Baltic Sea Research Institute

Warnemuende

C r u i s e R e p o r t

No. 44/96/15

R/V A. v. Humboldt

Monitoring Cruise
24 October to 15 November 1996
Kiel Bight to northern Gotland Basin

This report is based on preliminary data

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Monitoring Cruise
Cruise No. 44/96/15
r/v "A.v.Humboldt"

Warnemünde
20.11.1996

The fifth and last monitoring cruise in the frame of HELCOM/BMP/CMP performed by the Baltic Sea Research Institute Warnemuende in 1996 was carried out with r/v "A.v.Humboldt" between October 24th and November 15th, 1996.

Scientific staff participating:
G. Nausch (scientist in charge)
G. Plüschke (24.10.-15.11.1996)
P. Riel (24.10.-10.11.1996)
W. Roeder (13.11.1996)
H. Ruikholdt (24.10.-15.11.1996)
G. Schenkel (24.10.-15.11.1996)
H. Seehase (13.11.1996)
M. Sommer (13.11.1996)
A. Strohbach (24.10.-10.11.1996)
B. Wachs (24.10.-10.11.1996)
K.-P. Wlost (24.-29.10.1996)

Master: G. Herzig

Ports of call: Mukran/Germany - 29.10.1996
Gdynia/Poland - 5.-7.11.1996
Rostock/Germany - 10.-12.11.1996

The area under investigation covered the Baltic Sea between the Kiel Bight and the northern Gotland Basin. Marine meteorological, hydrographic and hydrochemical investigations were performed according to the Baltic Monitoring programme (BMP) and the Coastal Monitoring Programme (CMP) of HELCOM. The stations maps are attached to this report.

The weather conditions during the cruise were characterized by several lows passing rapidly the Baltic Sea area. As a result, wind speeds between 6 and 8 on the Beaufort scale dominated, partly increasing up to 10 Bft and interrupting the measurements several times. The dominating wind direction was southwest variing between south and northwest. The air temperature ranged between 6 and 11°C and was, therefore, relatively mild for the season.

The following hydrographic and hydrochemical conditions have been observed in the area under investigation (cf. also Table 1 and 2):

- The water temperatures in the surface layer ranged between 8.66°C in the western Gotland Basin and around 11.5°C in the western parts of the Baltic Sea (cf. Table 1, Fig. 1).

- The general salinity distribution is shown in Fig. 2. An inflow of saline rich water could be observed at the end of the cruise. In the Darß Sill area, salinity in the surface layer was around 10PSU higher than at the beginning of the cruise (Fig. 4a, b). Due to decreasing wind speed beginning at the 10th of November, the further penetration of these waters masses was interrupted and followed by sweeping back into the Belt Sea (Fig. 4c). Nevertheless, a dinstinct part filled the deeper regions of the Arkona Basin.

- The conditions in the central Baltic deep waters have changed slightly compared to the observations in August. In the Gotland Deep, the anoxic zone has increased and covers now the volume below 175m depth (0.1 - 1.2 mg H_2S/dm^3). Hydrogen sulphide concentrations up to 1.5 mg/dm^3 were measured in the Farö Deep (Fig. 3).

Independed from the event mentioned above, smaller inflows from the Arkona Basin have occured forcing more or less oxygenated water into the Bornholm Basin. Thus, only small lenses containing hydrogen sulphide remained.

The conditions in the near-bottom layer of the Gdansk Basin remained oxic, but the concentrations decreased to 0.79cm^3/dm^3 compared to August (>2cm^3/dm^3).

- The nutrient concentrations in the surface layer are relatively low for the season (Table 1), but the onset of the mineralization can be seen in the Arkona and Bornholm Basins at the end of the cruise, where nitrate concentrations between 0.8 and 0.9µmol/dm^3 have been detected.

Due to the anoxic conditions in the deep water layers of the Gotland and Farö Deeps high phosphate (Table 2) and ammonia concentrations (around 10µmol/dm^3) were measured. Relatively high phosphate concentrations and the presence of both ammonia and nitrate in the Bornholm Deep suggest that the change in the redox potential has happened very recently.

