PART 1

SURVEY OF THE HAKE STOCKS

25 January - 28 February 1991

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PART I

CHAPTER 1 INTRODUCTION

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 waters 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 and shellfish (although little informations is expected to be obtained on lobster). 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, 25 January to 28 February the main objective is a survey of the hake stocks covering the whole shelf area. The acoustic system will be used to observe possible mid-water occurrence of the two species of hake, but the observations on other pelagic fish will not be processed. The swept area trawl survey programme will cover depths down to 500 m and deeper if necessary. The survey design will be based on a semi-random distribution of hauls designed to cover the depth ranges of the two hake species and with density of stations adapted to the expected fish densities. Biomass estimates of Cape hake will be based on post-stratification by density areas. Trawl selectivity experiments and tagging of hake will be included to the extent that time permits. Some mid-water sampling of pilchard will be made for observations of length compositions and growth.

1.3 PARTICIPATION

The scientific staff from Namibia were:

From Namibia: 25/1-8/2: G. Cloete, Bernatitus Birisamub, Johnny Gamatham, Sielfried Gowaseb, Serubabel Kahiha.
9/2-28/2: Ekkard Klingelhoeffer, Richardt Kharuchab, David Gawaseb, Malakia Shimhanda, Willem Nauiseb

From IMR : O. Alvheim, J. Hamre (1/3-23/3), T. Haugland, T. Mørk, G.Sætersdal (1/2-17/2) and D. Zaera.

1.4 NARRATIVE

Figures 1 a-c show the course tracks with the positions of the fishing and hydrographic stations. The vessel left Walvis Bay on 25 January and work started near the southern border on the 27th. After a call in Lüderitz on 1 February the work continued northwards. The positions of the trawl stations were determined at the beginning of the cruise, covering the depth range from 180 to 450 m. By 3 February the shelf up to 25°S had been covered with a total of 45 bottom trawl stations. Most of the stations were worked during daytime, but at depths of 400 m and beyond fishing was at times also done during the night. Application of the newly installed EK500 acoustic system showed that single fish layers of hake could be recorded down to 400-500 m. The system was adjusted to record integrator output in layers of 5, 10 and 20 m above the bottom to enable studies of the amount of hake lifting off the bottom.

Juvenile hake was found off Easter Point and Hollands Bird Islands in aggregations in the form of swarms extending higher up from the bottom over shelf depths of 160-200 m. The hydrographic profile off Conception Bay was worked on 4 February. As catches in deep water were consistently low, depth coverage was limited to 400 m. The coastward limit of the survey was determined by the belt of soft muddy bottom usually found inside the 130-150 m depth range. February 8 was spent in Walvis Bay for exchange of crew members and participants from the Ministry of Fisheries and Marine Resources. Survey work was resumed on 9 February from Walvis Bay northwards with daylight fishing stations and acoustics covering the depth range 140-400 m. Following some heavy catch rates at shallow depths a special coverage was made of the inner shelf 140-110 m from Walvis Bay to Cape Cross in order to determine the shoreward limit of the hake distribution in this area. Areas of high density of juvenile hake were found at 110-120 m of depth inside the distribution of larger fish. A pilchard school area was found 40-50 nm WSW of Cape Cross and a sample was obtained by night fishing. The hydrographic profile off Cape Cross was worked on 13/14 February and the fishing programme was completed up to Ambrose Bay by 15 February with 76 stations for the middle area from St. Francis Bay.

The area from Ambrose Bay to Cunene was covered from 15 to 23 February and after calibration of the acoustic instruments in Baia dos Tigres in Angola on 24 February a further two days were spent working southwards towards Walvis Bay. The hydrographical profile off Möwe Point was worked on 20 February and that north of Cape Frio on 23 February. Because of the predominant pelagic occurrence of the hake in this northern area attempts were made to obtain double survey coverage of the high density areas with a swept-area trawl programme during the day and acoustic survey during the night. On the return southwards some selectivity experiments were made as well as attempts to catch hake alive with mid-water trawl for tagging. 54 swept area trawl hauls were made north of the Ambrose Bay. The vessel arrived in Walvis Bay on 28 February.

