

**PART I**

**SURVEYS OF THE HAKE STOCKS**  
**20 January-6 February 1993**



# TABLE OF CONTENTS

## PART I

CHAPTER 1	INTRODUCTION .....	1
1.1	General objectives .....	1
1.2	Specific objectives of Part 1 .....	1
1.3	Participation .....	2
1.4	Narrative .....	2
CHAPTER 2	HYDROGRAPHY .....	6
CHAPTER 3	RESULTS OF THE ACOUSTIC AND TRAWL SURVEY .....	13
3.1	Discussion of methods .....	13
3.2	SOUTHERN REGION, Orange River to St. Francis Bay .....	15
3.3	CENTRAL REGION, St. Francis Bay to Ambrose Bay .....	20
3.4	NORTHERN REGION, Ambrose Bay to Cunene River .....	24
CHAPTER 4	CONSIDERATIONS OF THE SURVEY RESULTS .....	28
Annex I	Size composition of main stocks	
Annex II	Maturity stages of female hake	
Annex III	Records of fishing stations	



## **CHAPTER 1 INTRODUCTION**

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### **1.1 GENERAL OBJECTIVES**

Following an offer from NORAD extended through FAO and UNDP, an agreement was reached in Windhoek in January 1990 between the UNDP Resident Representative and Namibian authorities for the execution of a programme of surveys of the fish resources of the Namibian shelf with the R/V "DR. FRIDTJOF NANSEN".

The purpose of the programme was agreed as follows:

The main objectives are descriptions of the distribution, composition and abundance of the most important resources of fish. The small pelagic fish horse mackerel, pilchard and anchovy will be investigated by the acoustic integration method combined with sampling with mid-water and bottom trawls. A swept area trawl survey programme will be used for the demersal stocks. All catches will be sampled to species by weight and numbers and biological sampling will be made of the commercially important stocks.

Environmental studies will include recording of surface temperature on a continuous basis and occupation of hydrographic stations in a series of fixed profiles.

Possible taxonomic problems will be studied by sampling and examination by experts in cooperation with FAO's Fisheries Department.

### **1.2 SPECIFIC OBJECTIVES OF PART 1**

During the first part, 20 January to 26 February the objective is investigations of hakes and the "minor" species, kingklip, monk, soles and large eye dentex covering the whole Namibian shelf. Since the distribution of these stocks extend into southern Angola, the survey should include the Baia dos Tigres bank. This was agreed in consultations with CIP, Luanda and Angolan representation on board the vessel was arranged.

To improve sampling of bottom dwelling species, monk and soles a special trawl which was thought to have higher catchability of these species was brought along for testing.

The acoustic system will be used to observe possible mid-water occurrence of the hakes. The survey design for the swept area trawl programme will be based on a semi-random distribution of hauls intended to cover the depth ranges of the two hake species and with a density of stations adapted to the expected fish densities. Biomass estimates of Cape hake will be based on post stratification by density areas.

An ichthyoplankton survey covering the shelf from 20° to 18°S was a further special objective.

### **1.3 PARTICIPATION**

The scientific staff were:

From Namibia, 20 January to 6 February:

Clemens Evenson, Johnny Gamatham, Hashali Hamukuaya, Lima Maartens, Willem Nauseb and Benediktus Ushona.

7 to 26 February:

Michael O.Toole, Filimon Dausab, Johnny Gamathan, Malakia Shimanda, Dawid Gaseb.

From Angola:

Mario Rafael

From Norway, 20 January to 6 February:

Oddgeir Alvheim, Reidar Johannesen and Magnar Mjanger.

7 to 26 February:

Gunnar Saetersdal, Else Torstensen, Reidar Johannesen and Magnar Mjanger.

### **1.4 NARRATIVE**

Figures 1 a-c show the course tracks with the positions of the fishing and hydrographic stations.

After leaving Walvis Bay on 20 January the vessel steamed south to start work off the Orange river on 22 January. The program followed that of previous surveys and was completed for the South Region, up to 25°S, by 2 February with 77 bottom trawl stations, five of which were test hauls with the special gear. Unfavourable weather conditions delayed the work, with three days being completely lost due to rough seas and force 7 - 8 winds. The hydrographic profile off Panther head was worked on 27 January and that off Hottentot Point on 30-31 January.