G. Nausch

Chief scientist

Table 1: Surface layer

Area Date	Stat Name/No.**	Temp. °C	Sal. PSU	PO_4^{3-}	$NO_{2\,3}^{-}$ * $\mu mol/dm^3$	SiO_4
Kiel Bight 20-10-1996	360/001	11.56	14.72	0.09	0.12	11.2
Meckl. Bight 25-10-1996	012/004	11.30	12.77	0.12	0.12	11.0
Lübeck Bight 25-10-1996	023/005	11.19	12.87	0.11	0.04	12.5
Arkona Basin 26-10-1996	113/031	11.59	7.32	0.11	0.16	8.8
Pom. Bight 30-10-1996	162/055	10.48	7.29	0.36	1.15	12.9
Bornholm Deep 27-10-1996	213/045	11.70	7.08	0.08	0.17	7.4
Stolpe Channel 27-10-1996	222/048	10.96	7.13	0.04	0.09	7.4
Gdańsk Bight 04-11-1996	233/090	9.95	7.16	0.09	0.60	7.1
SE Gotland Basin 04-11-1996	259/088	10.57	6.98	0.11	0.63	7.0
Gotland Deep 02-11-1996	271/081	9.49	6.95	0.08	0.23	6.7
Farö Deep 02-11-1996	286/079	9.45	6.57	0.11	0.27	7.0
N-Gotland Basin 02-11-96	281/077	9.12	6.50	0.13	0.35	7.1
Landsort Deep 01-11-1996	284/074	8.66	6.57	0.24	0.61	9.1
Karlsö Deep 01-11-1996	245/071	10.67	6.72	0.13	0.35	8.0

* $\Sigma\ NO_2^- + NO_3^-$

** see attached maps

Table 2: Bottom-near water layer

Area Date	Stat. Name/No.	Depth m	Temp. °C	Sal. PSU	O_2 cm^3/dm^3	PO_4^{3-} $\mu mol/dm^3$	$NO_{2,3}^-$ $\mu mol/dm^3$
Kiel Bight 24-10-1996	361/001	16	12.37	20.95	8.02	0.40	0.16
Meckl. Bight 25-10-1996	012/004	22	11.29	12.76	7.92	0.91	3.07
Lübeck Bight 25-10-1996	023/005	21	12.08	21.62	7.64	1.25	6.47
Arkona Basin 25-10-1996	113/031	45	11.66	20.37	4.37	1.07	2.96
Pom. Bight 30-10-96	162/055	13	10.46	7.29	7.10	0.36	1.14
Bornholm Deep 27-11-1996	213/45	87	7.99	17.19	1.05	5.38	5.59
Stolpe Channel 27-11-1996	222/048	88	5.29	13.53	1.73	3.19	8.38
Gdańsk Deep 04-11-1996	233/090	106	3.86	9.78	0,79	3.17	9.87
SE Gotland Basin 04-11-1996	259/088	87	4.51	10.21	2.12	2.29	9.94
Gotland Deep 02-11-1996	271/081	236	4.75	12.04	-1.60 (H_2S)	5.69	0
Farö Deep 02-11-1996	286/079	190	4.80	9.93	-1.48 (H_2S)	4.45	0
N-Gotland Basin 02-11-96	281/079	192	4.91	10.41	0.33	3.72	10.52
Landsort Deep 01-11-1996	284/074	443	4.82	8.70	0.64	3.13	11.32
Karlsö Deep 01-11-1996	245/071	107	4.53	9.57	0.41	3.50	11.12