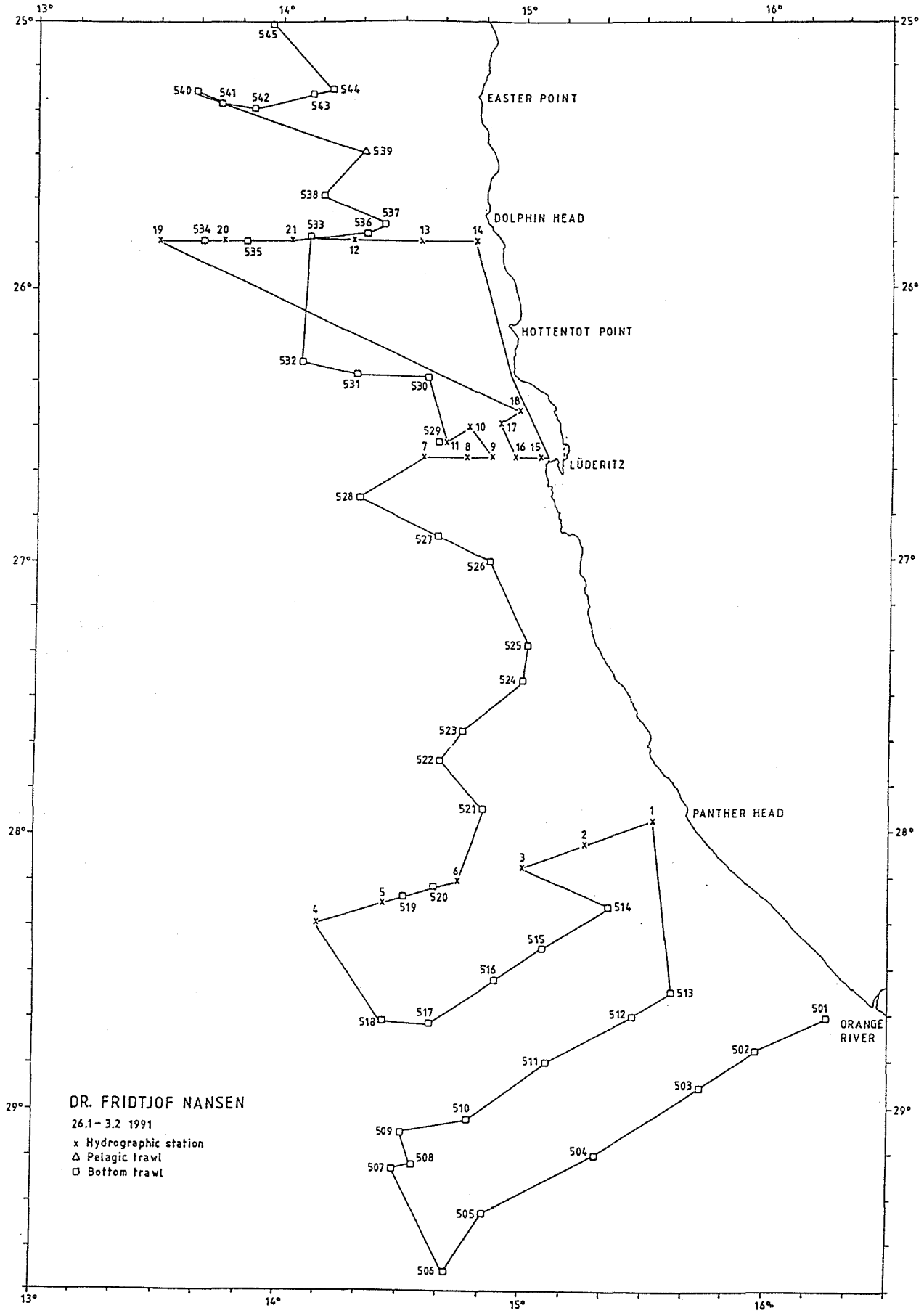


Figure 1a. Course tracks with fishing stations and hydrographic profiles, Orange River to St. Francis Bay.

