

WHP Ref. No.: AR4E/AR4W/AR15
Last updated: 15 December 1994

Cruise report
Meteor cruise 27, leg 3

A. Cruise narrative

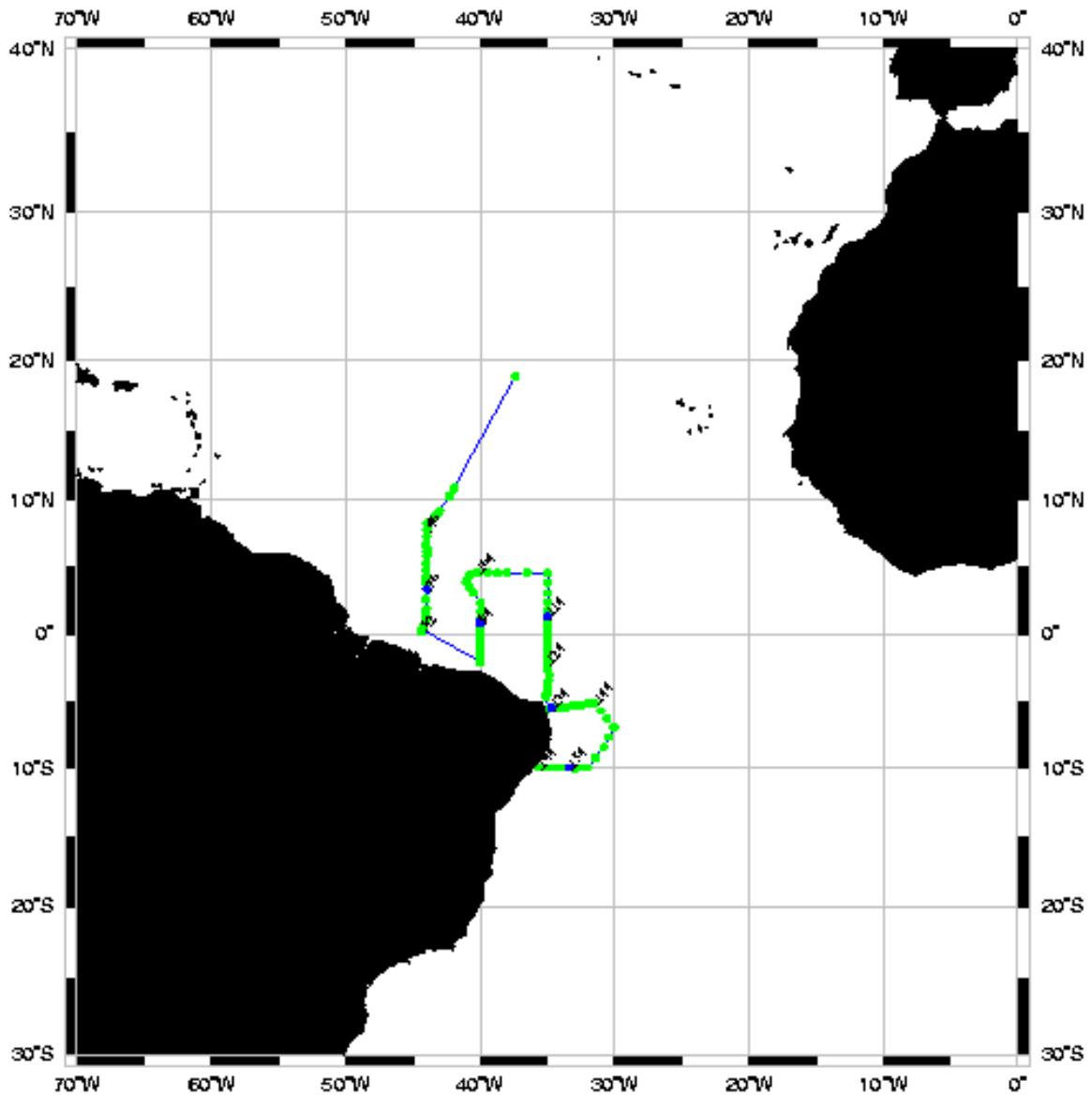
A.1. Highlights

- a. WOCE designation: AR4E, AR4W, and AR15
- b. Expedition designation: 06MT27/3
- c. Chief scientist: Prof. Dr. F. Schott
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- d. Ship: R/V Meteor
- e. Ports of call: Ponta Delgada, Azores to Recife, Brazil
- f. Cruise dates: February 19 to March 26, 1994

A.2. Cruise Summary Information

- a. Geographic boundaries: Stations were taken along AR4W (46°W) from the equator to 11°N and AR4E (35°W) from 5°S to 4°30'N. Additional stations were taken in the AR15 area within the area 10°S to 11°N and 30°W to 44°W. A track chart is available from the WHPO.
- b. Stations occupied: A total of 110 CTD/rosette stations were occupied during the cruise. Of these, 24 stations were done along AR4W, 16 were done along AR4E, and the remaining 70 were done in the AR15 Deep Basin Experiment - Brazil Basin area. Water sampling on the cruise included measurements of salinity, both by CTD and bottle sample oxygen determinations, CTD temperature. Tracer analysis were made for F-11 and F-12.
- c. Floats and drifters deployed: None reported
- d. Moorings deployed or recovered: An essential objective was to retrieve three moorings along the western boundary near 44°W. Two moorings could be retrieved intact on 4 March and the third one on 5 March.

