

Baltic Sea Research Institute Warnemünde

Cruise Report



R/V "GAUSS"

Cruise- No. 11 / 02 / 01 (Gauss 378)

29 January - 12 February 2002

This report is based on preliminary data

Institut für Ostseeforschung Warnemünde
an der Universität Rostock
Seestraße 15
D-18119 Rostock- Warnemünde
GERMANY

 +49-381-5197-0
 +49-381-5197 440

1. **Cruise No.:** 11 / 02 / 02 (GAUSS 378)
 2. **Dates of the cruise:** from 29/01/2002 to 12/02/2002
 3. **Particulars of the research vessel:**
 - Name: r/v 'GAUSS'
 - Nationality: Germany
 - Operating Authority: Bundesamt für Seeschifffahrt und Hydrographie (BSH), Hamburg
 4. **Geographical area in which ship has operated:**
Baltic Sea between Kiel Bight and northern Gotland Sea
 5. **Dates and names of ports of call**
 - Saßnitz 04 – 05/02/02
 6. **Purpose of the cruise**
Monitoring cruise in the frame of the HELCOM COMBINE programme
 7. **Crew:**
 - Name of master: K.-P. Walde
 - Number of crew:
 8. **Research staff:**
 - Chief scientist: Klaus Nagel

 - Participants :

Carina Bartsch	Günter Plüschke
Jan Donath	Oliver Primm
Ursula Hennings	Johann Ruickoldt
Käte Kunert	Birgit Sadkowiak
Astrid Lerz	Astrid Schultz
Ines Petersohn	Katharina Wörz
 9. **Co-operating institutions:**
All institutions dealing with HELCOM BMP
 10. **Scientific equipment :** CTD , water samplers, plankton net
-

11. General remarks and preliminary result

The area under investigation covered the Baltic Sea between Kiel Bight and the northern Gotland Basin as shown in the attached maps. Marine meteorological, hydrographic, chemical and biological investigations were performed according to both, the Baltic Monitoring Programme (BMP) and the Coastal Monitoring Programme (CMP) of HELCOM.

For some selected stations characteristic for different regions of the Baltic Sea, preliminary data of hydrographic and hydrochemical parameters in the surface and the near-bottom layer are compiled in the attached tables. These results are also compared with mean values calculated from the measurements performed during the February cruises of the years 1971 to 1990.

The weather during this cruise was very mild for this time of the year. Air temperatures varied between 4°C and 10°C. Several weak frontal systems passed during the time of the cruise causing moderate winds (mostly between 5 m/sec and 12 m/sec) from west to south. Only at the end of the cruise the weather becomes stormy with wind speeds exceeding 15 m/sec for two days.

Due to the mild winter, temperature in the surface layer was above the long term mean at all stations mentioned in attached tables, but still within the deviation observed at these stations. Salinity in the surface layer was slightly below the long term mean for the stations in the southern and central areas of the Baltic Sea. However, the western part Baltic Sea from Kiel Bight and Lübeck Bight up to Darss sill is well filled with water of higher salinity. Concentrations of nitrate and phosphate showed some variations compared to the values measured last year in February, but do not differ significantly from those values expected from the long term mean. However, nutrient concentrations in the Lübeck Bight were significantly lower than the long term means, in 2002 as well as already in February 2001. No evidence has been found that spring bloom had started in any area under investigation.

The temperature measured in the bottom layers of the deep basins was significantly above the long term means. These high temperatures had been already observed during the whole year 2001 and are contributed to relatively mild temperatures in winter during the last two years. In these areas, salinity in the bottom layer did not differ significantly from the values expected from the long term means. However, in contrast to the measurements in February 2001 and November 2001, no H₂S was found in the Bornholm Basin and H₂S concentrations in the eastern Gotland basin are dramatically reduced in

the water layer between 200 m and bottom (see attached profile of station TF0271). H₂S concentrations (expressed as negative O₂ – equivalents) decreased between November 2001 by about 75 %. As during the same time salinity increased by about 0.5 PSU and 0.3 PSU in the Bornholm Basin and eastern Gotland Basin, respectively, the observed changes were obviously caused by minor inflows in October and November 2001. While the oxygen concentration in the saline water was high enough to oxidise the H₂S in the Bornholm Basin completely, H₂S concentrations in the bottom layer of the Gotland Basin were only reduced from –4.74 ml/l in November 2001 to –0.97 ml/l in February 2002. H₂S concentrations between 125 m and the 200 m layer at station TF0271 - and other stations near by - were not affected by these inflows and did not change significantly since February 2001.

