

Appendix B Sample Cruise Plan

The WHPO would like to obtain at least a *preliminary* version of the cruise plan one year before the proposed cruise. Preliminary cruise plans are required in order to coordinate the overall activities of the WOCE Hydrographic Programme and notify the WOCE community of your plans. Cruise plans are posted on OCEANIC and widely used by the WOCE and JGOFS community.

Experience to date suggests that the final plans for a cruise will be made from three (3) to six (6) months before the actual departure. When the cruise plans are relatively final, the WHPO would very much appreciate an updated cruise plan. Updates are welcome at any time, however.

The example cruise plan presented here is not definitive and the requirements of your cruise may dictate a format that differs in detail from the one used here. Naturally, cruise plans for one-time sections will probably need to be more extensive and detailed than those for repeat hydrography cruises.

If a repeat section is being done more than once a year by the same group, a single cruise plan for the year is adequate with updates as needed if plans change. For time series stations a cruise plan is requested as the station is begun, with occasional updates as plans change over the years.

Whatever differences from our example your particular plans may dictate, we ask that you follow the basic outline presented Section 3.1 and that all the requested information be included when known. If required information is unavailable at the time the preliminary cruise plan is submitted please indicate that and submit the updated information when it becomes available. It is also helpful to know the funding status for the various measurements planned on the cruise.

If help from the WHPO for international cooperation is requested, then the type of assistance needed should be stated in the preliminary cruise plan. The further in advance of the cruise the WHPO is aware of support or coordination problems the more likely it is that we can be of some help.

B.1 Cruise Plan for A10: A Hydrographic section along 30°S

B.1.1 Summary Information

Chief Scientist:	Reiner Onken, Institut für Meereskunde an der Universität Kiel Düsternbrooker Weg 20 W-2300 Kiel, Federal Republic of Germany
Cruise:	METEOR 22, leg 5 (EXPOCODE: 06MT22/5)
Dates:	27 December 1992 to 31 January, 1993
Ship:	F.S. METEOR
Ports of Call:	Rio de Janeiro, Brazil to Cape Town, South Africa

B.1.2 Overview

A zonal hydrographic section (WOCE WHP section A10) is planned along 30°S. The main objective of this cruise is to map the large-scale distribution of temperature, salinity, and chemical constituents of the sea water and to determine heat and water transport rates. As the section through the center of the South Atlantic subtropical gyre is crossing the Brazil Current on the western side and the Benguela Current close to the African continent, the observational programme will be intensified there.

The measurements include approximately 100 small volume stations with sampling from a CTD/O₂/rosette equipped with 24 10-liter Niskin bottles. Sample analyses will include salinity, dissolved oxygen, nutrients, CFCs, and CO₂-related quantities. For direct current measurements, a ship mounted ADCP and XCPs will be used. Horizontal resolution of temperature measurements will be increased by launching XBTs halfway between hydrographic stations. In addition, investigations concerning aerosols and rainwater constituents, as well as marine taxonomy will be conducted during this cruise. The survey starts at the South American continental shelf with high resolution CTD and XCP measurements in the Brazil Current area. Stations will be spaced 20 nm or less apart. In the central part of the section, the distance between CTD stations varies between less than 30 and 50 nm depending on topography. Up to 40 water samples will be provided on every station with high resolution in the thermocline. There will be 28 scientists and technicians and two observers from the coastal states on board.

B.1.3 Scientific Goals

According to the WOCE implementation plan, Core Project 1, A10 is the heat flux section providing information on the flow of heat in and out of the Atlantic Ocean. In the same way, A10 contributes also to estimates of the heat flux in and out of the Southern Ocean (Core Project 2).

For the meridional transport of heat boundary currents play an essential role. Therefore, the observational programme will be intensified in the Brazil and Benguela Current area using different independent methods to determine the flow and temperature field. A closer station

spacing is also required at the flanks of the Mid Atlantic Ridge and other topographic barriers (Rio Grande Rise, Walvis Ridge), where stronger currents guided by topography are expected.

A10 crosses the Vema Channel, which plays an essential role in exchanging deep and bottom water between the Argentine and Brazil Basins. Together with long-term moorings deployed in this passage, A10 is expected to provide information on the flow of water through this gap (Core Project 3).