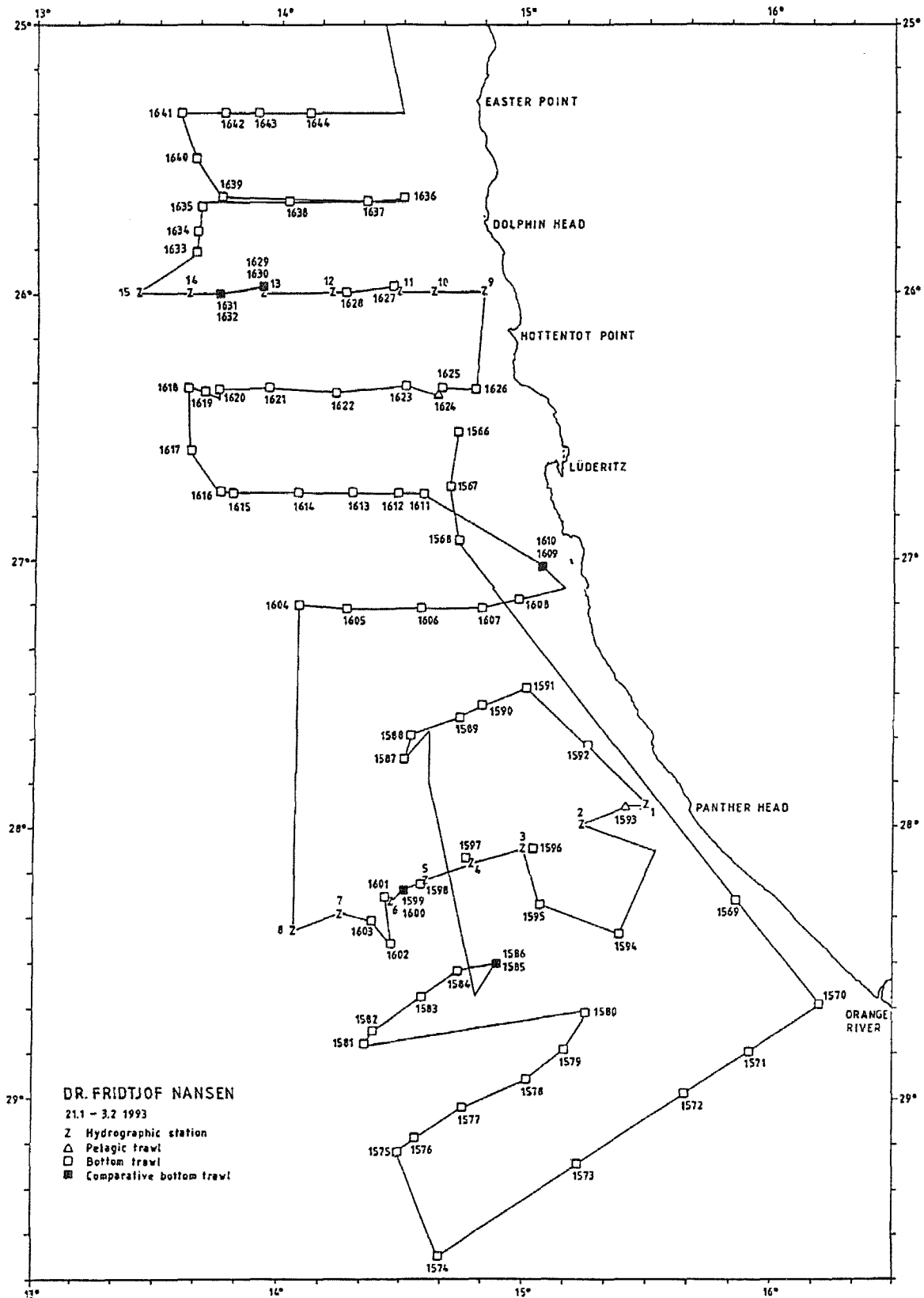


Figure 1a Orange River to St. Francis Bay. Course tracks, fishing stations and hydrographic profiles.

