Z	Copeland - Portpatrick	23-24 June	CTD, Surface Cs; Sub-surface Cs(2 & 4), Fluorometer, O_2.
1Z-6Z	" "	5 July	CTD, Fluorometer.
1Y-5Y	Corsewall-Kintyre	24 June	CTD (2 & 4), Surface Cs; Sub-surface Cs(2 & 4)
1A-5A	Antrim-Kintyre	24-25 June	CTD, Surface Cs; Sub-surface Cs (2 & 4).
1B-5B	Gigha-Islay	25 June	CTD, Surface Cs; Sub-surface Cs(2 & 4).
0D-8D	West from Islay	25-26 June	CTD, Surface Cs; Sub-surface Cs (2, 4 & 7) Fluorometer, Nutrients, Phytoplankton, O_2.
1E-5E	Firth of Lorne	4 July	CTD, Surface Cs; Sub-surface Cs(3); Fluorometer.
1G-16G	Sound of Mull - shelf edge	26-27 June	Surface s^o/oo; CTD, surface Cs, sub-surface Cs, Fluorometer, nutrients, phytoplankton & O_2 (1,2,4,6,7,9,11,13,15 & 16); Zooplankton (1,2,7,9,11,15).
BN2-BN9	St. Kilda shelf	30 June	CTD, Fluorometer, nutrients, phytoplankton, O_2, Zooplankton (9,5,2).
1J-8J	Loch Resort - shelf edge	1 July	CTD; Surface Cs(1,2,4-6,8); Sub-surface Cs(2).
1K-9K	Loch Seaforth - Loch Gairloch	3 July	CTD, Fluorometer; Surface Cs (1-4,6,8); Sub-surface Cs(2).
1L-6L	Broad Bay - Eddrachillis Bay	2 July	CTD, Fluorometer.
1M-9M	NW from Butt of Lewis	1-2 July	CTD.
DN1-DN9	Loch Boisdale-Loch Bracadale	3 July	CTD.
P1-P5	Wigton Bay - Point of Ayre	5 July	CTD, Fluorometer, Surface Cs; Sub-surface Cs (2,4)
P6-P10	Jurby - Luce Bay	5 July	CTD, Fluorometer, Surface Cs; Sub-surface Cs (9)
V1-V6	Calf of Man - Anglesey	6 July	Surface Cs.
B-T	Anton Dohrn Seamount Section	27-29 June	CTD; Fluorometer, nutrients, O_2, phytoplankton (M,N,O,P,Q).