The nutrient situation in the bottom layers of the deep basins reflect the oxygen situation. In areas in which concentrations of H₂S decreased, also those of phosphate and ammonia decreased. In regions with stable anoxic conditions, e.g. Fårö Deep and western Gotland Basin, concentrations of phosphate and ammonia remained quite stable during the last months.

Klaus Nagel
Scientist in charge

Attachments :

- tables of preliminary results (surface layer and near bottom layer)
- comparison of actual data with mean values calculated from the measurements during the February cruises of the years 1971 – 1990 (surface layer and near bottom layer)
- profiles of oxygen concentrations at station TF0271 (eastern Gotland Basin)
- transects of temperature, salinity and oxygen between Kiel Bight and northern Gotland Sea
- map showing oxygen concentrations near the bottom
- track charts

Preliminary results of hydrographic and hydrochemical parameters at selected stations -
surface layer -

Station Date	Stat.Name Stat.No. **)	Temp. °C	Salinity PSU	NO ₃ *) µmol/l	PO ₄ µmol/l	SiO ₄ µmol/l	O ₂ ml/l
Kiel Bight 30/01/02	TF0360 5	3.86	18.47	6.81	0.77	19.2	8.05
Mecklenburg Bight 30/01/02	TF0012 9	3.30	15.680	6.84	0.63	16.2	8.31
Lübeck Bight 29/01/02	TF0023 1	3.00	15.270	6.35	0.60	16.3	8.27
Arkona Basin 31/01/02	TF0113 22	3.32	8.23	3.51	0.48	10.5	8.48
Pomeranian Bight 03/02/0	TFOB4 43	3.30	7.70	10.16	0.61	17.8	8.90
Bornholm Deep 02/02/00	TF0213 42	3.41	7.32	3.33	0.61	11.9	8.71
Stolpe Channel 05/02/02	TF0222 53	3.16	6.94	3.06	0.60	13.0	8.85
SE Gotland Basin 06/02/02	TF0259 55	3.17	6.92	3.12	0.68	18.8	8.67
Gotland Deep 07/02/02	TF0271 62	3.80	7.26	3.59	0.58	11.0	8.55
Fårö Deep 08/02/02	TF0286 64	3.33	7.02	3.92	0.59	11.6	8.69
Landsort Deep 09/02/02	TF0284 66	2.36	6.54	4.35	0.67	14.4	8.87
Karlsö Deep 09/02/02	TF0245 68	2.82	6.74	3.25	0.66	13.8	8.74

*) NO₃ is given as sum of NO₃⁻ and NO₂⁻ (in most samples NO₂⁻ was present only in traces)

**) see attached maps

Preliminary results of hydrographic and hydrochemical parameters at selected stations
– near bottom layer -