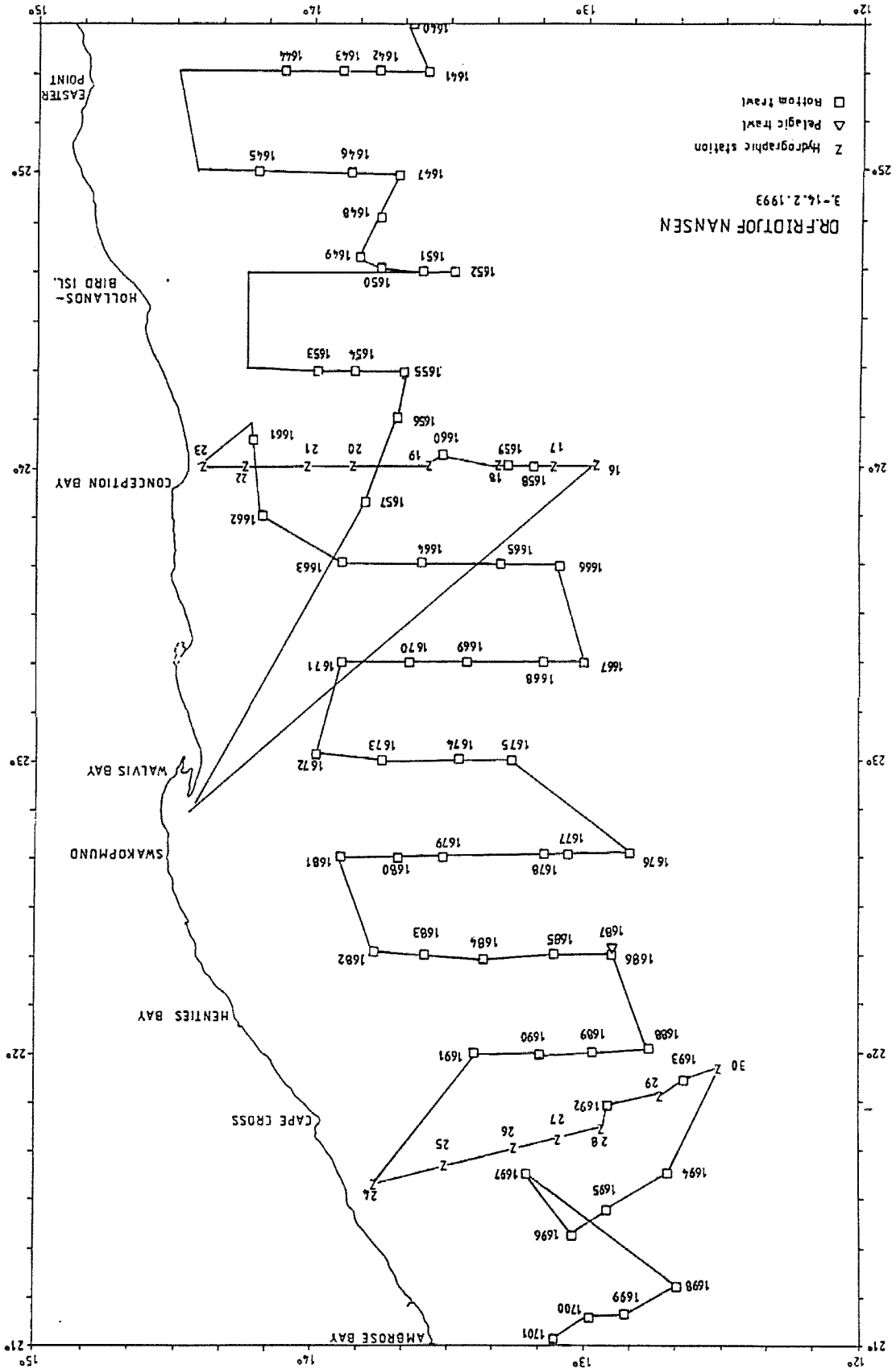


Figure 1b St. Francis Bay to Ambrose Bay. Course tracks, fishing stations and hydrographic profiles.



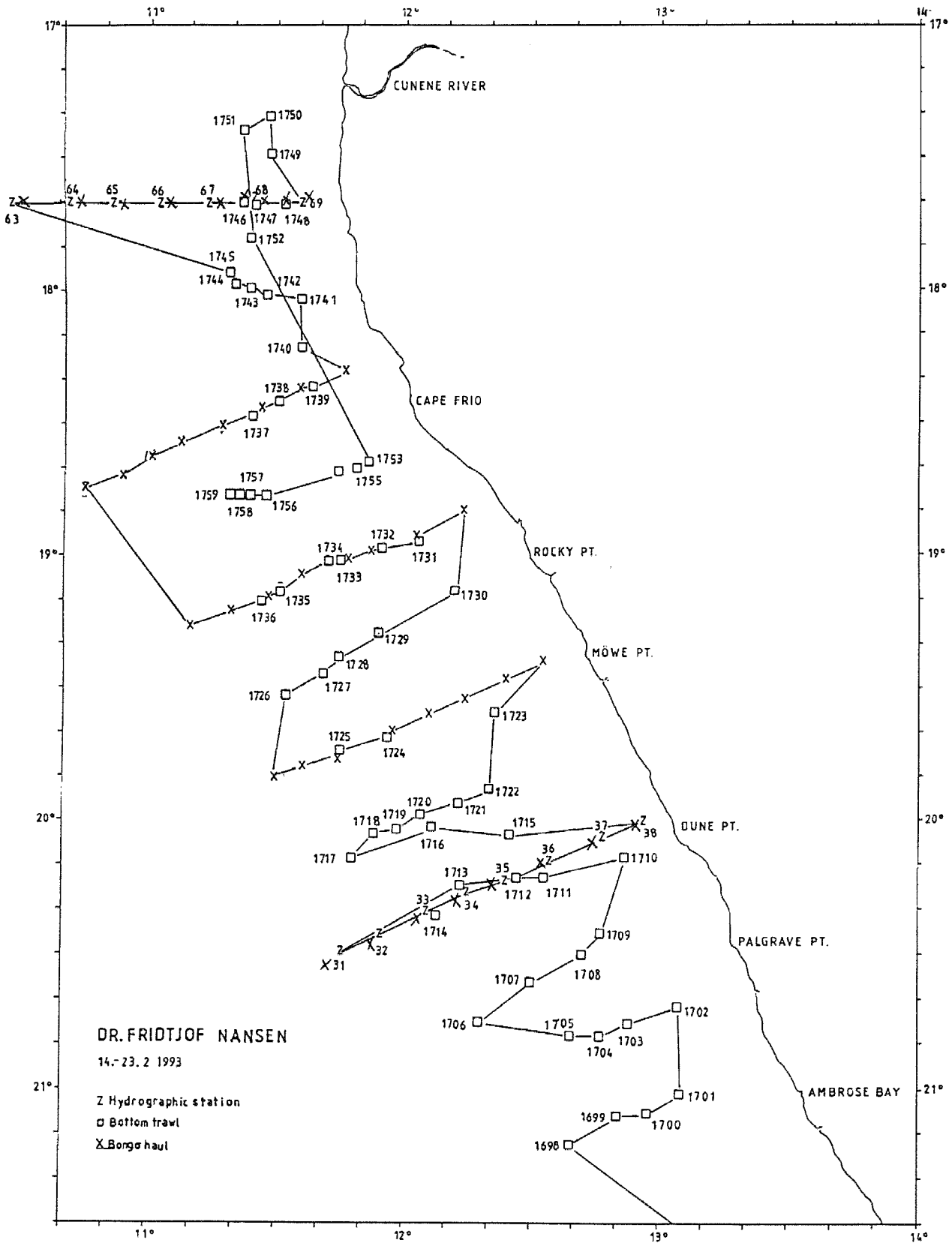


Figure 1c Ambrose Bay to Cunene River. Course tracks, fishing stations and hydrographic profiles.

Work in the Central Regions was disrupted by a visit to Walvis Bay 5-7 February for exchange of scientific staff and resumed with the occupation of the hydrographic stations in the section off Conception Bay on 8 February. After a few days of rough weather conditions improved and the survey work proceeded in good order northwards with the Cape Cross section worked on 13 February and the Central Region covered at Ambrose Bay on the 14th with a total of 57 trawl stations.

Weather conditions in the Northern Region were generally favourable. Rough bottom in shallower parts affects to some extent the distribution of trawl stations. The hydrographic stations in the Dune Point section were occupied on 15 - 16 February and this section was also the first of a series of ichthyoplankton lines with Bongo stations worked every 40nm northwards. The northernmost profile near Cunene was worked on 21 February. Survey of the southern Angolan shelf started on 22 February but was curtailed that evening due to a breakdown of navigational instruments. A line of trawl stations south of Cape Frio was fished on 23 February thus completing the coverage of the northern region with a total of 56 successful fishing stations. Walvis Bay was reached on 25 February.

