

I.O.S.

**R R S SHACKLETON
CRUISE 2/75 LEG 1**

19 FEBRUARY – 5 MARCH 1975

**CURRENT METER MOORINGS AND HYDROGRAPHIC
SECTION BETWEEN MADAGASCAR AND SEYCHELLES**

CRUISE REPORT NO 29

1975

**NATURAL ENVIRONMENT
INSTITUTE OF OCEANOGRAPHIC
SCIENCES
RESEARCH COUNCIL**

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Cruise Report No. 29
1975

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Introduction

This cruise originated from a proposal made in August 1973, to use an unallocated period of passage planned for the 'Shackleton' in July-August 1975 between Djibouti and Durban. It was proposed to work some hydrographic sections across the Somali current in that period, as a contribution to pilot studies of the Arabian Sea in advance of the First GARP Global Experiment. As a supplement to that, two days of ship-time were requested on an earlier cruise, in March-April 1975, which would allow two current meter moorings to be set along the equator, to be recovered during the July-August cruise. Three major changes in plans occurred, however, before the beginning of the cruise. First, it became clear from the JASIN 1972 data and some WHOI observations that we do not know how to calculate accurately the drag on a subsurface mooring in a strong current, and so it seemed inadvisable to try to set such moorings in the equatorial under-current. A feasible and useful alternative would be to place them in the south equatorial current between Seychelles and Madagascar. Next, the ship's schedule was rearranged, with the original March-April cruise omitted, and the period 24 February-4 March was allocated solely for IOS use, between Mauritius and Seychelles. Then, because of storm damage at Mauritius, the ship was diverted to Durban, and the cruise had to be lengthened to provide for the extra distance on passage. The itinerary became

Leave Durban	19 February 1975
Arrive Seychelles	5 March 1975

List of scientific participants

D.I. Gaunt	I.O.S. Wormley
M.J. Harris	" "
S. Jones	I.O.S. Barry
J. Price	" "
J.C. Swallow (Pr. Sci.)	I.O.S. Wormley

Narrative

'Shackleton' left Durban at 1815Z on 19 February 1975. A course towards the first planned station position off the northern end of Madagascar was chosen via the central part of the Mozambique channel, in the hope of avoiding unfavourable currents and giving more opportunity for testing acoustic equipment in deep water. During the 8 days passage, mooring wires and lines were wound on to the main winch, and these were paid out for metering and tensioning combined with testing acoustic releases and command pingers for the current meter moorings. Soundings were recorded on passage, and the EM log was recorded manually so that surface currents could be estimated using satellite fixes. The total time occupied in wire tests was 11½ hours. Four hours were spent hove to in a small cyclone on 23 February. Apart from that, the passage was uneventful.

A hydrographic section was started early in the morning of 28 February, from off Cape Amber, Madagascar, towards the Seychelles Bank, across the south equatorial current. As usual,

the current was strongest (2.4 kts) near Madagascar. The first current meter mooring was set on 1st March, after a site survey the previous night. The hydrographic section was continued, with a gap whilst passing Farquhar Island and Providence Reef, and after 5 hrs bathymetric survey of part of the Amirante Trench the second mooring was set there on 3 March.

With approximately 12 hours in hand, towed hydrophones were tested, the EM log was compared with a direct-reading current meter at speeds up to 3 kts (less than 0.1 kt difference) and the bathymetric survey of the Amirante Trench was extended northwards before occupying the final hydrographic station on 4 March. On the way in towards Mahe over the southern part of the Seychelles Bank, six sediment samples were collected. 'Shackleton' arrived at Port Victoria, Mahe in the forenoon of 5 March 1975.

Mooring work

The purpose of these current meter moorings was to monitor the south equatorial current through the change from northeast to southwest monsoon. The position and depth of the first one was a compromise between having a significant current to measure and not exposing the mooring to excessive drag. The second one was placed in the Amirante Trench, so that any deep flow between the Somali and Mascarene basins could be observed at the same time as the near-surface measurements. Three current meters had been intended for the second mooring, but one was found to be faulty, the clock not triggering the recording cycle although it appeared to be running, and so the uppermost meter was omitted. Both moorings were laid buoy first, the wire and line being paid out over the A frame sheave from the main winch, with the vessel going slowly astern. The weather was good and no difficulties occurred during the mooring operations. Details of the moorings are given in Table 2.