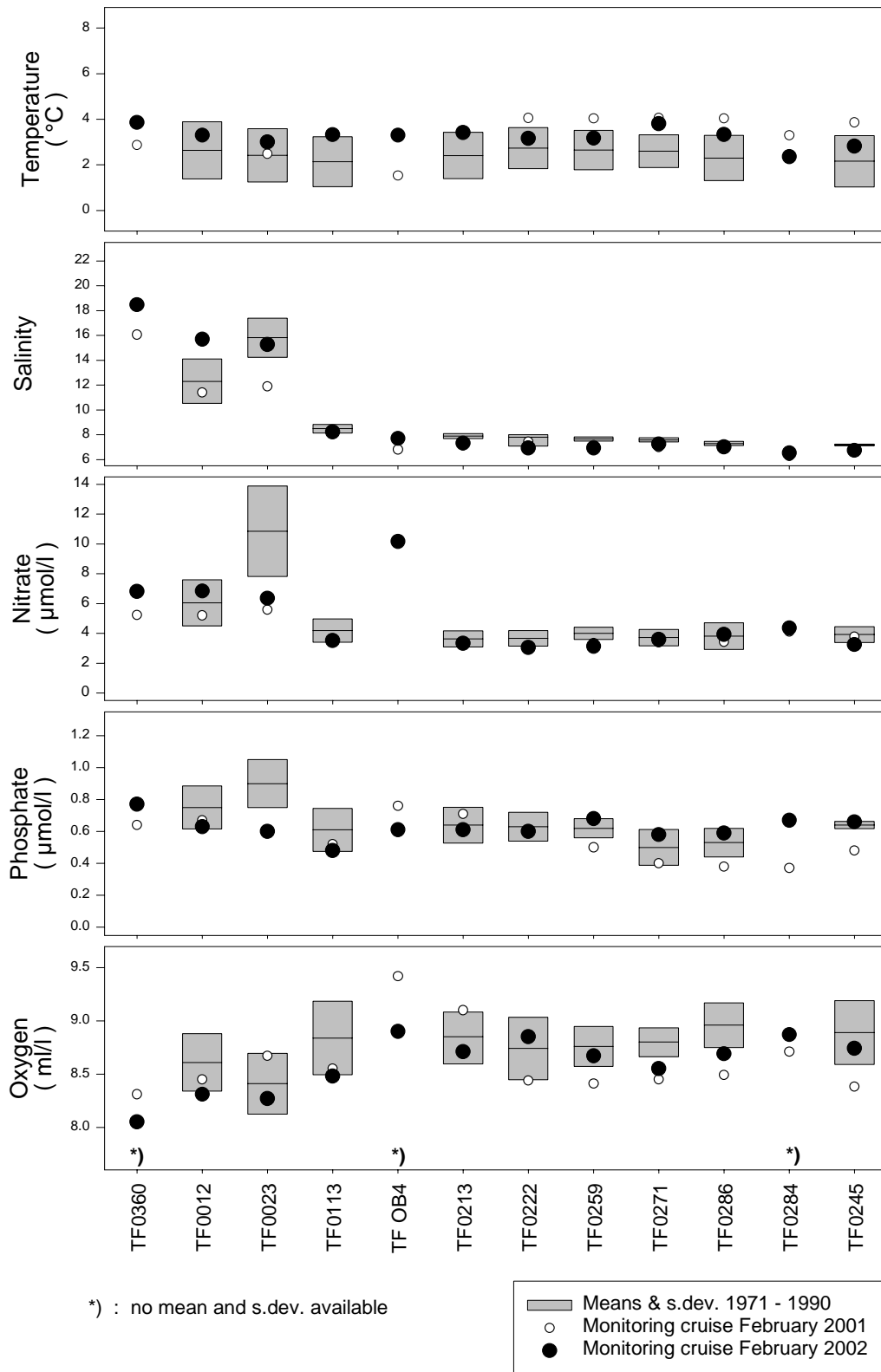
Station Date	Stat.Name Stat.No. **)	Depth m	Temp. °C	Salinity PSU	NO ₃ *) µmol/l	PO ₄ µmol/l	SiO ₄ µmol/l	O ₂ ***) ml/l
Kiel Bight 30/01/2002	TF0360 5	21	4.15	21.26	7.10	0.72	18.2	7.67
Mecklenburg Bight 30/01/2002	TF0012 9	25	3.82	18.83	6.84	0.67	16.6	7.92
Lübeck Bight 29/01/2002	TF0023 1	24	2.97	15.32	6.36	0.70	17.0	8.25
Arkona Basin 31/01/2002	TF0113 22	48	4.08	17.59	6.90	0.70	14.6	7.19
Pomeranian Bight 03/02/2002	TFOB4 43	13	3.35	7.73	10.10	0.62	17.7	8.74
Bornholm Deep 02/02/2002	TF0213 42	88	9.20	16.09	9.63	2.40	45.3	1.45
Stolpe Channel 05/02/2002	TF0222 53	91	8.96	13.64	9.25	2.40	44.8	2.09
SE Gotland Basin 06/02/2002	TF0259 55	89	5.44	10.22	4.18	3.24	47.5	0.21
Gotland Deep 07/02/2002	TF0271 62	238	6.89	12.33		3.78	60.3	-0.97 (H ₂ S)
Fårö Deep 08/02/2002	TF0286 64	189	5.91	11.31		5.47	64.3	-3.10 (H ₂ S)
Landsort Deep 09/02/2002	TF0284 66	434	5.28	10.23		4.50	57.1	-1.00 (H ₂ S)
Karlsö Deep 09/02/2002	TF0245 68	107	4.93	9.75		4.10	55.2	-0.71 (H ₂ S)