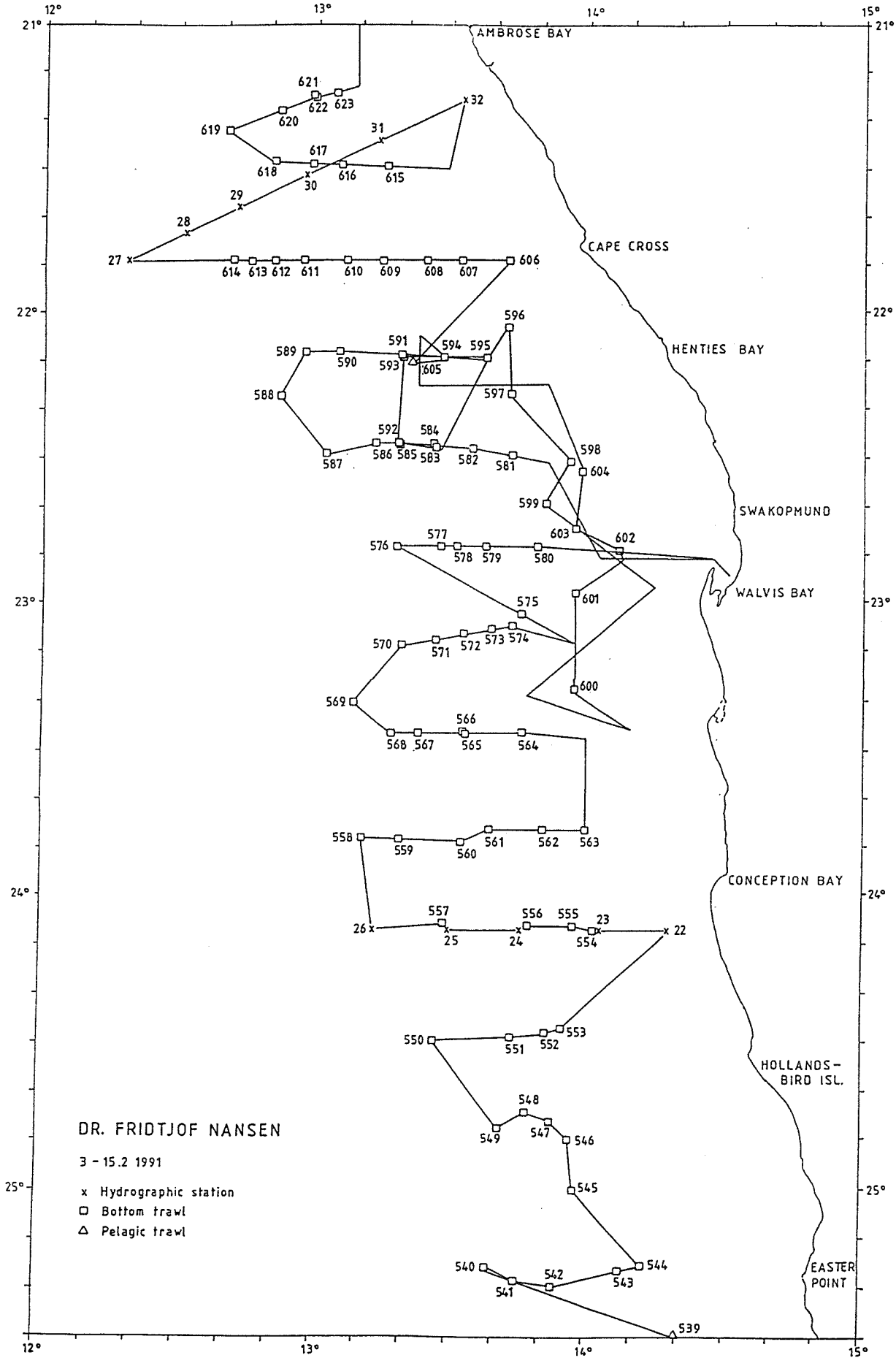


Figure 1b. Course tracks with fishing stations and hydrographic profiles, St. Francis Bay to Ambrose Bay.

