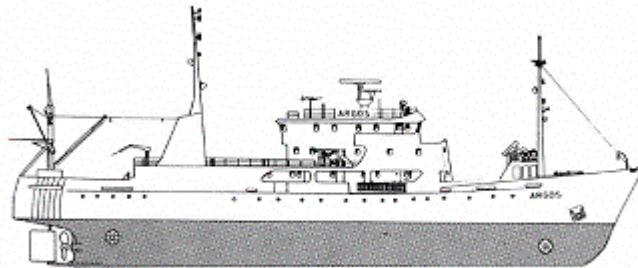


CRUISE REPORT FROM R/V ARGOS



Survey period: 2004-03-21 - 2004-03-26

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

Principal: SMHI

SUMMARY

The expedition was part of SMHI's regular marine monitoring programme and covered the Skagerrak, the Kattegat, the Sound and the Baltic Proper.

Data presented in this report have been subject to preliminary quality control procedures only.

Oxygen concentrations below 2 ml/l were found in the Baltic at depths exceeding 70 to 80 metres. Hydrogen sulphide was found in the Northern Baltic Proper and West Gotland Basin, at depths exceeding 80 to 90 metres. Surface phosphate and silicate levels in the northern part of the Baltic were above normal values, while inorganic nitrogen showed lower than normal values. Surface DIN was close to zero from the Sound to Hanöbukten, indicating the start of the spring bloom – about a month earlier than normal. There are indications that the initial bloom is subsiding at Anholt E, in the Kattegat, and just beginning in the Skagerrak.

The next expedition is scheduled for April 19 to 23, 2004.

PRELIMINARY RESULTS

The cruise, part of SMHI's ordinary monitoring programme, began in Karlskrona on March 21 and ended in Göteborg on March 26. The winds during the expedition varied from weak to fresh mainly from north to west.

Baltic Sea

Surface water temperature varied from 2°C in the north to 3°C in the south, which is typical for the season. The surface mixed layer was well defined throughout the sea. East and west of Gotland, the thermocline and halocline were found at 50 – 60 metres, while in the Southern Baltic, they were just shallower, at 40 – 50 metres. In the Arkona Basin, bottom water oxygen conditions were good (5 – 7 ml/l at ~40 metres). In the rest of the Baltic however, oxygen concentrations were below 2 ml/l at depths exceeding 70 to 80 metres. The Autumn 2002 – Spring 2003 inflows, renewed the bottom water in the Eastern Gotland Basin, where an oxygen minimum now exists between 80 and 90 meters depth. Hydrogen sulphide has returned to BY20 below 200 metres. The inflow has not reached west of Gotland, where hydrogen sulphide exists from 80 metres and downwards in the Norrköping Deep, and from 90 metres in the Karlsjö Deep. Bottom oxygen concentration at these two stations is two standard deviations below the 1990 – 1999 mean.

Surface Dissolved Inorganic Nitrogen (DIN: the sum of nitrate, nitrite and ammonium) are below the 1990 – 1999 average at all stations. From the Hanö Bight and westwards, levels are close to the detection limit. Surface phosphate concentration remains very high around Gotland. Levels are more than one standard deviation above the mean on both sides of Gotland, from BY20 in the north, to BCS III-10 in the south. In the Bornholm Basin, levels are also elevated, but only slightly above the mean. From the Hanö Bight and westwards, surface phosphorus concentrations are below average. Surface silicate values are above average to the west and north of Gotland (Karlsjö Deep; Norrköping Deep and BY20). From the Gotland Deep southwards, and into the east of the Bornholm Basin, levels were normal. From Christiansö westwards, levels were below average for the time of year.

The low nutrient concentrations, reduced Secchi depth (6 – 7 metres in the south western Baltic, compared to around 15 metres further north), supersaturation of surface oxygen and high fluorometer values reported by the CTD indicate that the spring bloom has spread as far east as Christiansö. This is approximately one month earlier than during the 1990s.

The Kattegat and the Sound

Surface water temperatures were between 3.5-4.5°C, which is normal for this time of year. The thermocline was found at 18 metres at West Landskrona (with another at 3 metres); 13 – 18 metres at Anholt East, and about 17 metres at Fladen. Surface salinity was normal at W. Landskrona and Anholt E., but was significantly lower than normal at Fladen. The halocline was found at the same depth as the thermocline at these three stations. Drogden East, at the southern entrance to the Sound, was stratified, with 9 psu at the surface and just under 17 psu at the bottom, at 11 metres. This is unusual. Fluorescence, measured with the CTD, showed maxima above 15 metres at W. Landskrona, Anholt E. and Fladen. Surface phosphate concentration was just below average for the time of year from Öresund northwards. DIN was close to zero, and silicate was below average at West Landskrona and Anholt East. It was above average at Fladen.

Surface oxygen saturation was average for the time of year at West Landskrona and Fladen, at around 105%. At Anholt East it was about 101%. This is below average, and also below the high values observed at the beginning of the month. Bottom oxygen levels were normal for the time of year.

Observations of relatively high bottom salinity in the Arkona Basin, and the weak northward current in the Sound, suggest that a small inflow event had just finished. The high levels of oxygen saturation, fluorometer data and the low nutrient concentrations indicate that the spring bloom was still in progress, though the reduction in oxygen saturation at Anholt E. may indicate that the initial activity has peaked there. Higher than normal silicate levels at Fladen can be attributed to Baltic Outflow water, also explaining the lower-than-normal salinity at this station.

The Skagerrak

Surface water temperatures varied between 3 and 5°C, lowest at the coast, highest in the central parts. This is normal for the time of year. Surface salinity varied from 21 psu at Släggö, in the coastal area, to 34 psu at Å17 (offshore). Thermocline and halocline were found at the same depth: 10 – 20 metres offshore; above 10 metres inshore. Between P2 and Å13 there was no surface mixed layer, with stratification extending all the way to the surface. Surface phosphate concentrations were below average inshore (0.1 – 0.2 µmol/l at stations P2 and Släggö) and slightly above average offshore (0.2 – 0.4 µmol/l at stations Å13 and Å17). Surface DIN and silicate were also below average inshore (1 – 4 µmol/l and 2 – 4 µmol/l respectively). Oxygen saturation in the surface waters was above 100% at all stations, though the CTD fluorometer only registered enhanced chlorophyll levels at the inshore stations (P2, Släggö and Å13). Oxygen levels at the bottom were more than one standard deviation above the seasonal average at the offshore stations, and close to average inshore.

The reduced nutrient concentrations inshore, together with the fluorometer data and the oxygen saturation, indicate that the spring bloom is underway at these stations. The high levels of oxygen saturation observed offshore, and the decrease in nutrient concentrations compared with those observed during the previous cruise would suggest that the bloom is underway offshore as well. The lack of signal from the fluorometer suggests however that any bloom may still be at a very early stage.

PARTICIPANTS

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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