*) NO₃ is given as sum of NO₃⁻ and NO₂⁻ (in most samples NO₂⁻ was present only in traces)

**) see attached maps

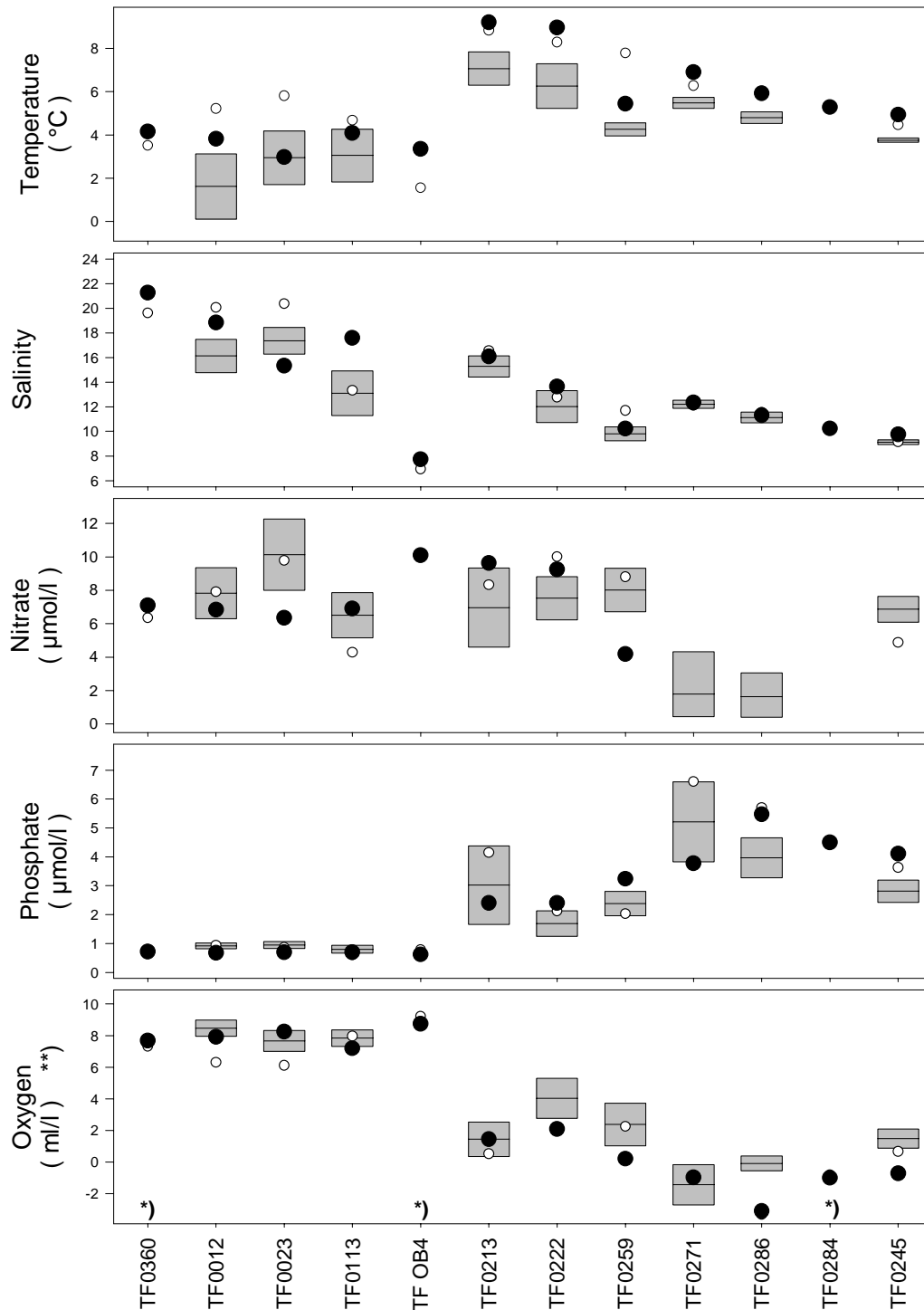
***) H₂S was converted to negative O₂ - equivalents