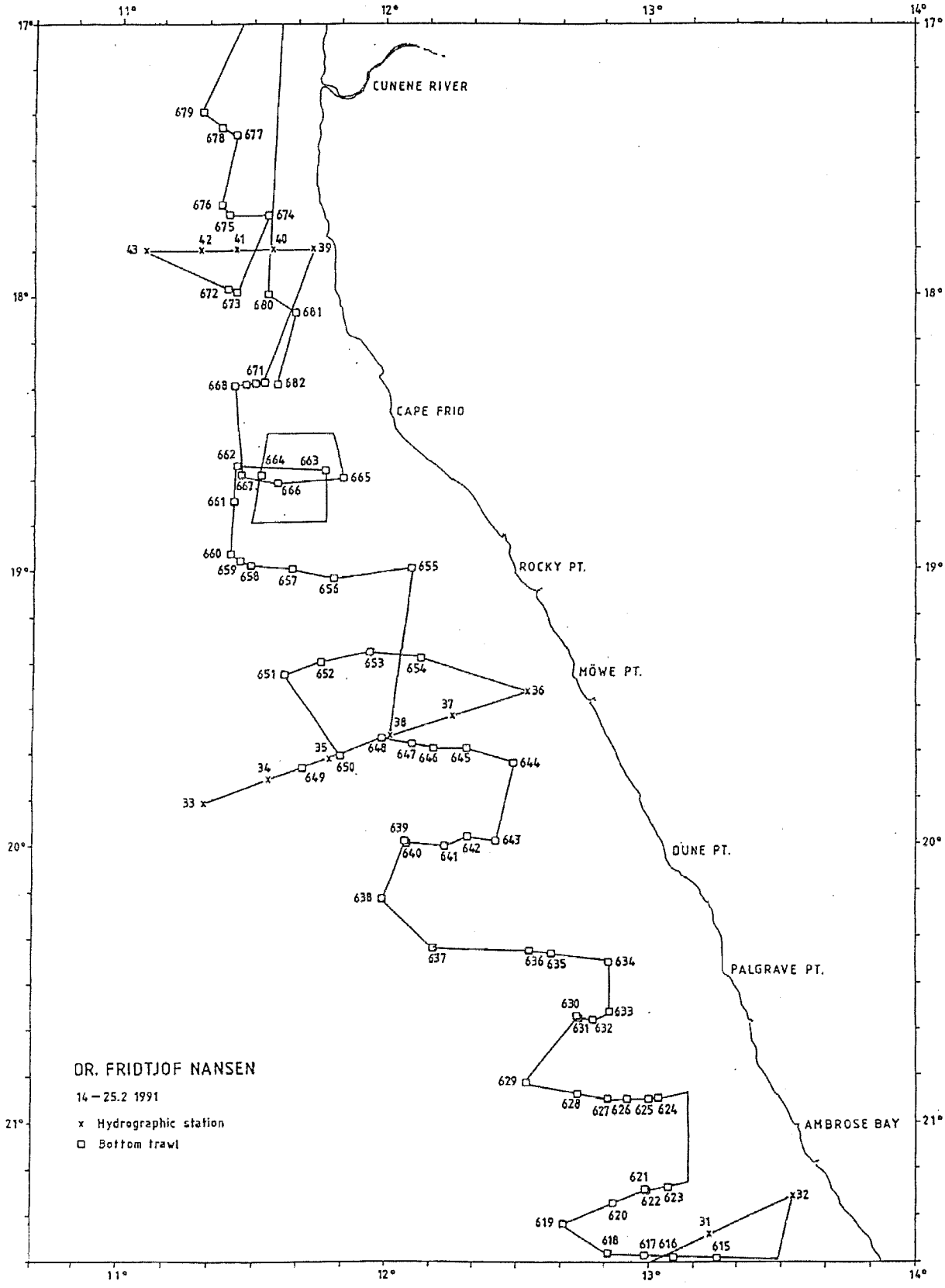


Figure 1c. Course tracks with fishing stations and hydrographic profiles, Ambrose Bay to Cunene River.

CHAPTER 2 HYDROGRAPHY

Figures 2a-c show the sea temperature at 4 m of depth as observed with the ships thermograph and Figures 3a-e show the distribution of temperature, salinity and oxygen in the 5 hydrographic transects worked. The position of the transects are shown in Figure 1a-c.

The area south of Lüderitz was covered during a period of calm weather and this may explain the presence of oceanic water, 20°C and 35.5 °/oo salinity over the shelf edge. North of Lüderitz wind force 6-7 prevailed and may have contributed to the active upwelling conditions found in this area. The profile at 25°50' is similar to that of 6 February 1990, but with surface oceanic water even further offshore in this years observations. Also, the profile at 24°08' near Conception Bay demonstrated an active upwelling situation reflecting a period of wind and is similar to last years observations.

From Walvis Bay northwards the temperature at the sea surface was about 2°C lower than that found in Survey 1/90 at the same time of the year, but conditions near the shelf bottom seem largely similar. High salinity water > 35.5 °/oo is present near the surface southwards to the Möwe Point profile which is approximately as last years situation. This is an indicator of the intrusion of warm tropical water from the north and northwest.