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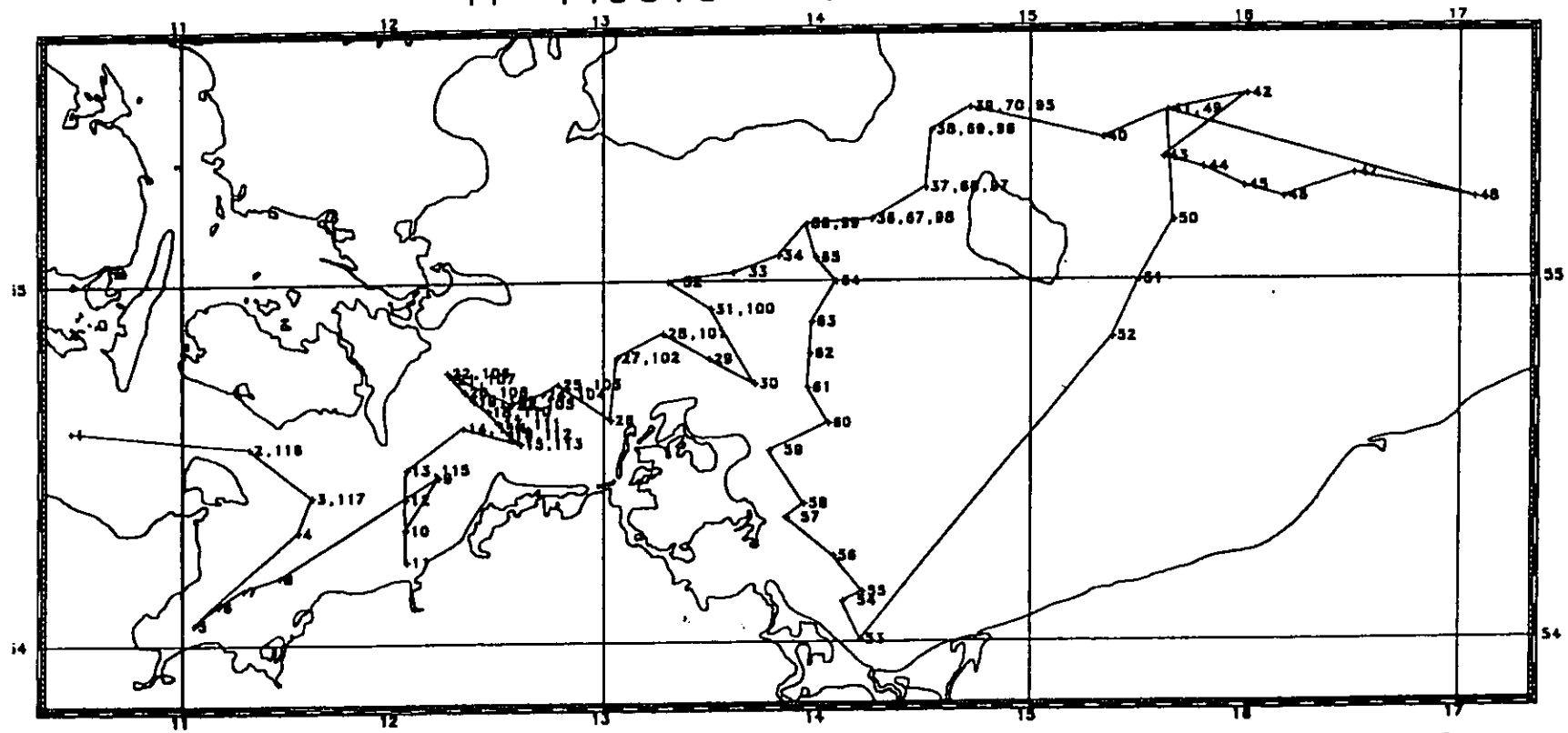