In addition, A10 will improve our knowledge of the general circulation and the distribution of water masses in the South Atlantic.

B.1.4 Parameters, Contributing Institutions, and Personnel

Details are listed in Table B.1, Table B.2, and Table B.3.

TABLE B.1: Parameters to be measured

Parameter/Instrument	Sampling Group	Principal Investigators
CTD/O ₂ /rosette	IfMK	J. Holfort
ADCP	IfMK	N. Zangenberg
Salinity	IfMK	N. Zangenberg
XBT, XCP	IfMK	J. Holfort R. Onken
F-11, F-12, F-113, CCl ₄	UBT	A. Putzka
³ H, ³ He, ¹⁴ C	UBT	A. Putzka
NO ₃ , PO ₄ , SiO ₄ , O ₂	IfMK	H. Johannsen
TCO ₂ , pCO ₂ , pH, alkalinity	IfMK	B. Schneider K. Johnson
Atmospheric aerosol	UMZ	S. Matthias-Maser
Marine Taxonomy	BAH	C. Zelck

B.1.5 Water Sampling Equipment and Underway Measurements

Details are listed in Table B.4.

B.1.6 Cruise Track and Stations

The proposed track is shown in Figure 1. We plan to spend 35 days at sea. After leaving Rio de Janeiro, the cruise begins immediately with an ADCP section across the Brazil Current (BC) heading for way point A. There, a CTD/rosette test station will be conducted in deep water that will also provide blanks for the CFC determinations. Next, METEOR will steam to point B (Figure 1) and begin another ADCP/XBT section across the BC heading for point C up the shelf. This section will be used for locating the BC core. At point C, METEOR will turn and CTD/XCP stations spaced 20 nm or less depending on the ADCP/XBT results will be performed between points C and D. At point D, METEOR will then head eastward along 30°S up to point E. Station distance will be less than 30 nm over steep topography in the Vema Channel and the Walvis Ridge, around 30 nm at the flanks of the Mid Atlantic Ridge, and

TABLE B.2: Participating institutions

BAH	Taxonomische Arbeitsgruppe der Biologischen Anstalt Helgoland c/o Zoologisches Institut und Museum Martin-Luther-King-Platz 3 W-2000 Hamburg 13 Germany	Telefon: +49-40-4123-5642 Telefax: +49-40-4123-3937
DWD	Deutscher Wetterdienst - Seewetteramt Bernhard-Nocht-Str. 76 W-2000 Hamburg 36 Germany	Telefon: +49-40-31 908813 Telefax: +49-40-31 908803 Telex: 211 291 hadw d
IfMK	Institut für Meereskunde an der Universität Kiel Düsternbrooker Weg 20 W-2300 Kiel 1 Germany	Telefon: +49-431-5970 Telefax: +49-431-56 58 76 Telex: 17 431 793 ifmkiel ttxt d
SFRI	Sea Fisheries Research Institute Private Bag X2 Rogge Bay 8012 Cape Town, Republic of South Africa	Telefon: +21-253900 Telefax: +21-252920
UBT	Universität Bremen Fachbereich Tracer Oceanographie Postfach 33 04 40 W-2800 Bremen 33, Germany	Telefon: +49-421-218-3503 Telefax: +49-421-218-3601 Telex: 245 811
UMZ	Institut für Physik der Atmosphäre Johannes-Gutenberg-Universität Saarstr. 21 W-6500 Mainz 1, Germany	Telefon: +49-6131-39 2283 Telefax: +49-6131-39 3532

between 30 and 50 nm in the Brazil, Angola, and Cape Basins. After reaching point E, METEOR will head for F, where another high resolution survey of the Benguela current is planned using CTD, XCP, XBT, and ADCP. Station work will be finished at point F (Figure 1).

B.1.7 Logistics (addresses, communication links, and agents)

The planned cruise is the fifth and final leg of METEOR cruise 22 starting in Hamburg on September 22. During legs 1-4, METEOR will call at Recife twice, Santos, and Rio de Janeiro. Further details concerning these legs as well as deck, laboratory, and berthing layout, details of the ship's navigation and communication equipment, winches, etc. can be obtained from the WHPO, METEOR-Leitstelle, or the chief scientist (cf. Table B.5). Ship's agents and communication links can be found in the same table.