Monitoring stations / February cruises : near-surface layer

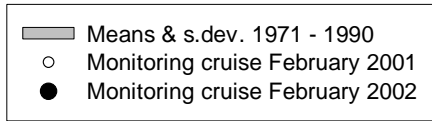


K. Nagel \ st_0202s \ 11/02/2002

Monitoring stations / February cruises : near-bottom layer

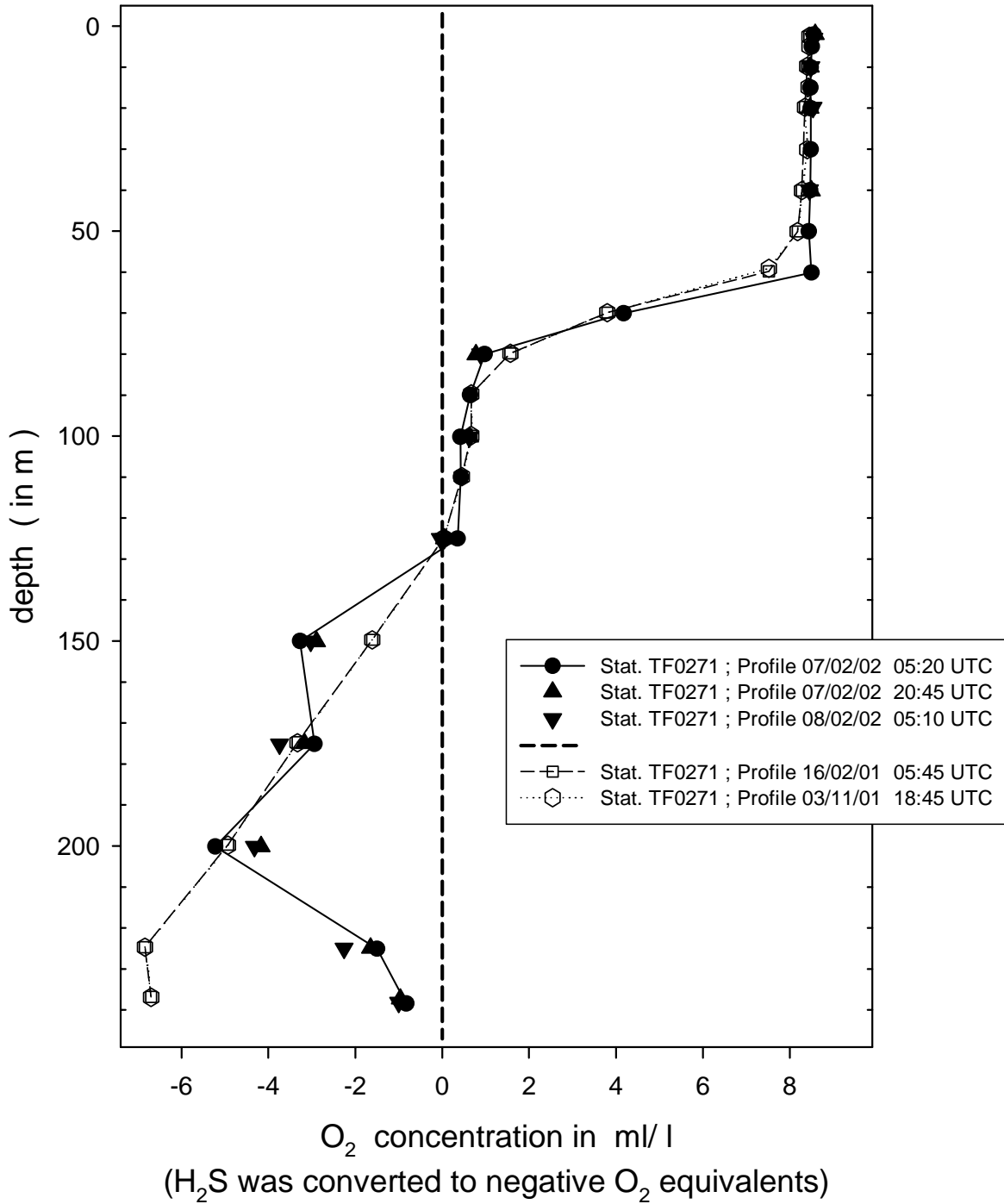


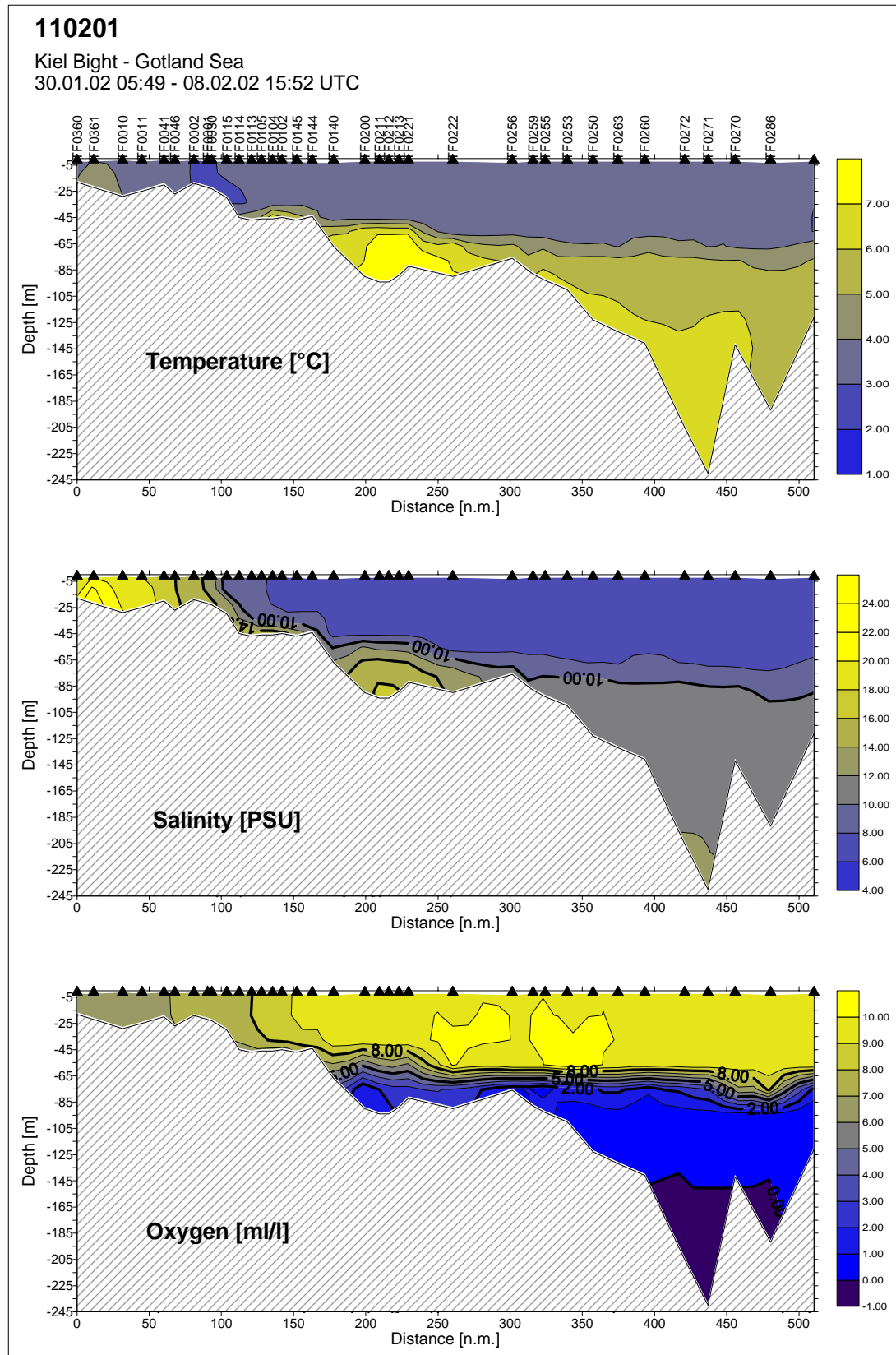
*) : no mean and s.dev. available
 **) : H₂S was converted to negative O₂ equivalents