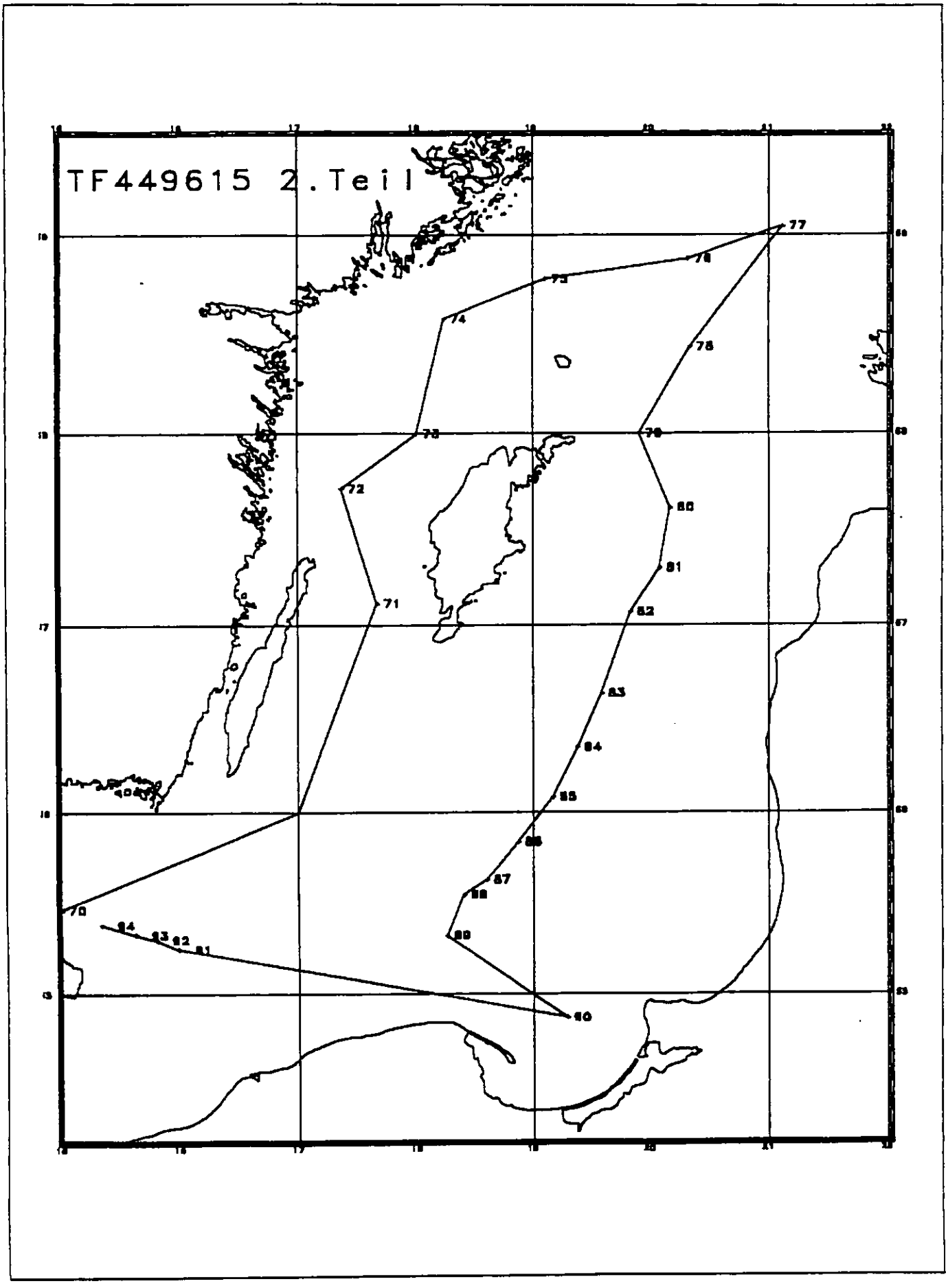
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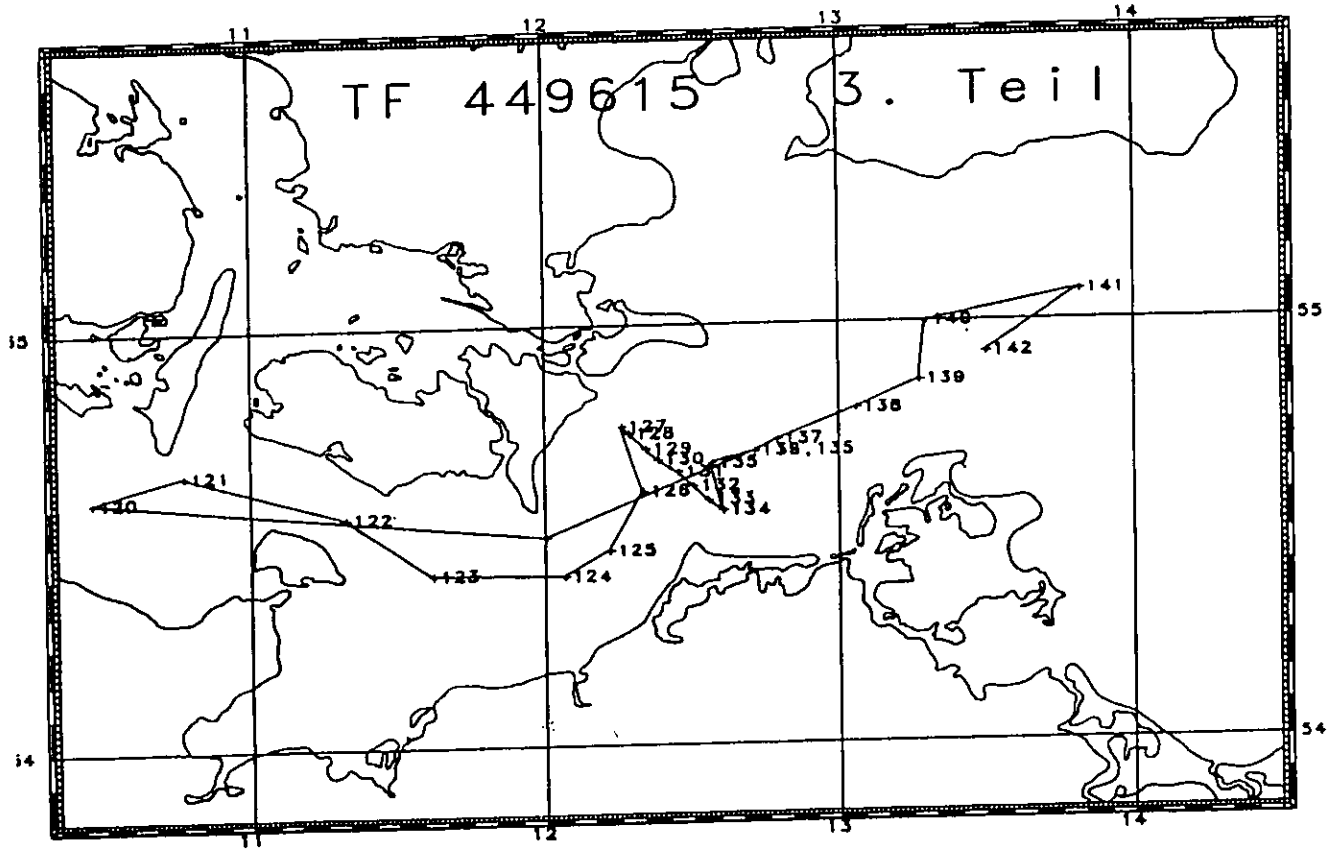
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Monitoring Oktober/November 1996