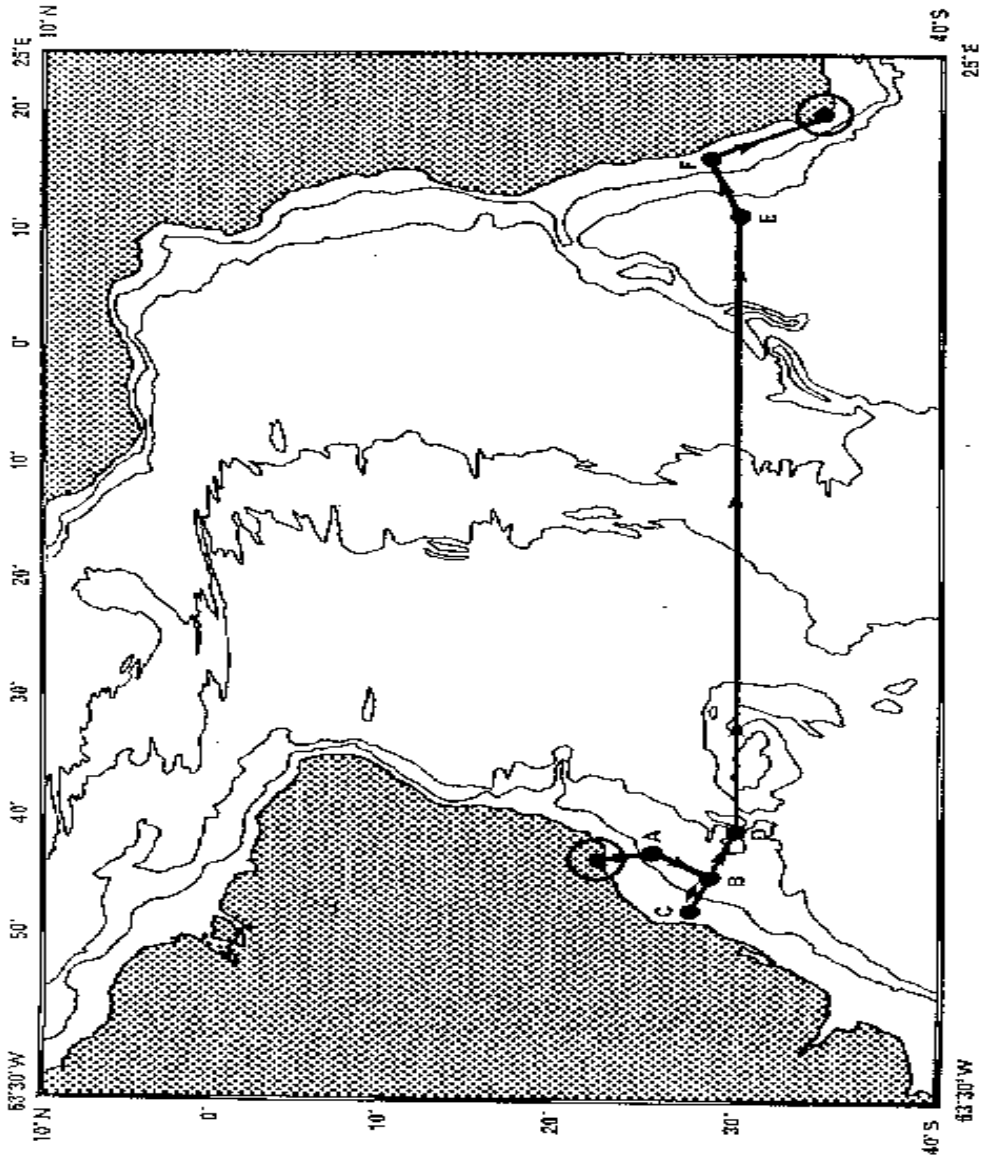


Fig. 1: Cruise track METEOR 22/5

TABLE B.3: Cruise participants

<u>Meteorology</u>		
Bassek	Dieter	DWD
Röd	Erhard	DWD
<u>Physical Oceanography</u>		
Beckmann	Uwe	IfMK
Duncombe Rae	Chris	SFRI
Erasmi	Wolfgang	IfMK
Girod	Ilona	IfMK
Holfort	Jürgen	IfMK
Koy	Uwe	IfMK
Meyer	Peter	IfMK
Onken **	Reiner	IfMK
Welter	Alexander	IfMK
Zangenberg	Norbert	IfMK
<u>Marine Chemistry</u>		
Johannsen	Hergen	IfMK
Johnson	Kenneth	IfMK
Karbach	Ute	IfMK
Korves	Annette	IfMK
Mintrop	Ludger	IfMK
Morak	Anja	IfMK
Morlang	Jürgen	IfMK
Schneider *	Bernd	IfMK
<u>Tracers</u>		
Bulsiewicz	Klaus	UBT
Fraas	Gerd	UBT
Putzka*	Alfred	UBT
Weyland	Joachim	UBT
<u>Atmospheric Physics</u>		
Brinkmann	Jutta	UMZ
Krämer	Martina	UMZ
Matthias-Maser *	Sabine	UMZ
<u>Marine Taxonomy</u>		
Zelck *	Clementine	BAH
Observer — Brazil		
Observer — Namibia		
* responsible for specific group		
** chief scientist, also responsible for specific group		

TABLE B.4: Sampling equipment and analyses methods

Small-Volume Sampling	Two 24-place rosettes with 10-liter bottles
CTD System	2 EG&G Mark III with O ₂ sensors 1 EG&G Mark V with O ₂ sensor
Salinometer	2 Guildline Autosals 60 ampoules of IAPSO Standard Seawater
XBT	100 probes T5-special (1100 m) controller by IfM Kiel
XCTD	25 probes Sippican MK- 10 interface
Underway sampling	150 kHz RDI ADCP thermosalinograph
Nutrients	Autoanalysers by IfM Kiel
Oxygen	Winkler method, semiautomatic, visual end point