## **CHAPTER 2 HYDROGRAPHY**

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Figures 2 a-c show the sea temperature at 4m of depth as observed with the ships thermograph and Figures 3 a-c show the distribution of temperature and salinity in the five hydrographic transects worked. Rough weather prevailed during the coverage in the south and this is reflected in the profiles from this part especially in that off Panther Head which shows intensive upwelling. Also the profile off Conception Bay demonstrates recent upwelling. Calmer weather prevailed in the north with presence of surface water with salinity exceeding 35.50 ‰ in the northernmost profile demonstrating intrusion of Angolan water.

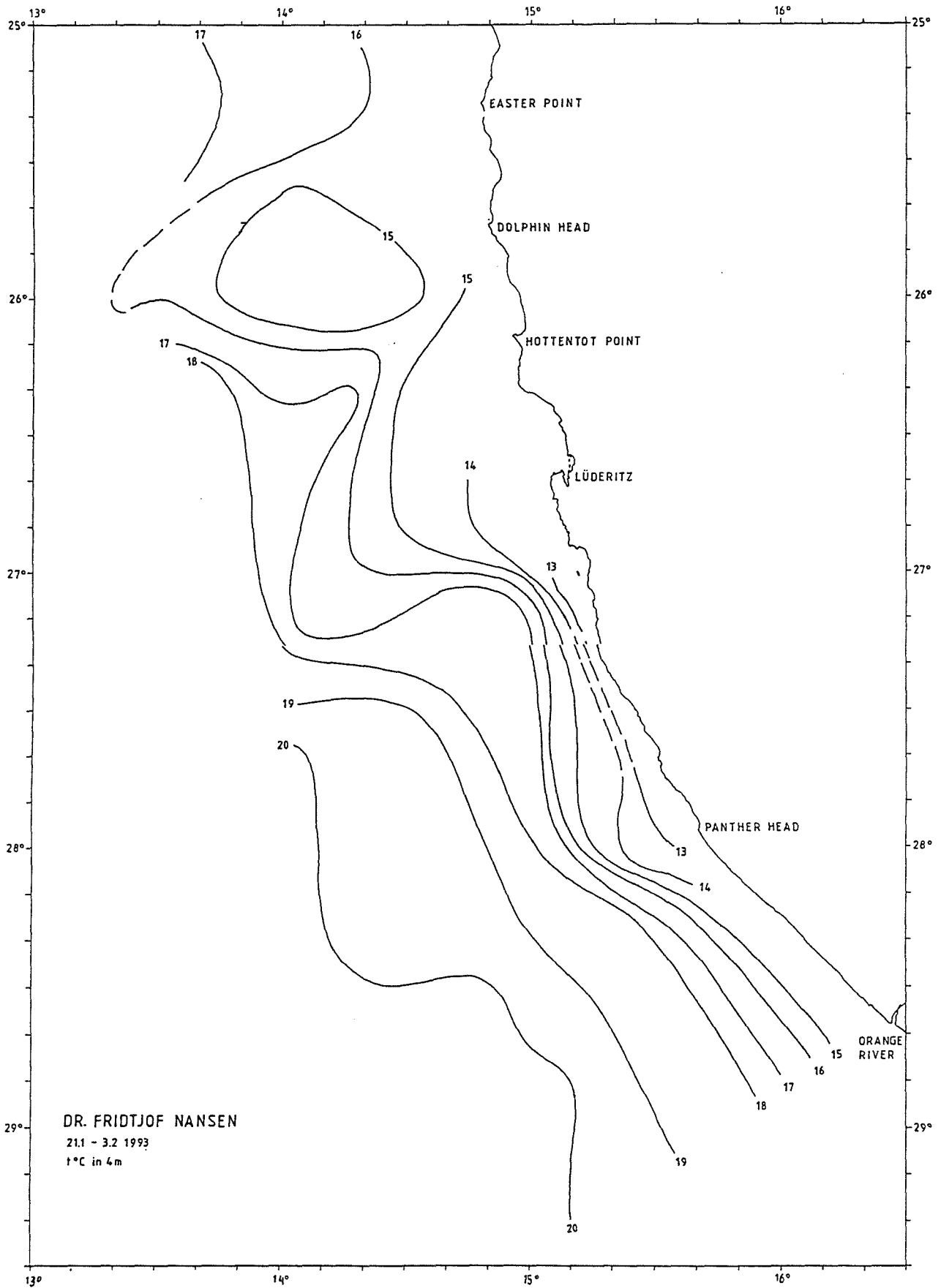


Figure 2a Distribution of sea temperature at 5m of depth based on observations of the ships thermograph.