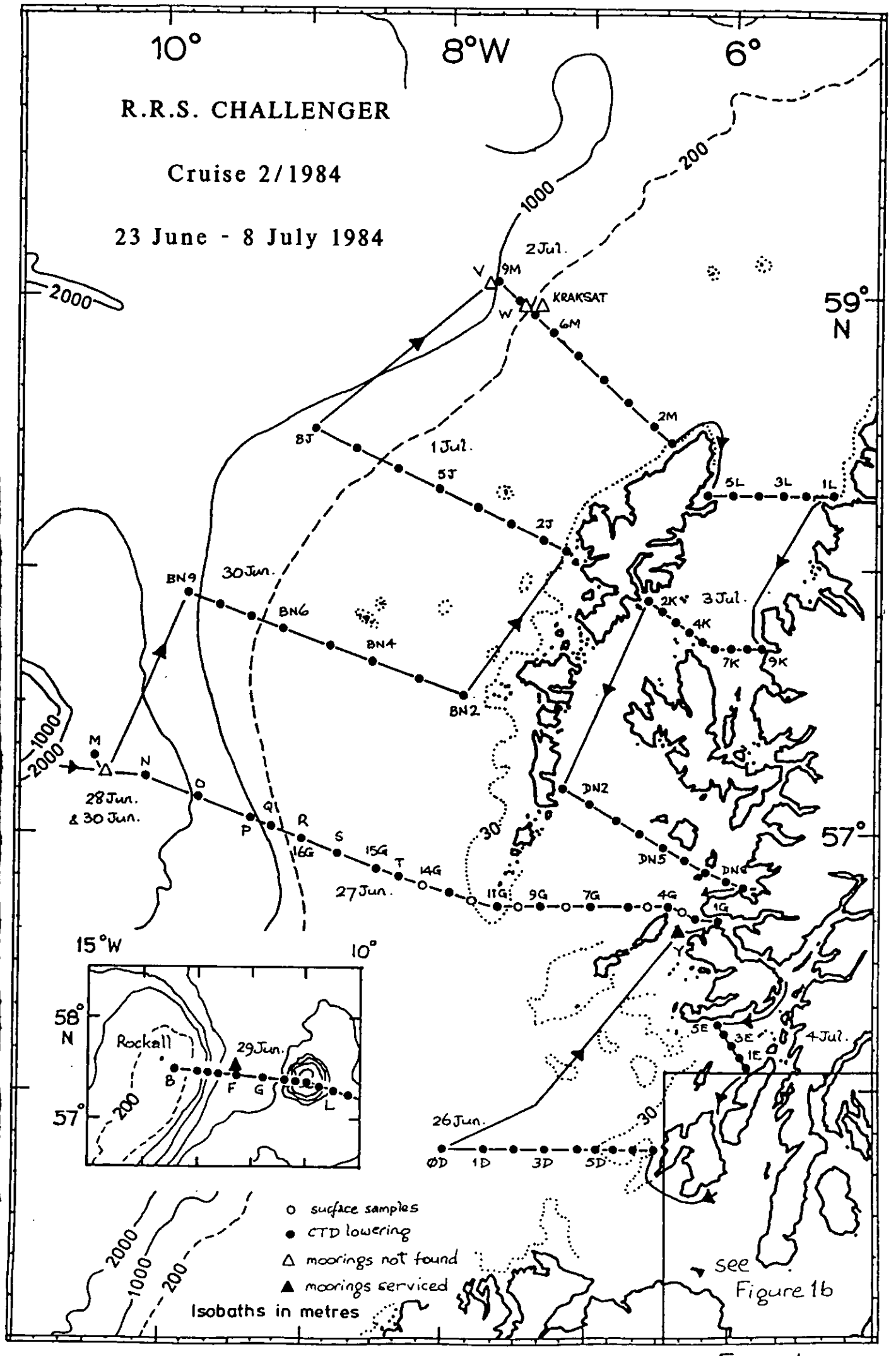

10°
8°W
6°
R.R.S. CHALLENGER
Cruise 2/1984
23 June - 8 July 1984
59° N
57°
2000
1000
200
30
2Jul.
V
9M
W
KRAKSAT
6M
2M
8J
1Jul.
5J
2J
5L
3L
1L
BN9
30Jun.
BN6
BN4
BN2
2K
3Jul.
4K
7K
9K
M
N
O
28Jun.
& 30Jun.
P
Q
R
S
16G
15G
T
14G
27Jun.
11G
9G
7G
4G
1G
DN2
DN5
DN8
Y
5E
3E
1E
4Jul.
26Jun.
ØD
1D
3D
5D
15°W
10°
58° N
57°
Rockall
29Jun.
B
F
G
L
o surface samples
• CTD lowering
△ moorings not found
▲ moorings serviced
Isobaths in metres
see Figure 1b