Fig. 1

Temperature [°C]

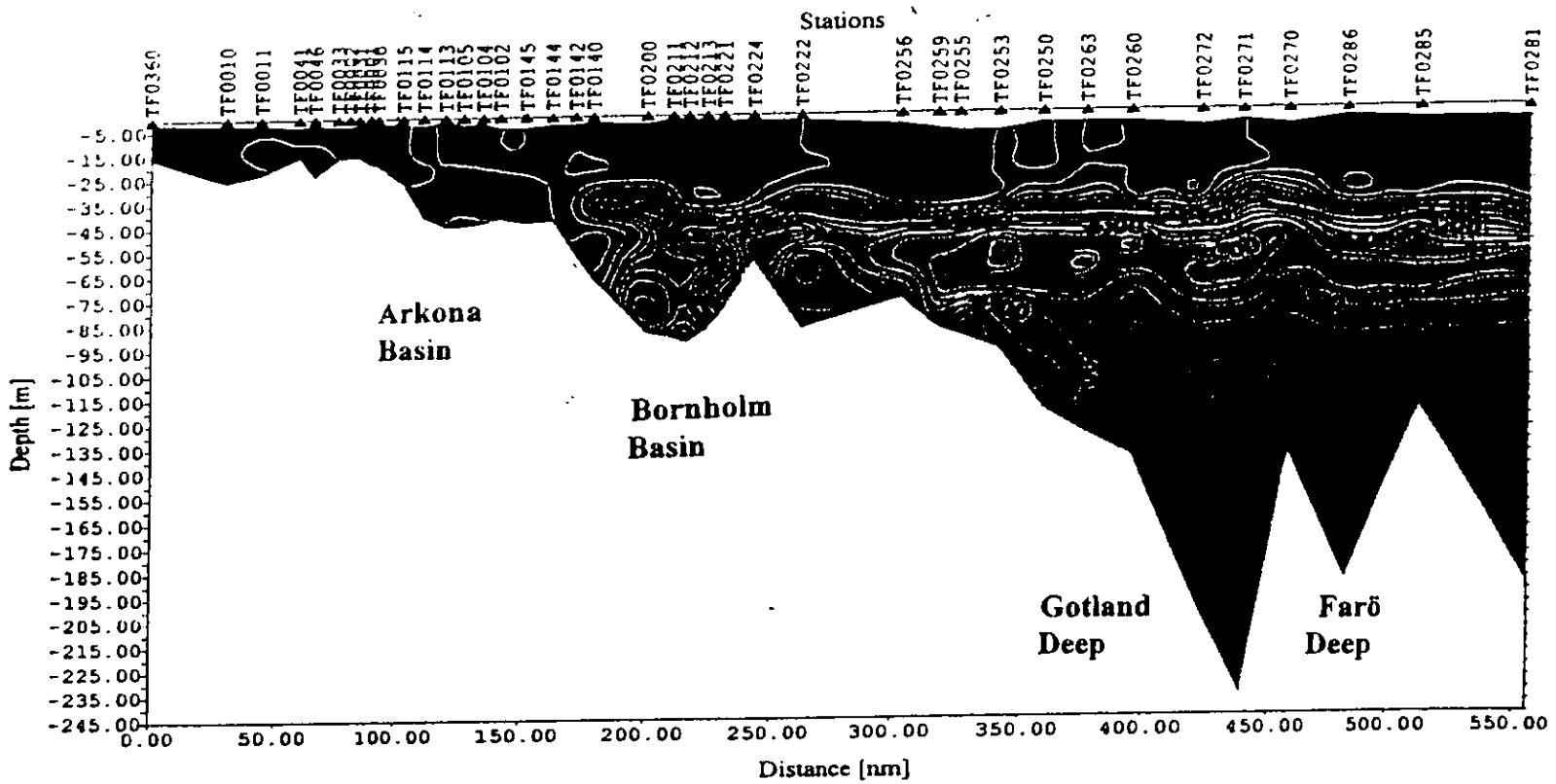

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Fig. 2

Monitoring Oktober/November 1996

Salinity [PSU]