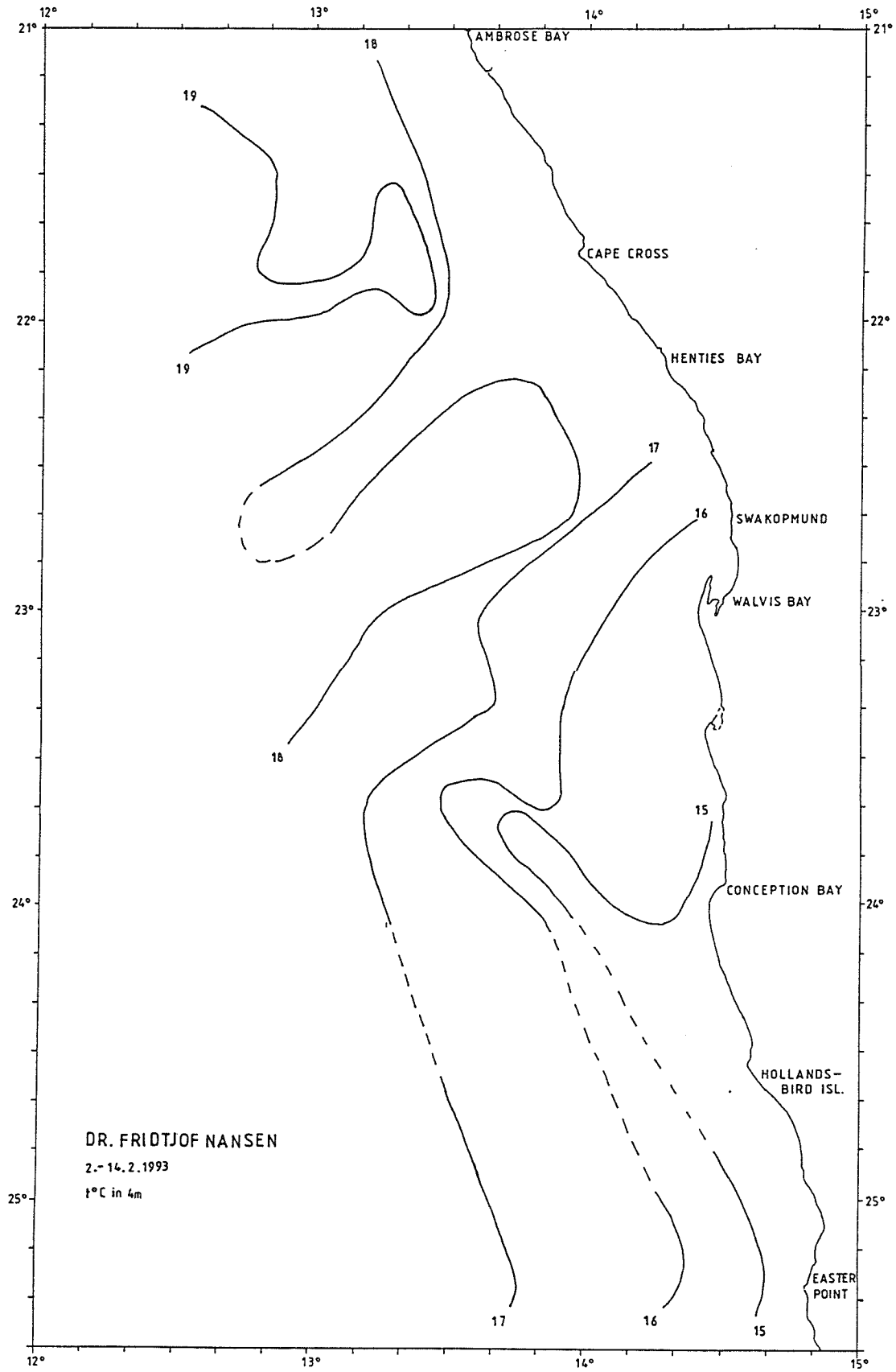


Figure 2b

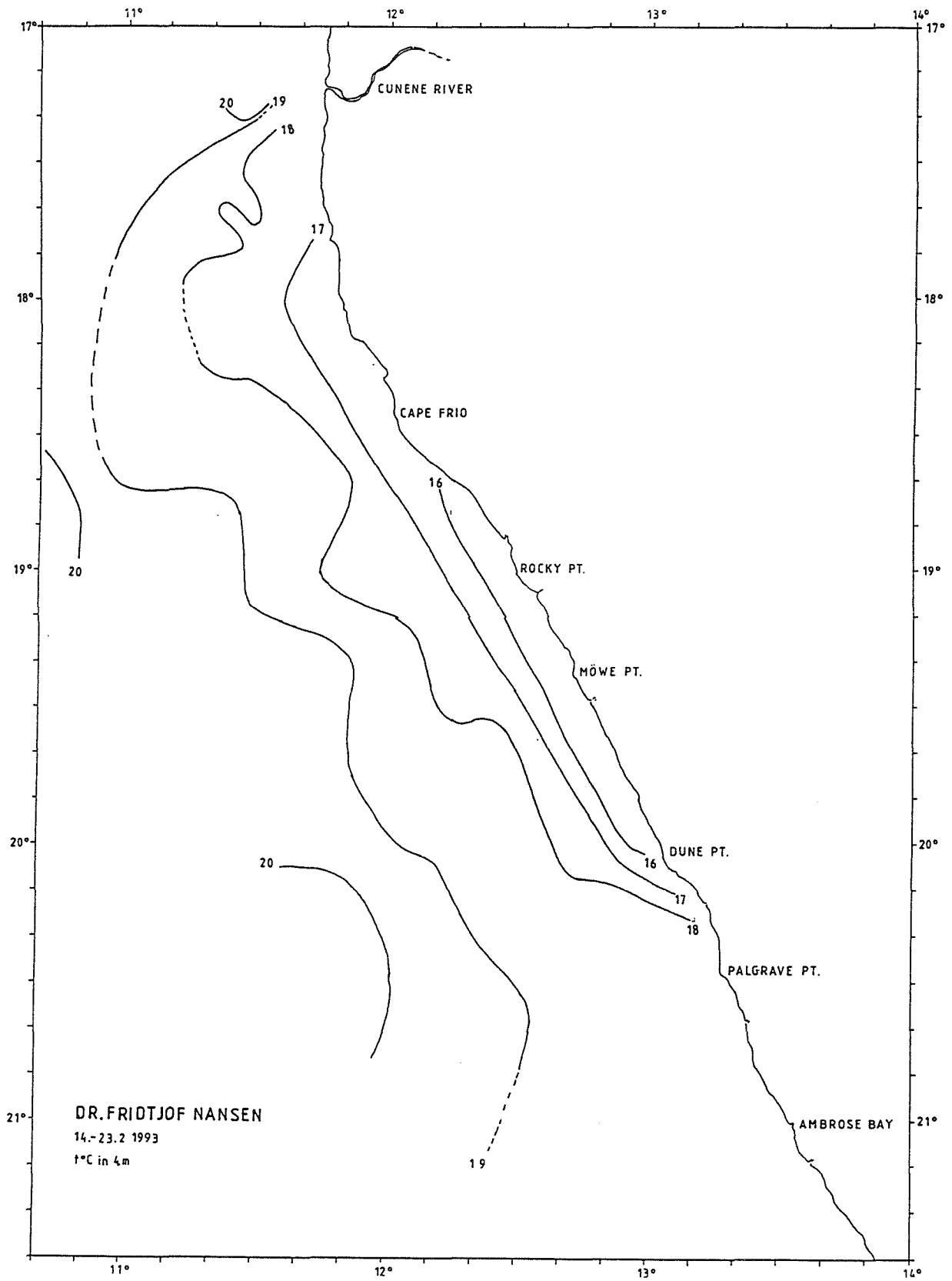


Figure 2c