K. Nagel \ st_0202b \ 11/02/02/00

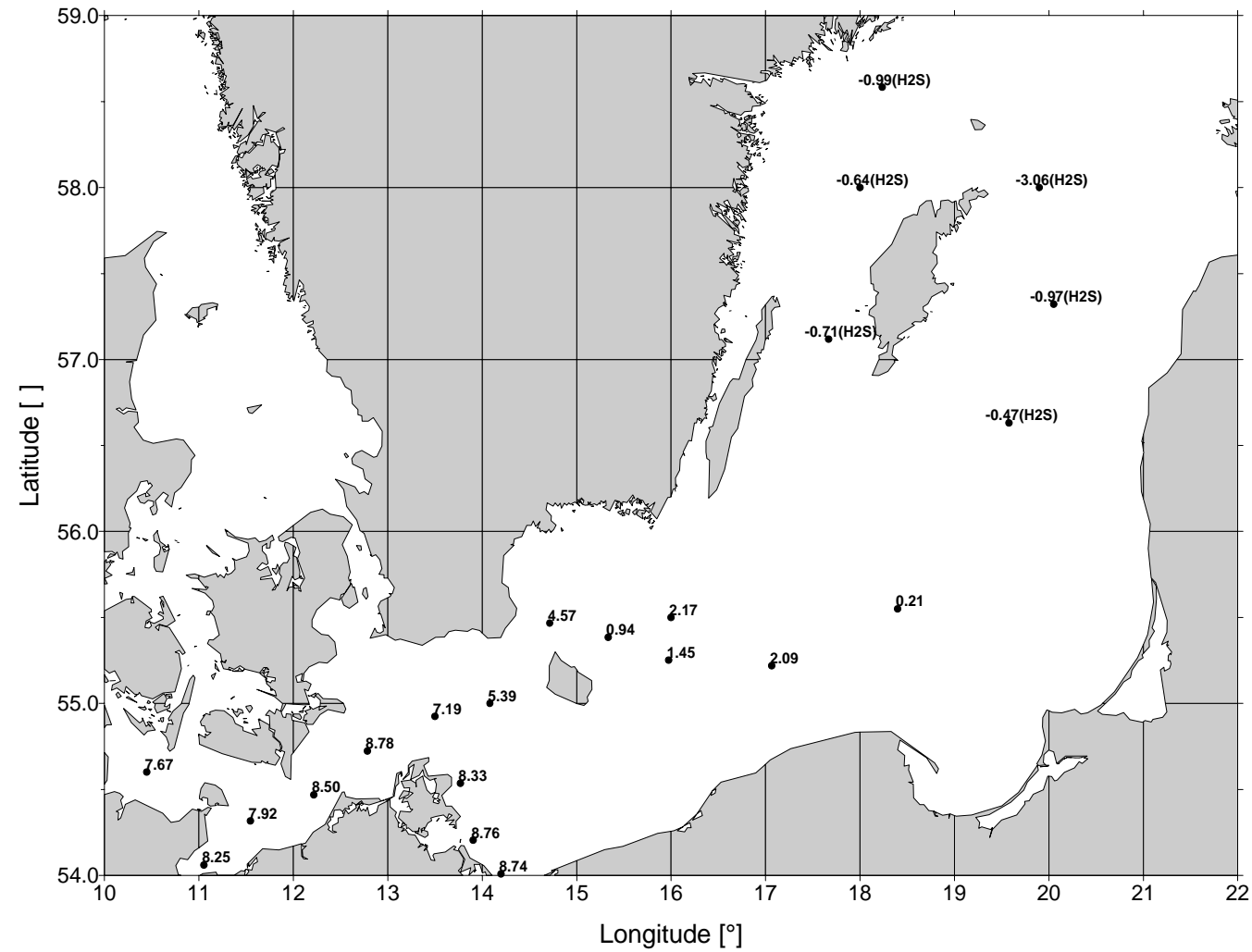
TF 02/2002
O₂ / H₂S condition Eastern Gotland Basin