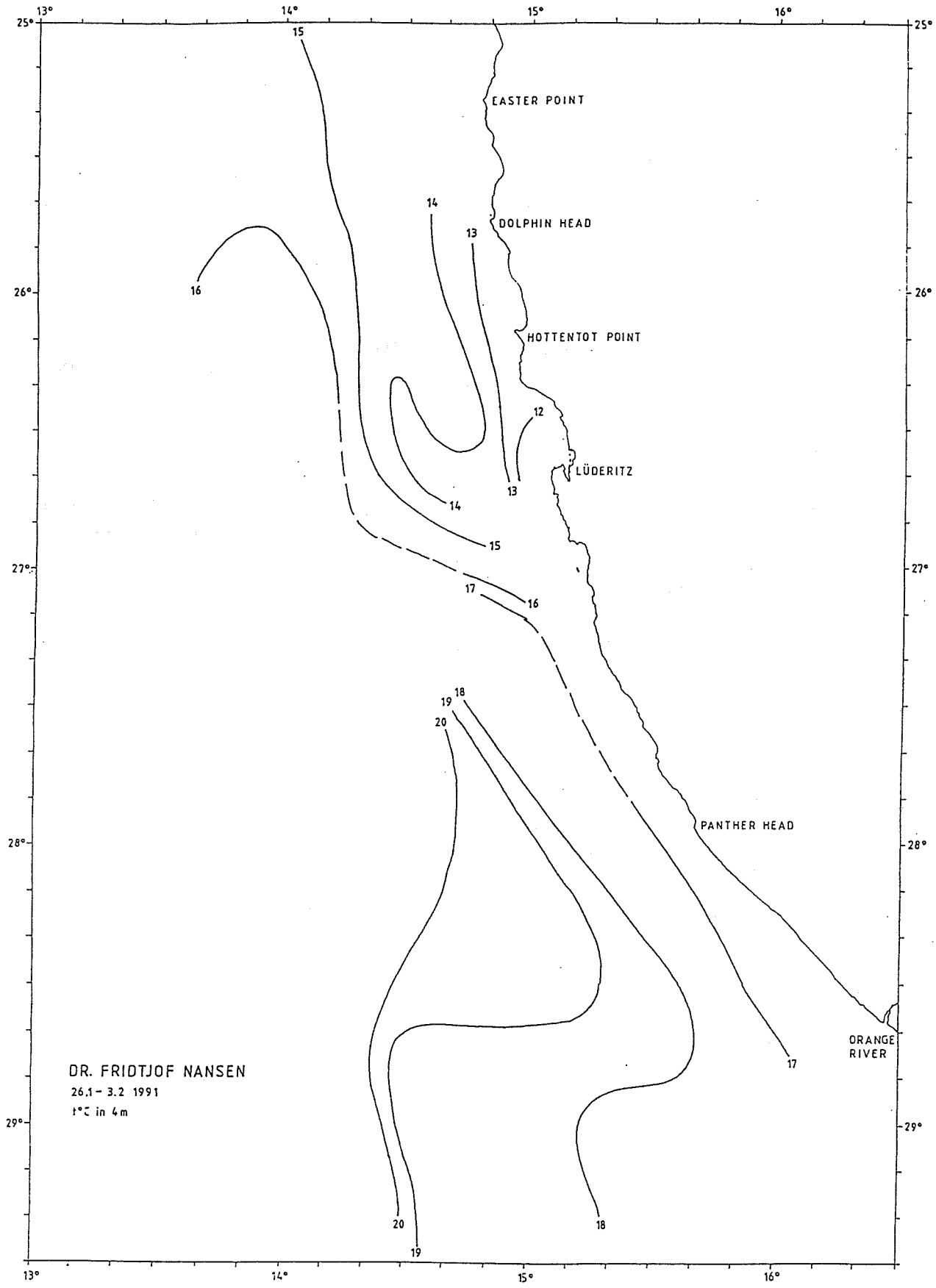


Figure 2a. Temperature at sea surface Orange River to St. Francis Bay.

