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Oceanographical Laboratory

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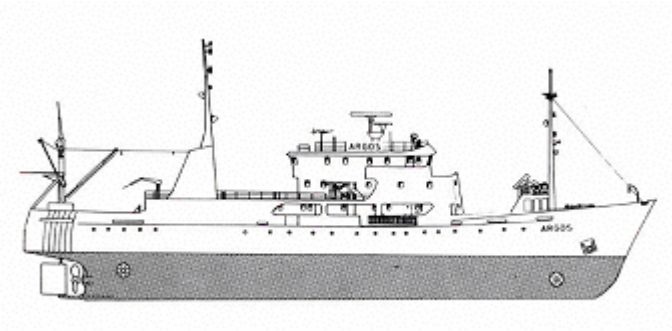
CRUISE REPORT FROM R/V ARGOS



Survey period: 2009-06-29 - 2008-07-04

Survey area: The Skagerrak, Kattegat, Sound, and Baltic Proper

Principal: SMHI

SUMMARY

The expedition took place within SMHI's regular marine monitoring programme and covered Skagerrak, Kattegat, the Sound and the Baltic Proper.
Data presented in this report have been subject to preliminary quality control procedures only.
N.B! Mean and standard deviation in figure **N14 Falkenberg** is not based on data from Oceanographical Laboratory neither for sampling nor for analysis why any comparison with this years data is without relevance.

Surface temperatures were higher than normal in the Skagerrak and the Kattegat. Nutrient concentrations in the surface layer were normal for the season with exception of higher phosphate and silicate level in the southern Kattegat
In the northern Kattegat (Fladen) bottom water oxygen concentration was 4.4 ml/l and in the Arkona Basin (BY1) 3.6 ml/l. Oxygen concentrations in the Baltic Proper were below 2 ml/l everywhere at depths exceeding 60 – 80 metres.
Hydrogen sulphide was found below 100 metres in the eastern- and from 80 – 90 metres in the western Gotland Basins.
Surface accumulations of cyanobacteria (blue green algae) were observed in the Baltic.
A more detailed report on the algal situation can be found at: **Algal report (Pdf)**

The next expedition is scheduled for July 27 to August 01, 2009.

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PRELIMINARY RESULTS

The cruise, part of SMHI´s ordinary monitoring programme, began in Gothenburg on June 29 and ended in the same port on July 4. The winds during the expedition were weak to moderate from a dominating direction of northeast. Air temperature varied between 16-26°C.
Zooplankton samples were taken as part of the Bazooca project, studying the occurrence of the comb jelly Mnemiopsis.

The Skagerrak

Surface water temperatures were above normal throughout the investigated area. The highest, 19.8°C at Å13 and 18.7°C at the entrance of the Gullmar Fjord and at P2. Surface salinities increased from 22,5 psu outside Lysekil, which was lower than normal to 30 psu in the central parts. Thermo- and halocline both began not deeper than 10 meters. Secchi depths varied between 8 and 11 metres.
Phosphate and nitrite-nitrate concentrations, in the surface waters, were below detection limits for each parameter, phosphate and nitrite 0.02 µmol/l and nitrate 0.1 µmol/l. Silicate concentrations varied between 0.1-0.7µmol/l.

The phytoplankton diversity was low in the Skagerrak area and the samples were dominated by the dinoflagellate genus *Ceratium*. The chlorophyll fluorescence maximum at the Skagerrak coast (P2) was dominated by *Ceratium* spp.

The Kattegat and the Sound

N.B! Mean and standard deviation in figure **N14 Falkenberg** is not based on data from Oceanographical Laboratory neither for sampling nor for analysis why any comparison with this years data is without relevance.
Surface water temperatures in the Kattegat varied between 18-20°C, which is higher than normal for July. The highest temperature was measured at Läsö E. In the Sound at W Landskrona temperature was normal, 17°C. Surface salinities varied between 8.2 (the Sound) and 21.4 psu. At Anholt E surface salinity was much lower than normal, 9.8 psu, due to an outflow of Baltic water. Thermo- and halocline began shallow, in the Kattegat not deeper than 10 metres and in the Sound at a depth of 12 metres. Secchi depths were between 5 (the Sound) and 8 metres.
Nitrate concentrations in the surface waters were close to zero. Phosphate values were higher than normal at Anholt E, as well as in the Sound, 0.19-0.26 µmol/l. In the remaining parts phosphate level was ca. 0.04 µmol/l. Also silicate concentration was enhanced at Anholt E, 7.1µmol/l. Otherwise silicate level varied between 0.8-7.9 µmol/l, where the highest value was measured in the Sound.
The lowest oxygen concentration in the bottom water was measured at Fladen, 4.4 ml/l corresponding to a saturation of 66%.

At the Kattegat coast (N14), *Proboscia alata* was the most numerous species and the filamentous cyanobacterium *Anabaena* spp. was common in the whole area. Chlorophyll fluorescence maxima at N14 and Anholt E were dominated by the flagellate *Dictyocha speculum* and the dinoflagellate genus *Ceratium* spp.

Baltic Proper

Surface water temperature was about 15-20°C. The temperatures were normal at almost all stations in the Baltic. Higher temperature than normal was measured at BY20 and in the Kalmar Sound. The halocline began at 30 to 35 metres in the Arkona Basin, at 45 metres in the Bornholm Basin and at 60 to 80 metres in the remainder of the Baltic. The thermocline began at depths of 10 - 20 metres. Secchi depths varied between 4 and 7 metres.

Nutrient concentrations of surface layer were normal for the summer in the whole area, i.e. phosphate 0.1 to 0.2 µmol/l, silicate 8 to 10.7 and nitrate less than 0.1 µmol/l, which is the limit of detection.
Oxygen concentration in the bottom water of the Arkona Basin (BY1) was 3.6 ml/l. Oxygen concentrations below 2 ml/l were found deeper than 60 – 80 metres in the remainder of the Baltic. Hydrogen sulphide was found from 100 metres in the Eastern Gotland Basin, and from 80 – 90 metres in the Western Gotland Basin.
Oxygen saturation of more than 130% was measured in the Western Gotland Basin and at Fårö, indicating strong algae bloom. At all measurements in the Baltic fluorescence peaks were recorded at a depth of 10-20 metres. The highest value, 6 mg/m3, was measured at BY1.

Surface accumulations of cyanobacteria were observed north and south of Drogden. Accumulations reappeared east of BY5 and were visually observed half of the distance towards BCS III-10. At BCS III-10 the accumulations increased and northwards passing Gotland there were dense patches of cyanobacteria. Dense accumulations were observed north of Öland and southwards in the sound of Kalmar. Thick patches of cyanobacteria accumulations were observed south of Hanö Bight. The filamentous cyanobacteria *Aphanizomenon* spp. and *Nodularia spumigena* (toxic) were abundant at most of the Baltic stations.

PARTICIPANTS

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Lina Elgeskog	Student	

Plots

Click on the button to open appendices. Note that this will only work when connected to Internet!

APPENDICES

- Track chart
- Table over stations, parameters and sampling depths
- Map showing bottom oxygen concentrations
- Monthly average plots for selected stations
- Profiles for selected stations