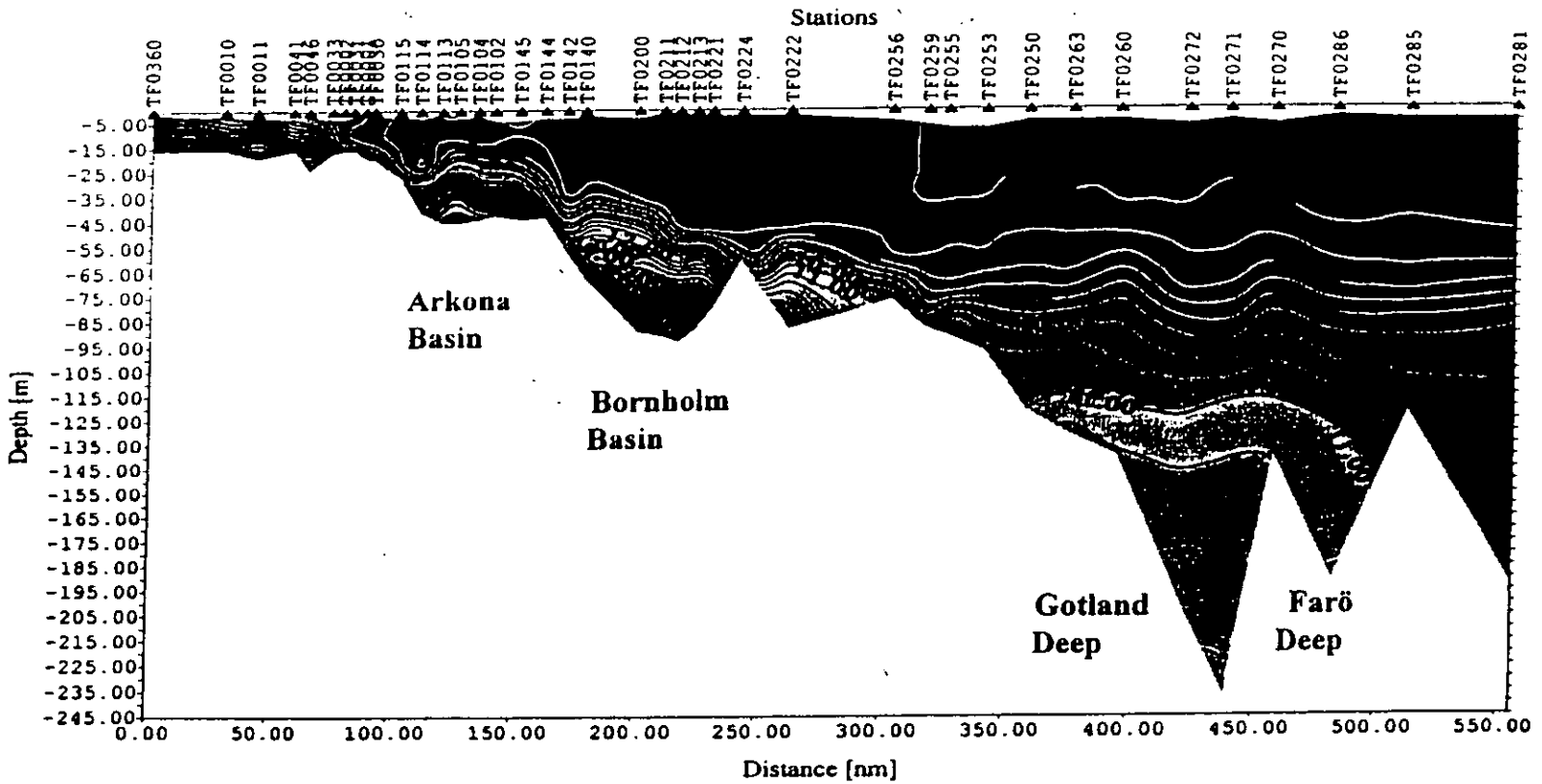

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