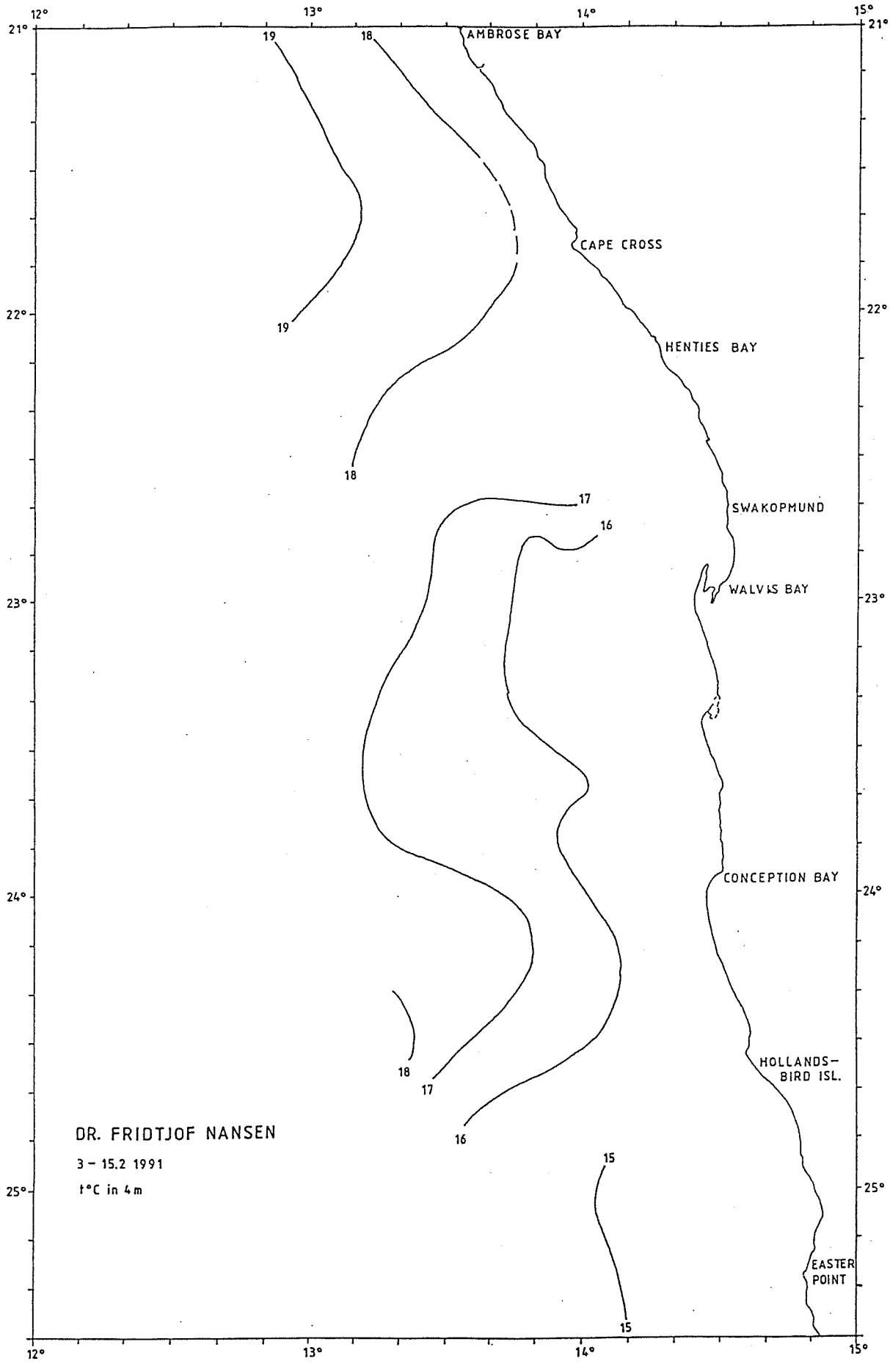


Figure 2b. Temperature at sea surface St. Francis Bay to Ambrose Bay.

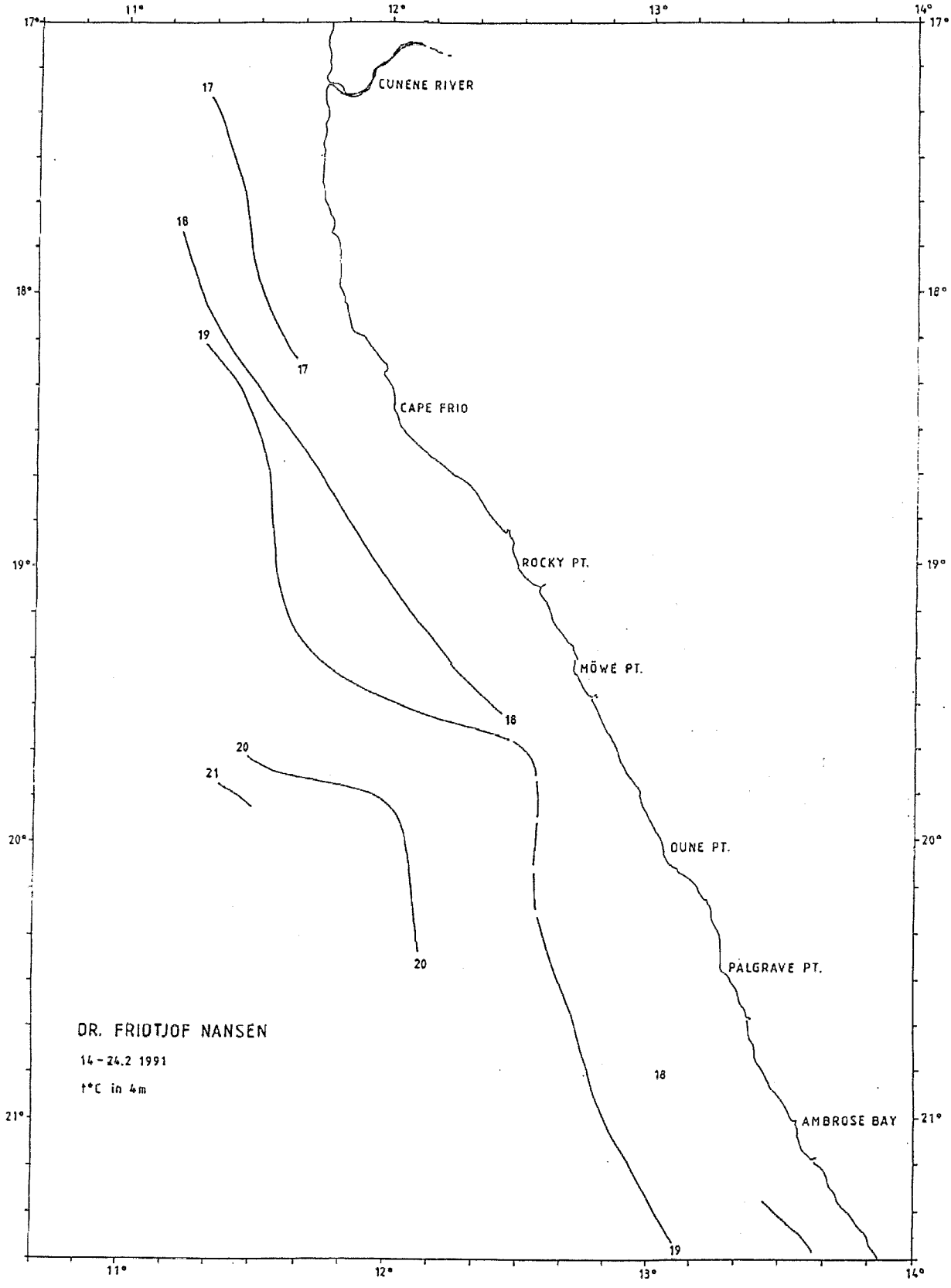


Figure 2c. Temperature at sea surface Ambrose Bay to Cunene River.