Station locations for AR04 : SCHOTT



A.3. List of Principal Investigators

Parameter/Instrument	Sampling group	Responsible Investigator
CTD/O2 / Rosette	IfM Kiel	Lothar Stramma
Chlorofluorocarbons	IfM Kiel	Monika Rhein
ADCP	IfM Kiel	Jurgen Fischer
Pegasus	IfM Kiel	Gerd Krahnmann
Salinity	IfM Kiel	Lothar Stramma
Oxygen	IfM Kiel	Monika Rhein
XBTs	IfM Kiel	Lothar Stramma
Mooring recovery	IfM Kiel	Friedrich Schott

A.4. Scientific Programme and Methods

Leg 3 of METEOR cruise 27 focussed on the investigation of the circulation and the water mass exchange in the western tropical Atlantic. This investigation was carried out in the context of the World Ocean Circulation Experiment (WOCE). The cruise was a follow-up study to the investigations carried out during METEOR cruises M 14/2 in October 1990, M 16/3 in May/June 1991 and M 22/2 in November 1992. The western tropical Atlantic plays an important role in the water mass exchange between the northern and the southern hemispheres. The meridional heat transport takes place by warm surface waters and subpolar intermediate waters from the southern hemisphere moving northward in the upper 1000 m, and North Atlantic Deep Water (NADW) moving southward between 1200 and 4000 m. The details of this water mass exchange across the equator and the seasonal changes of the flow field are not well understood, and were the main subject of this cruise.

Due to some repairs in Lisbon, METEOR departed one day behind schedule out of Ponta Delgada, on 19 February 1994 16:00 local time. In the morning of 24 Feb., a test station was operated where CTD and the lowered ADCP (LADCP) were found to operate satisfactorily. During the crossing of the Vema Fracture Zone, three deep stations with CTD/LADCP were run across the channel (see Figure). During 27-28 February a deep section from the Mid-Atlantic Ridge (MAR) to the Ceara Rise across the Guiana Basin was carried out to measure the deep boundary current there and possibly recirculation west of the MAR.

An essential objective was to retrieve three moorings along the western boundary near 44°W. Two moorings could be retrieved intact on 4 March and the third one on 5 March. In between mooring work, CTD/LADCP stations were continued and on Saturday, 5 March, the 44°W section was completed. The work on the 40°W section began on 7 March.

At the northern end of that section, a northwesterly leg was attached to connect with the southeastern flank of the Ceara Rise and cut across the deep boundary flow there. On 13 March the 35°W section was begun at 4°30'N with shallow (to 2200m) stations over the

MAR, southward to 10°N. All 8 Pegasus transponder pairs along 35°W, deployed in fall 1990 and spring 1991, were still operational, and good profiles were obtained at those stations. On 18 March, measurements in the boundary currents off Natal near 5°40'S were begun. The connection from the 5°S to the 10°S sections was occupied by 6 deep stations. The southward leg was terminated in the morning of 23 March, and the work at the last section, along 10°S, began. The last CTD station was made on March 25, and the ship arrived in Recife in the morning of March 26, 1994, where the cruise M27/3 ended.

A.5. Major Problems and Goals Not Achieved None reported.

A.6. Other Incidents of Note None reported.

Cruise Plan

Line AR4E 35°W - 2°N to Brazil

Logistical requirements:

Length (nm): 420

Small Volume Stations: 15

Repeats/Yr: 4x No. of Yrs: 1

Program constraints: Once each season with 30 nm station spacing.

Operator: GERMANY

Chief scientist: Schott/IfMK

Ship: METEOR (POST-7/64) Cruise/leg: 06MT27/3

Cruise date: Feb. 19-Mar. 26 1994

Cruise plan received: March 93

Cruise report received: Nov. 94

ADCP: Fischer/IfMK

CTD: Stramma/IfMK

Chlorofluorocarbons-all types: Rhein/IfMK

Moorings - any type: Schott/IfMK

Oxygen: Rhein/IfMK

Pegasus instrument: Krahnmann/IfMK

Salinity: Stramma/IfMK

XBT: Stramma/IfMK

Notes: Divided into E and W and relocated at CP1-4.