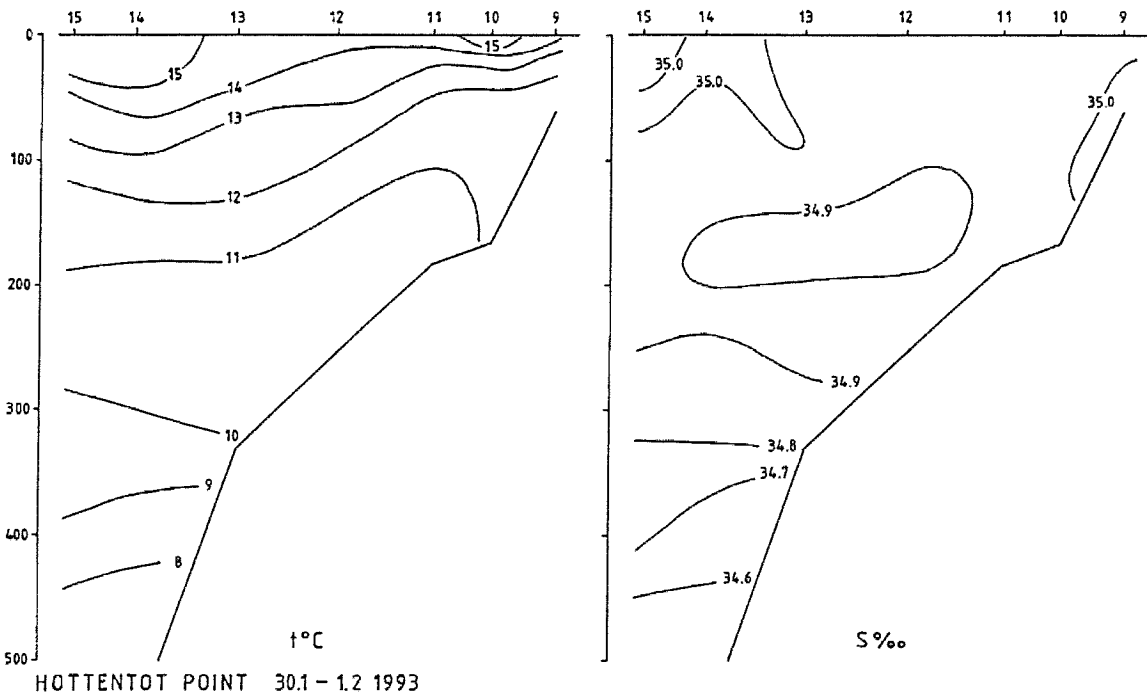
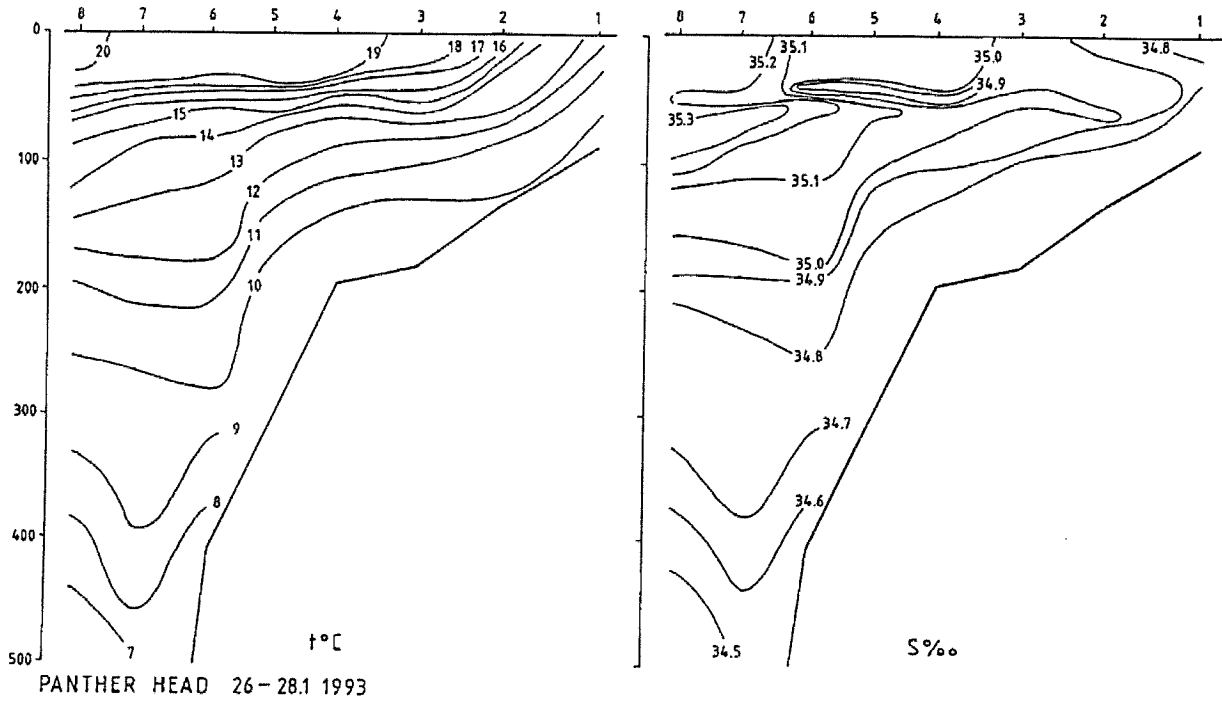
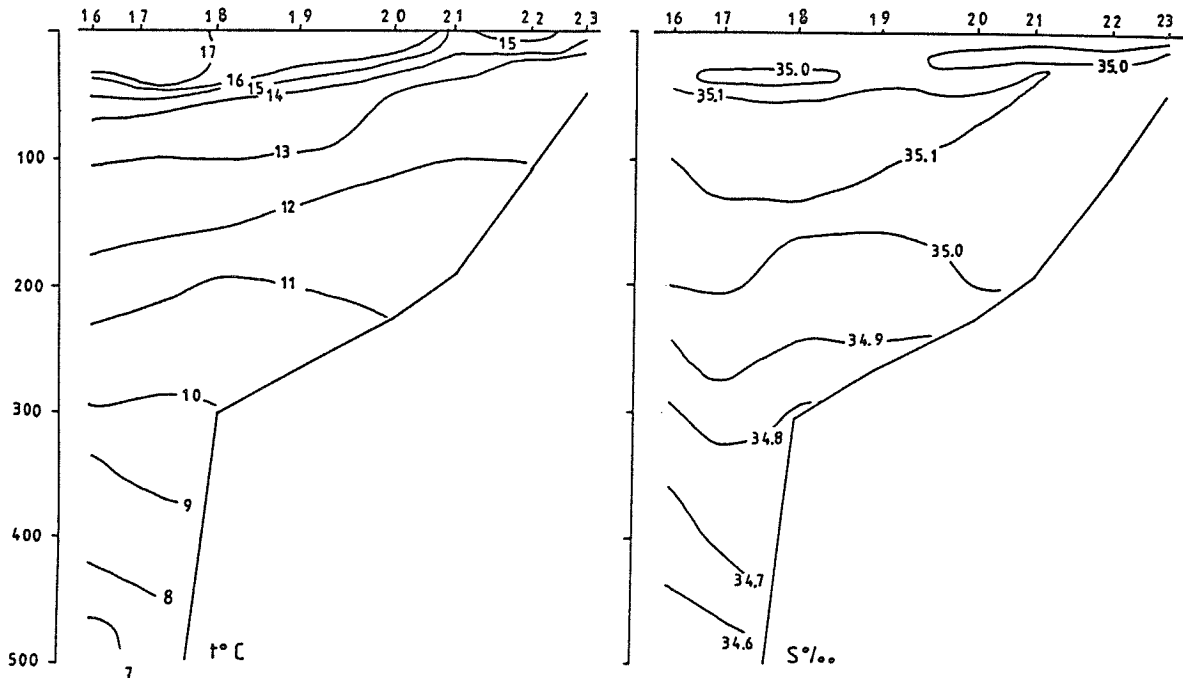