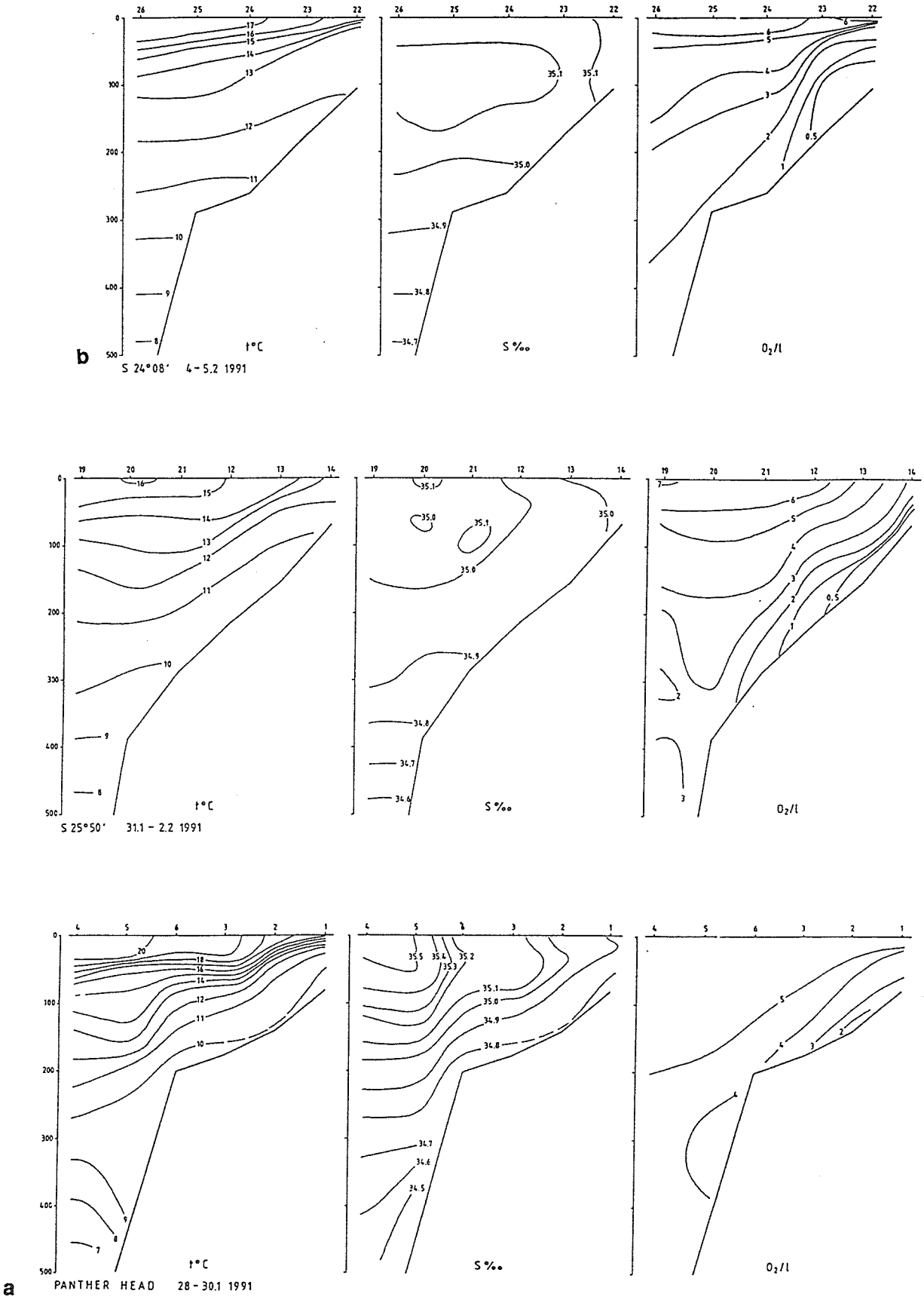
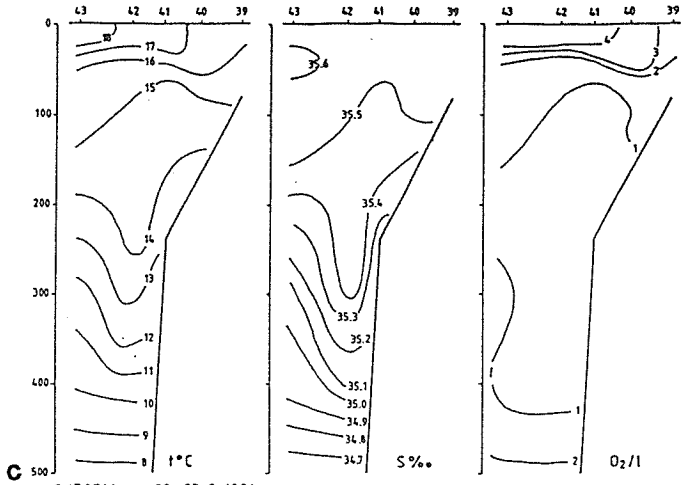