Carbon dioxide partial pressure	Equilibrator/IR-spectrometer
Total carbonate C _T	Coulometric titration
Alkalinity A _T	Potentiometric alkalinity titration
CFCs	Gas chromatography
Radioactive tracers	Samples only. No on board analyses.

TABLE B.5: Addresses, communication links, and agents

Ship's Operator:	Leitstelle METEOR Institut für Meereskunde der Universität Hamburg Tropfowitzstr. 7 W-2000 Hamburg 54 Germany	Telefon: +49-40-4123-39 74 Telefax: +49-40-4123-46 44 Telex: 21 25 86 ifmhh d Telemail: IFM.HAMBURG/ Omnet
Chief Scientist:	Dr. Reiner Onken Abt. Meeresphysik Institut für Meereskunde an der Universität Kiel Düsternbrooker Weg 20 W-2300 Kiel 1, Germany	Telefon: +49-431-597-38 95 Telefax: +49-431-56 58 76 Telex: 17 431 793 ifmkiel ttx d
Communication links:	Research Vessel METEOR	Call Sign: DBBH Telefon (via INMARSAT): (Atlantic East) 00871-11 205 22 (Atlantic West) 00874-11 205 22 Telefax (via INMARSAT): (Atlantic East) 00871-11 20122 (Atlantic West) 00874-11 205 22 Telex (via INMARSAT): (Atlantic East) 0581-11 205 22+ (Atlantic West) 0584-11 205 22
Agents:	<i>Rio de Janeiro, Brazil</i> Lachmann Acencias Maritimas s.a. Rua Sao Bento 8, 11th floor P.O. Box 1629 20090 Rio de Janeiro-RJ, Brazil	Telefon: +55-21-296-4100 Telefax: +55-21-263-0945 Telex: 382122326
	<i>Cape Town, South Africa</i> Combine Ocean s.a. ltd. 1st floor, B.P. Centre, Thibault Square, P.O. Box 1147 Cape Town 8000 South Africa	Telefon: 27-21-214171 Telefax: 27-21-215133 Telex: 95/527406