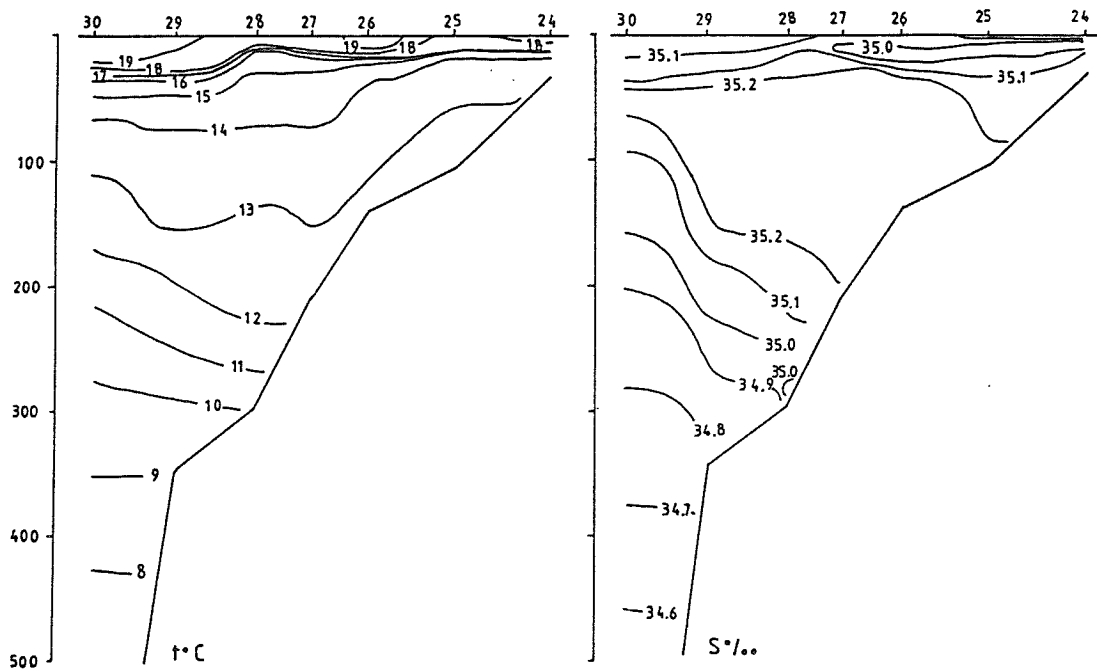


Figure 3a Orange River to St Francis Bay. Temperature and salinity in the standard profiles worked.