Figure 3. Hydrographic profiles. a: Orange River to St. Francis Bay, b: St. Francis Bay to Ambrose Bay, c: Ambrose Bay to Cunene River.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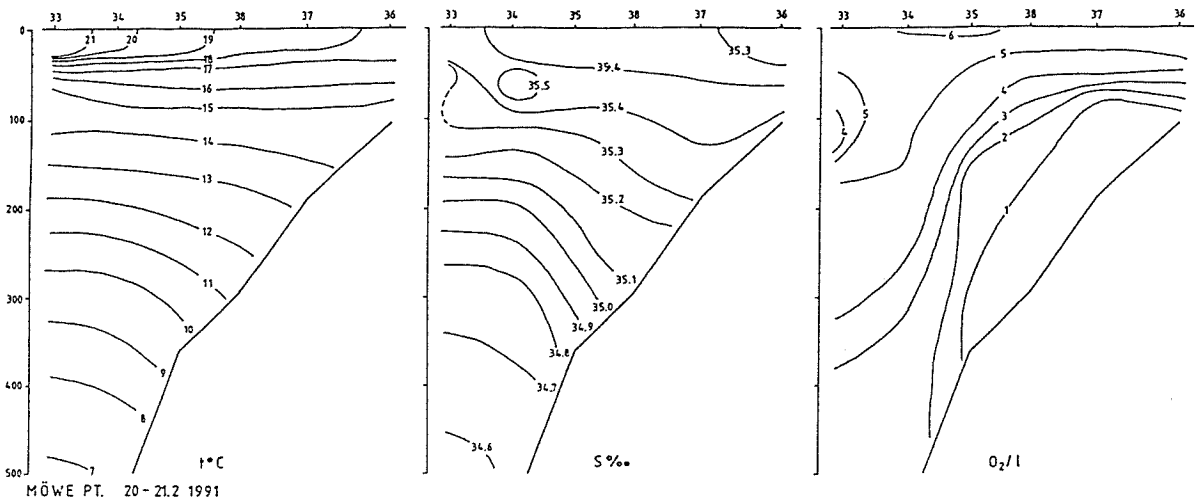
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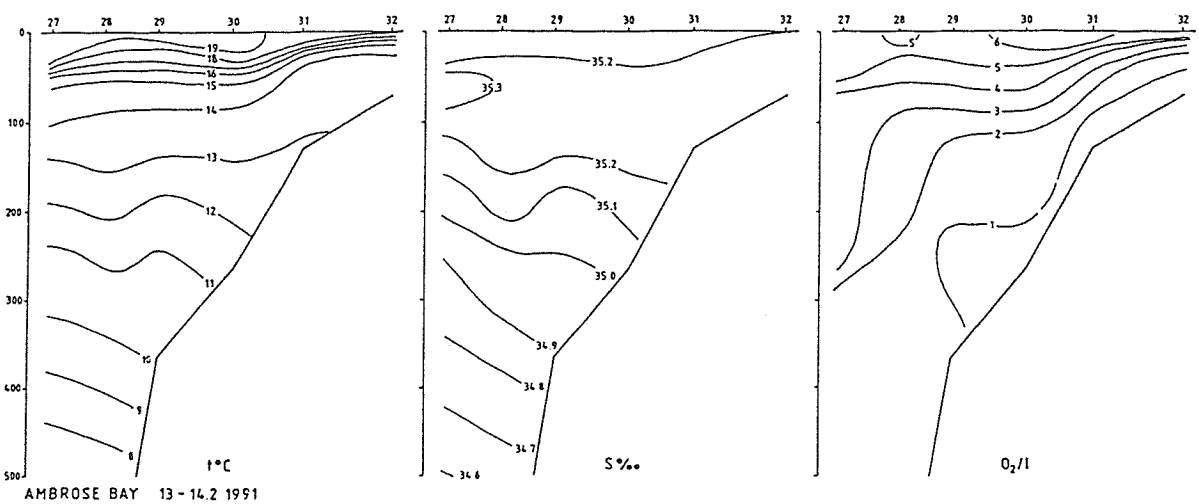
AMBROSE BAY
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