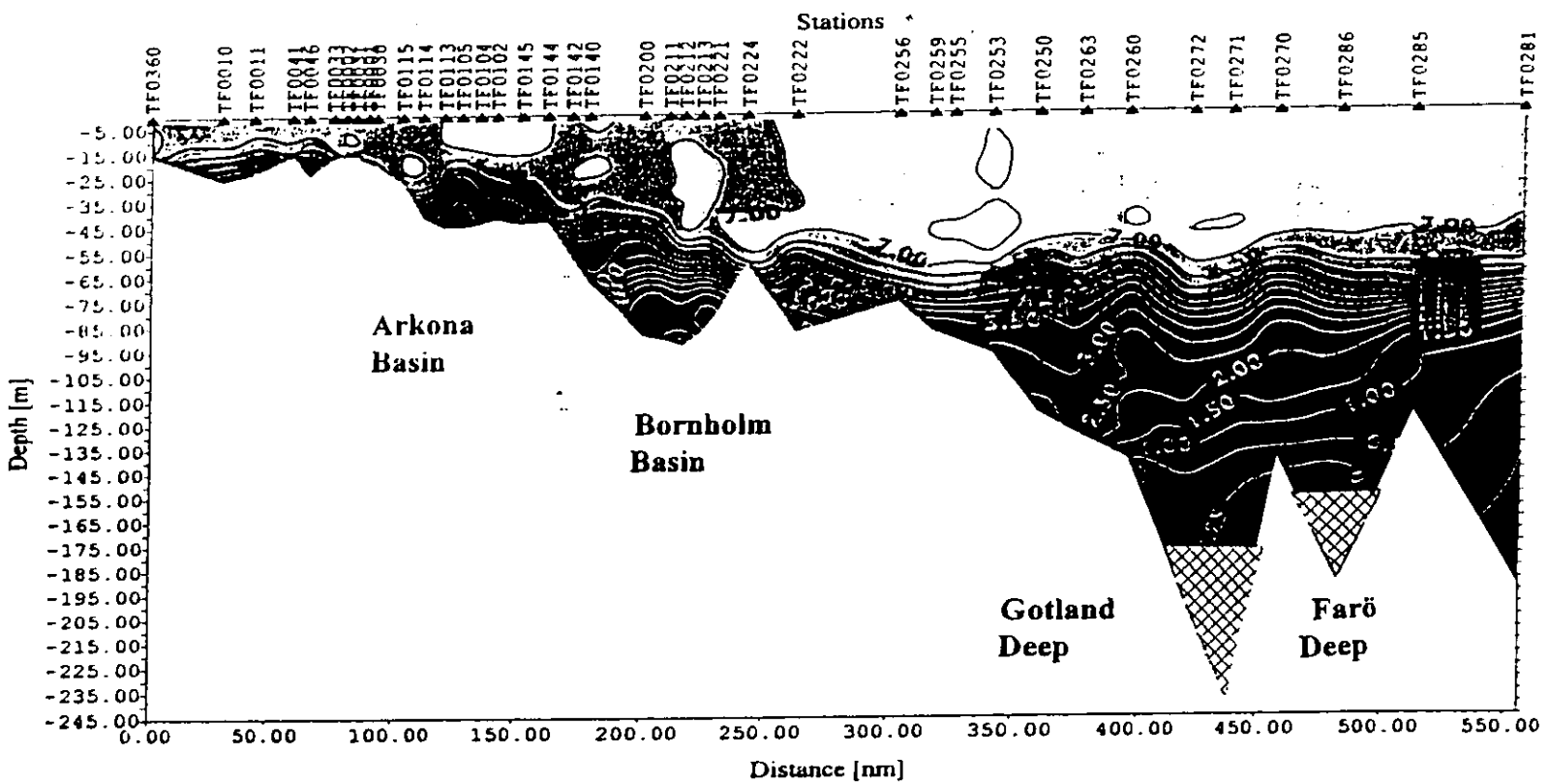
Fig. 3