Hydrographic work

After one practice station (1253) to check the water bottles, combined with one of the acoustic tests, a section of 11 stations was occupied between Madagascar and the Seychelles Bank (see Fig. 2). Each station consisted of a single cast of 11 water bottles to 1200 m plus an XBT. Salinities were measured on an Autolab salinometer. The first station of the section (1254) was reoccupied (1256) because of doubts about a possible hang-up; a messenger-operated pinger was devised and used from the second station onwards, at the bottom of each cast, to remove any further doubts. Station positions and times are given in Table 1.

Grab sampling

At the request of Dr Braithwaite, Department of Geology, University of Dundee, samples of sediment were collected using a Shipek grab at six stations on the Seychelles Bank to the south of Mahe. The samples were left on board in a freezer.

Table 1. Station List

No.	Date	Time (GMT)	Lat. S	Long. E	Gear	Remarks
1253	26.2	1630	14°11.4'	44°59.2'	WB,XBT	+ acoustic tests
1254	28.2	0257	11°41.8'	49°10.8'	"	
1255		0756	11°21.8'	49°40.5'	"	
1256		1227	11°42.3'	49°11.6'	"	repeat 1254
1257	1.3	0152	11°00.6'	50°13.9'	"	
		0751	10°56.3'	50°14.9'	"	mooring 188
1258		1252	10°37.8'	50°25.5'	"	
1259		1758	10°20.3'	50°53.1'	"	
1260	2.3	0347	9°13.4'	51°30.8'	"	
1261		0839	8°53.0'	51°40.7'	"	
1262		1330	8°22.6'	51°55.0'	"	
1263		1754	7°55.1'	52°11.1'	"	
1264	3.3	0219	7°27.7'	52°25.3'	"	
		0755	7°29.6'	52°25.2'	"	mooring 189
1265	4.3	0318	6°44.7'	52°50.9'	"	
1266		2128	5°06.2'	55°18.2'	Grab	depth 40 m
1267		2208	5°01.9'	55°17.7'	"	depth 59 m
1268		2254	4°55.0'	55°17.9'	"	depth 67 m
1269		2337	4°48.3'	55°17.6'	"	depth 73 m
1270	5.3	0043	4°56.6'	55°14.4'	"	depth 71 m
1271		0148	4°48.0'	55°14.2'	"	depth 66 m

Notes: 'Time' means time of release of messenger, or time of submergence of mooring, or time grab struck bottom.
 WB = water bottles. XBT = expendable bathythermograph.

Table 2. Moorings

I.O.S. mooring 188 (Shackleton Stn 1257)

<u>Item</u>	<u>Depth (m)</u>	<u>Remarks</u>
Subsurface float	196	4 ft. dia. sphere
Aanderaa C.M. No 280	208	also recording pressure
Aanderaa C.M. No 468	513	
Anchor	3094	1 ton scrap chain

I.O.S. mooring 189 (Shackleton Stn 1264)

<u>Item</u>	<u>Depth (m)</u>	<u>Remarks</u>
Subsurface float	280	4 ft. dia. sphere
Aanderaa C.M. No 219	583	
Aanderaa C.M. No 469	3982	
Anchor	5108	1 ton scrap chain

Notes: In both moorings, 8 mm and 6 mm Kilindo wire used for upper 2000 m, polypropylene multiplait line below that.
All current meters sampling every 30 mins.