020203S5V1.srf

IOW 2001, Sektion Physik - J.Donath



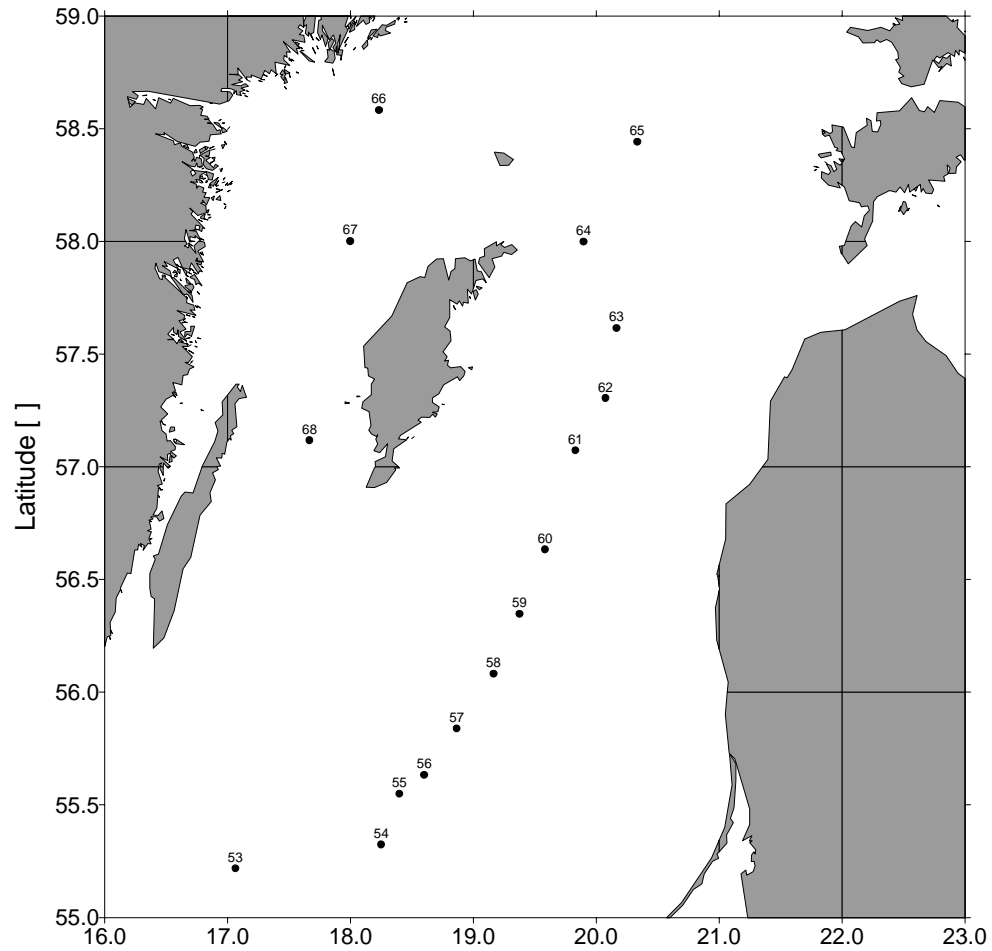
CRUISE

FEBRUARY 2002

TF 110202

Oxygen bottom
concentration

29.01.02 - 14.02.02



Station map

Monitoring 02/2002

TF 2002 / 02

16 stations (part2)

29.01.02 - 14.02.02