Monitoring Oktober/November 1996

Oxygen [uncorrected sensor values] (cm3/dm3)



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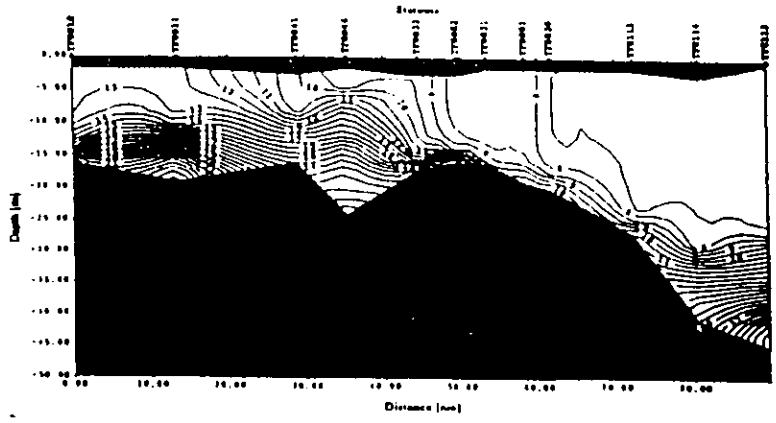
Monitoring Oktober/November 1996

Fig. 4a

Salinity



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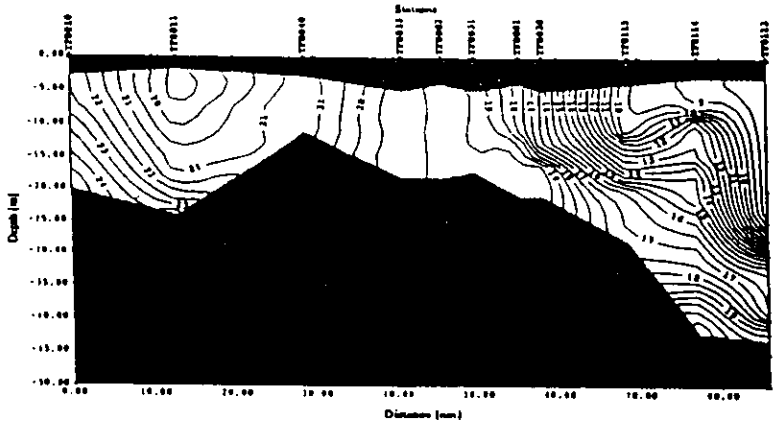
Monitoring Oktober/November 1996

Fig. 4b

Salinity



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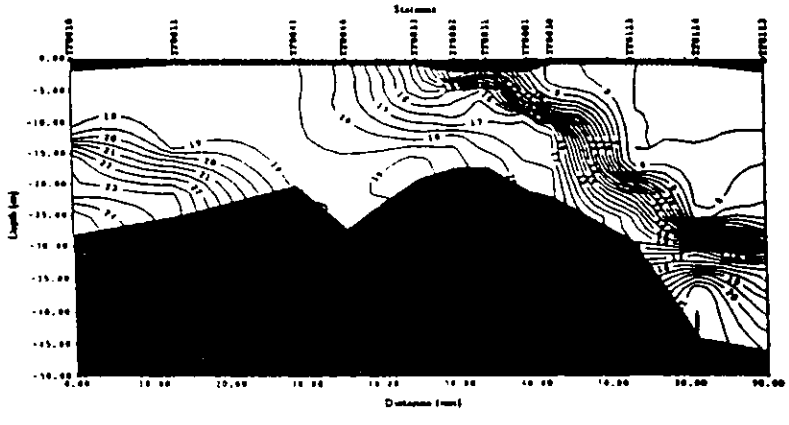
Monitoring Oktober/November 1996

Fig. 4c

Salinity



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