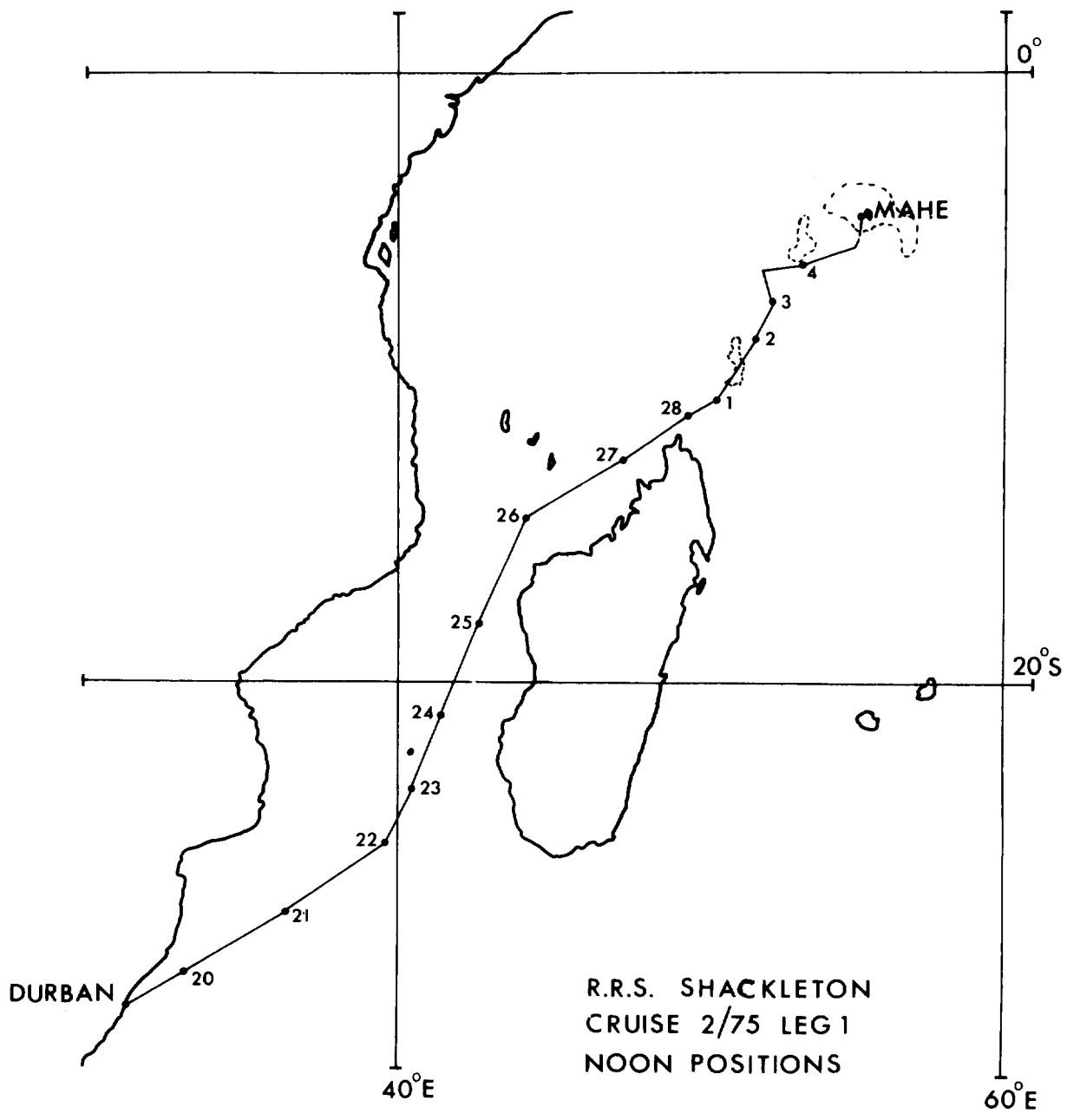


FIG. 1

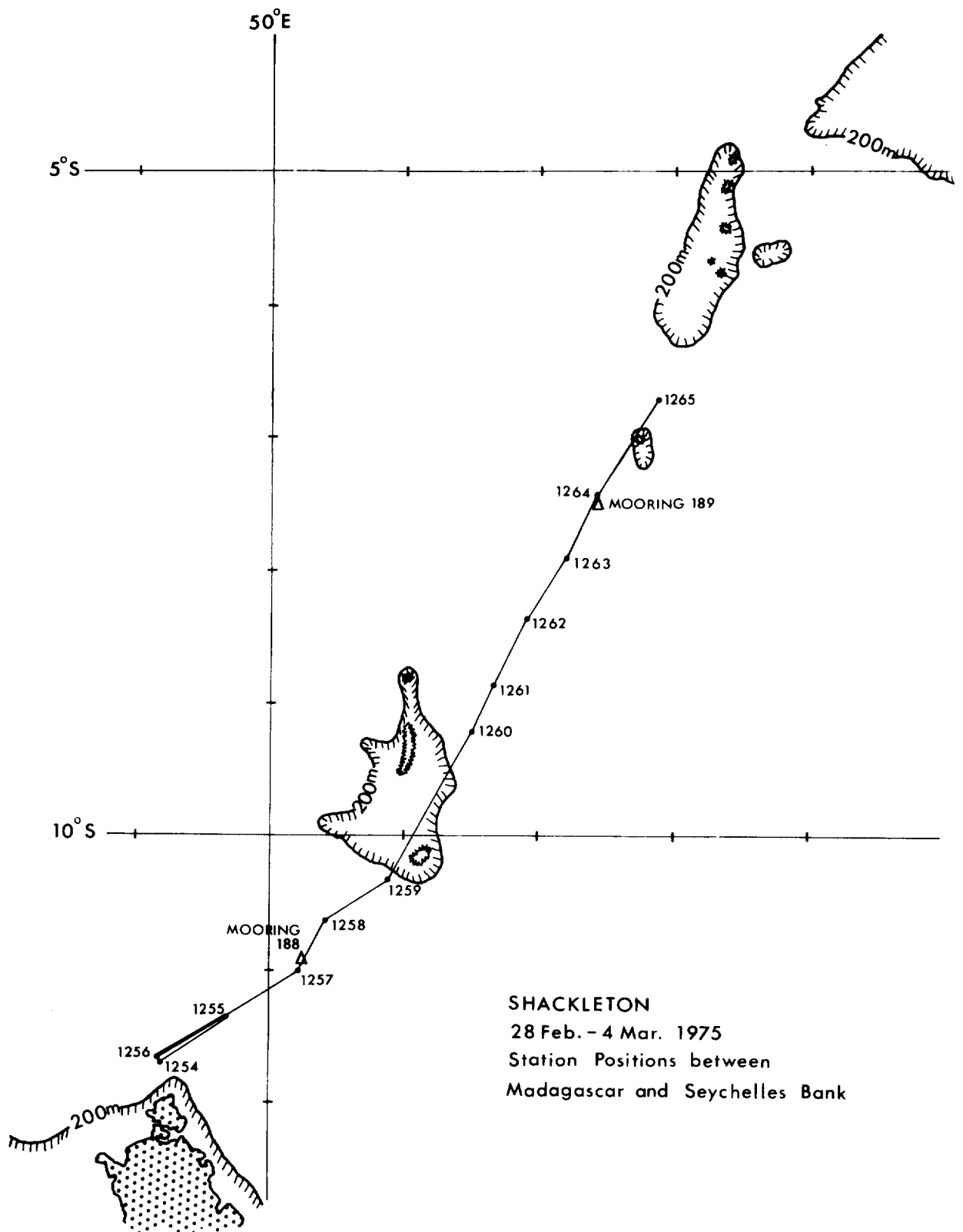


FIG. 2

CRUISE REPORTS

CRUISE No. and/or DATE REPORT No.

R.R.S. "DISCOVERY"

1	(International)	Published and
2	(Indian Ocean)	distributed by the
3	(Expedition)	Royal Society

NIO CR¹

4	February – March 1965	4
37	November – December 1970	37
38	January – April 1971	41
39	April – June 1971	40
40	June – July 1971	48
41	August – September 1971	45
42	September 1971	49
43	October – November 1971	47
44	December 1971	46
45	February – April 1972	50
46	April – May 1972	55
47	June – July 1972	52
48	July – August 1972	53
49	August – October 1972	57
50	October 1972	56
51	November – December 1972	54
52	February – March 1973	59
53	April – June 1973	58

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54	June – August 1973	2
55	September – October 1973	5
56	October – November 1973	4
57	November – December 1973	6
58	December 1973	4
59	February 1974	14
60	February – March 1974	8
61	March – May 1974	10
62	May – June 1974	11
63	June – July 1974	12
64	July – August 1974	13
65	August 1974	17
66	August – September 1974	20
68	November – December 1974	16

¹ NIO CR National Institute of Oceanography, Cruise Report.

² IOS CR Institute of Oceanographic Sciences, Cruise Report.