Figure 1a

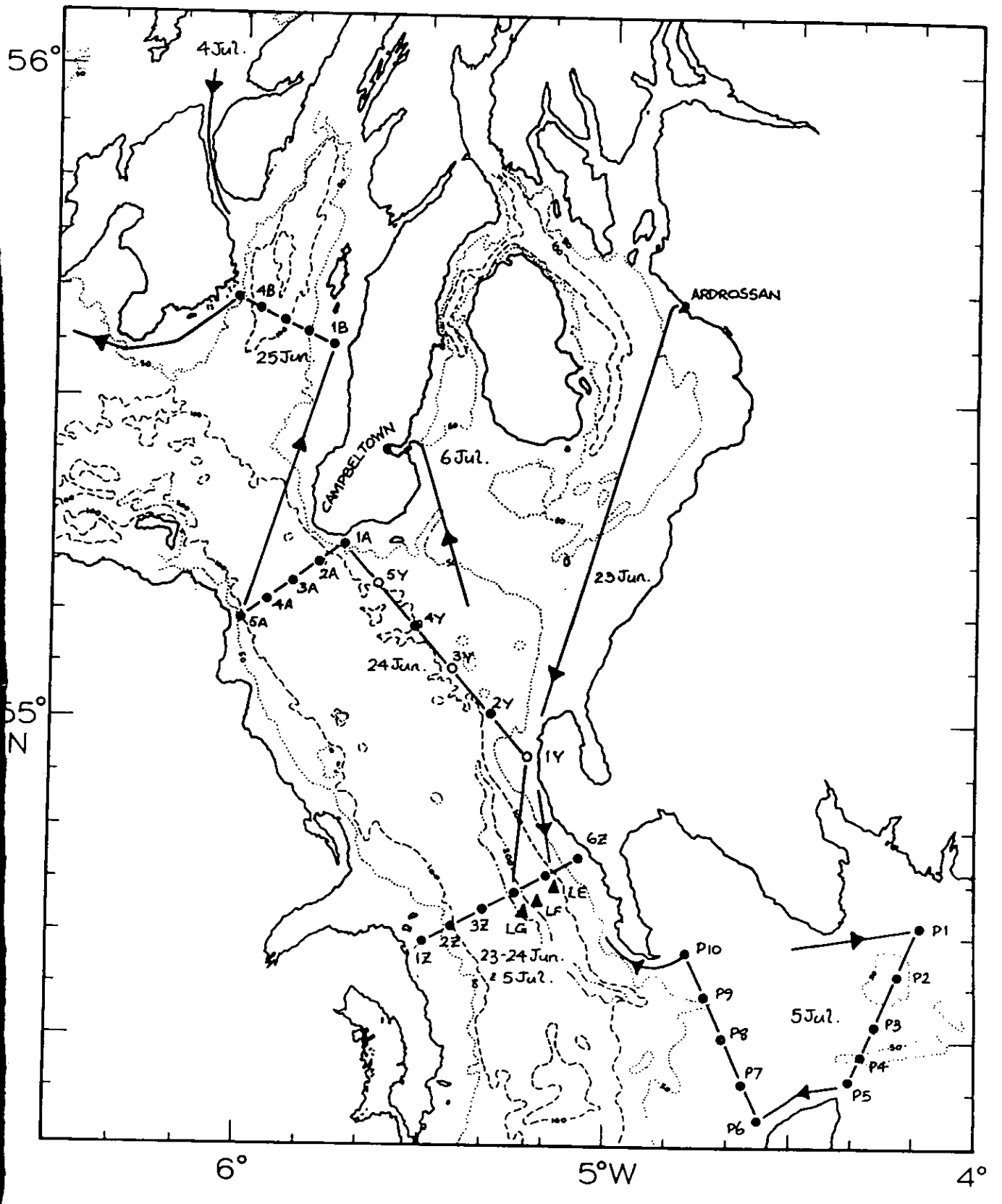
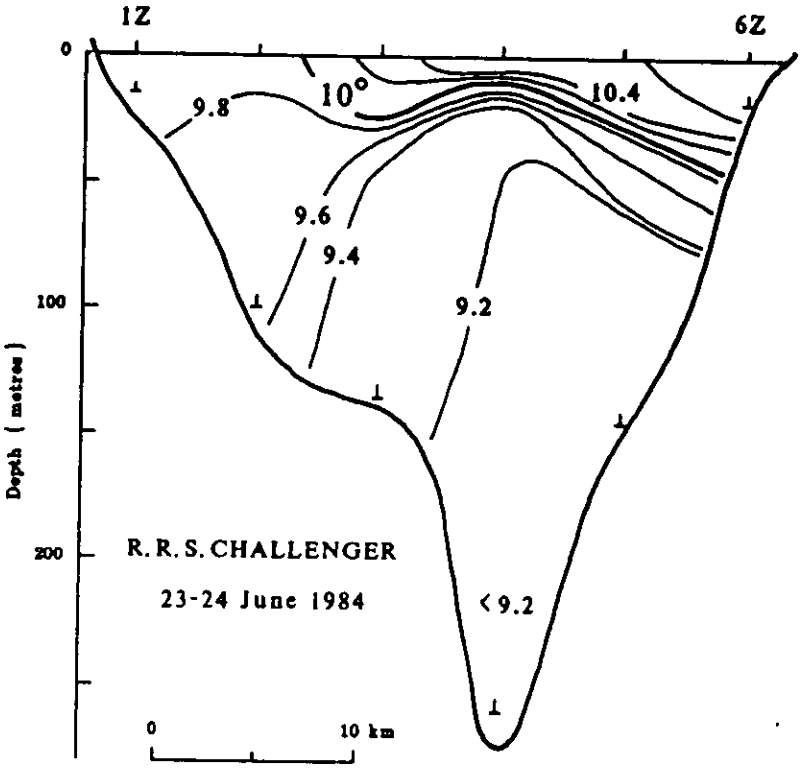