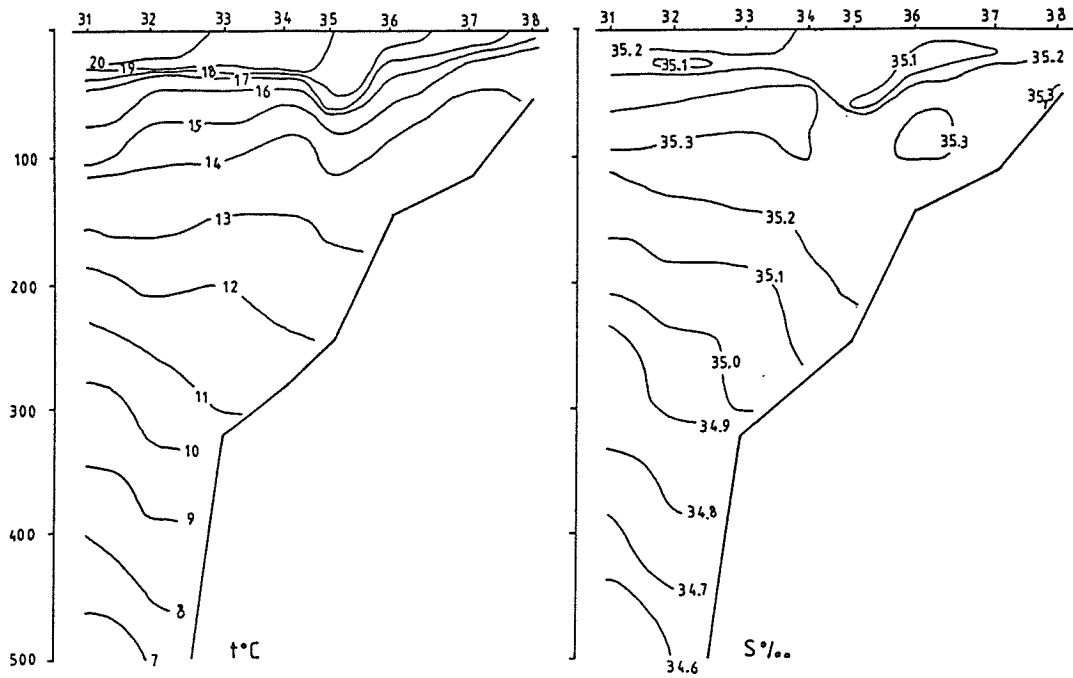


CONCEPTION BAY 8.2.1993

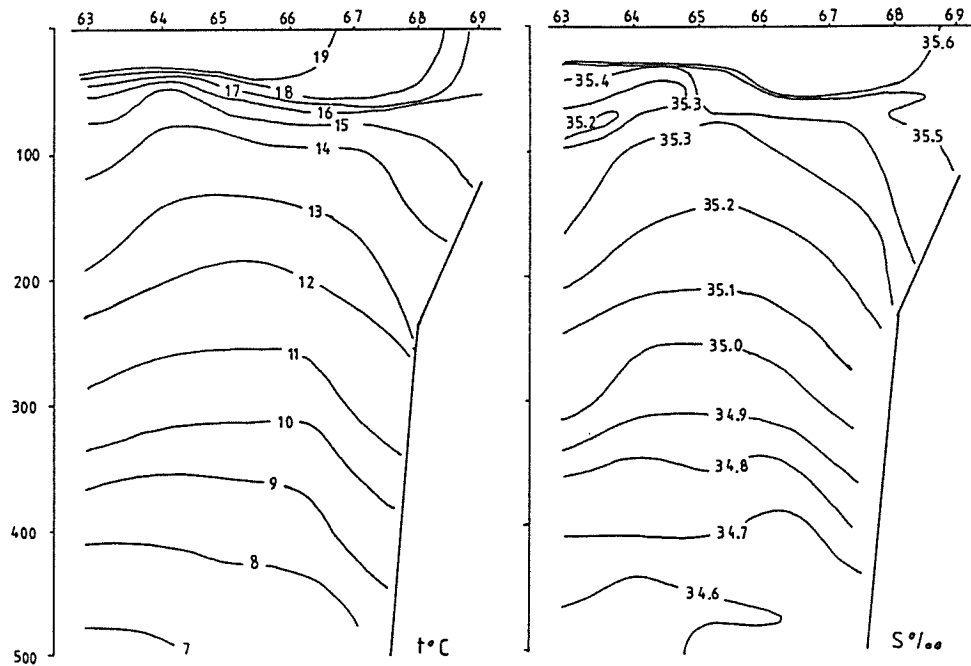


NORTH OF CAPE CROSS 13.2.1993

Figure 3b St Francis Bay to Ambrose Bay. Temperature and salinity in the standard profiles worked.



DUNE PT. 16.2.1993



S 17°40' 21.2.1993

Figure 3c Ambrose Bay to Cunene River. Temperature and salinity in the standard profiles worked.