56°
55°
N
6°
5°W
4°
4Jul.
4B
1B
25Jun.
ARDROSSAN
CAMPBELTOWN
6Jul.
1A
2A
3A
4A
5A
5Y
4Y
3Y
2Y
1Y
24Jun.
25Jun.
6Z
LE
LF
LG
3Z
2Z
1Z
23-24Jun.
& 5Jul.
P10
P9
P8
P7
P6
P5
P4
P3
P2
P1
5Jul.

Figure 1b


1Z
6Z
0
100
200
Depth (metres)
9.8
10°
10.4
9.6
9.4
9.2
< 9.2
R.R.S. CHALLENGER
23-24 June 1984
0
10 km

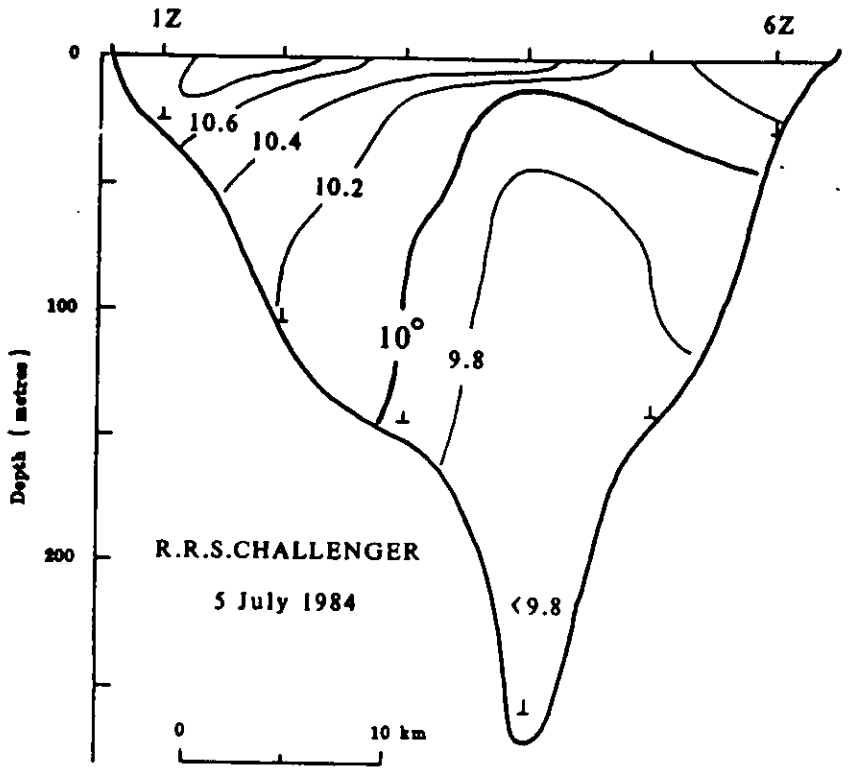

1Z
6Z
0
100
200
Depth (metres)
10.6
10.4
10.2
10°
9.8
< 9.8
R.R.S.CHALLENGER
5 July 1984
0
10 km

Figure 2