

Report from SMHI's monitoring cruise on board KBV001 Poseidon



Survey period: 2012-03-20 to 2012-03-26
Survey area: The Skagerrak, Kattegat, 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 parts of the Baltic Proper. Data presented in this report have been subject to preliminary quality control procedures only.

In Skagerrak and Kattegat the spring bloom was over and the amount of nutrients was low, which is normal for the season. In the Baltic Proper winter conditions prevailed. The concentrations of nitrite+nitrate were normal while the amount of phosphate still were elevated at all stations and much over normal in the southwest parts. Silicate was also elevated in these areas. The inflow that occurred in November/December 2011 had reached the southeast parts of the Baltic Proper and had started to enter the eastern Gotland Basin. Hydrogen sulphide was found in the western and eastern Gotland basin from depth exceeding 95-100. Oxygen concentrations below 2 ml/l (hypoxia) were found from depth exceeding 80-85 meters in the eastern Gotland Basin, from 70-85 meters in the western Gotland Basin and the southeast Baltic Proper. In Hanö Bight hypoxia was found at depths exceeding 65 meters.

The next expedition will take part in mid-April.

PRELIMINARY RESULTS

The cruise, part of SMHI's ordinary monitoring programme, began in Göteborg on March 20th and ended in the same port March 26th. Winds during the expedition were fresh to strong during the first day. During the rest of the cruise, winds were weak to moderate and sunny weather prevailed. Due to missing permits to enter Danish waters the stations, BY4 and BY5, had to be excluded. To monitor the inflow that occurred in November/December 2011 extra CTD-profiles were taken at station BY9, BY7 Stolpe Trench and Stolpe Sill.

The Skagerrak

Surface water temperatures were normal and varied between 4.4 and 4.9°C. Surface salinities were also normal, varying between 25 to 31 psu. The thermocline was weakly developed, with the exception of offshore Skagerrak where the thermocline and halocline was found at 20 meters depth. At the coastal stations the halocline was found at 5- 10 meters depth.

The nutrients in the surface layer were normal for the season and had generally increased somewhat compared to the previous measurement in February when the spring bloom was ongoing.

The concentration of phosphate varied from 0.05 to 0.17 µmol/l and the sum of nitrite + nitrate varied from below the detection limit (<0.10) in offshore Skagerrak to 3.71 µmol/l in the southern parts. The amount of silicate varied from 0.7 to 2.8 µmol/l, lowest in the offshore Skagerrak and highest in the southern parts.

The spring bloom was over at the coastal stations but remains of the bloom could be seen in offshore Skagerrak as fluorescence in the surface layer. The oxygen saturation in the surface layer was lower than normal which indicates that the spring bloom was early this year.

The oxygen conditions in the offshore deep water were good, while the coastal stations, P2 and Släggö, showed much lower oxygen concentrations in the deep water than normal.

The Kattegat and the Sound

Surface water temperatures were normal and varied from 3.9 to 4.8°C. The surface salinity was normal, 19-23 psu, with the exception of the Sound in which the salinity was higher than normal, 16 psu. The halocline and thermocline were both found at 15 to 20 metres depth, there thermocline was weak.

The spring bloom was over in this area and consequently the amount of nutrients was low or completely consumed. The concentration of phosphates varied between 0.05 and 0.21 µmol/l. The sum of nitrite+nitrate varied from below the detection limit to 0.91 µmol/l and the silicate concentration from 0.3 to 3.9 µmol/l. The highest concentrations were found in the Sound.

The oxygen concentration in the deep water was lower than normal at all stations except from in the Sound where the oxygen situation was normal.

Baltic Proper

The temperature in the surface water was normal at all stations. At the coastal station Ref M1V1 the temperature was 1.7 °C, while the offshore temperature varied between 2.7 and 3.5°C. The thermocline and halocline were found at 30-35 meters depth in the Arkona Basin, 50 meters depth at Hanö Bight and in the central parts of the Baltic Proper from 65-70 meters depth.

The amount of nitrite+nitrate in the surface was normal and varied between 2.11 and 4.45 µmol/l, lowest in southwest and highest in northeast. The concentration of phosphate was elevated at all stations and much higher than normal in the Hanö Bight, the Kalmar Sound and in the Arkona Basin. The concentration varied between 0.71 and 0.91 µmol/l. The high concentrations of phosphate in these areas are most likely due to upwelling of deep water since surface salinity and

silicate were higher than normal. The silicate concentration was well above normal in the areas mentioned above and varied between 16.3 and 18.8 $\mu\text{mol/l}$. In the remaining parts of the Baltic Proper the silicate concentration varied between 12.7 and 14.9 $\mu\text{mol/l}$.

The oxygen condition in the southern parts of the western Gotland Basin had worsened compared to the previous visit in February. Hypoxia ($< 2 \text{ ml/l}$) was found at depth exceeding 80 meters and hydrogen sulphide was found close to the bottom. During the previous sampling occasion hypoxia was found from 85 meters depth and no hydrogen sulphide was found. The stratification was now somewhat stronger than in February.

The inflow that occurred in late 2011, which improved the oxygen conditions in the Hanö Bight, the Arkona Basin and the Bornholm Basin, had now reached the southeast part of the Baltic Proper and could be perceived at intermediate depth at BY10. At the station, BY9 Kleipeda, the inflow was observed from 100 meters depth to the bottom (122m), with oxygen concentrations of 0.5-1.2 ml/l and salinities of about 11.5 psu.

To monitor the inflow back to the Bornholm Basin, CTD-profiles were taken at BY7 Stolpe Trench and at Stolpe Sill. At Stolpe Trench the inflow was found in a 10 meters thick layer at the bottom with a salinity of 13 psu and oxygen concentration of about 2 ml/l. The CTD-profile at Stolpe Sill showed a 3 meters thick layer at the bottom with a salinity of 13 psu and oxygen concentration of 4.5 ml/l. Since similar salinities and temperature were found close to the bottom at Stolpe Sill (62 meters) and Stolpe Trench (88 meters) the inflow was still ongoing. The conditions in the Bornholm Basin could not be monitored since no permits to enter Danish EEZ were granted.

Oxygen concentrations below 2 ml/l (hypoxia) were found from depth exceeding 80-85 meters in the eastern Gotland Basin, from 70-85 meters in the western Gotland Basin and the southeastern Baltic Proper. In the Hanö Bight hypoxia was found at depths exceeding 65 meters.

The phytoplankton activity was low in the whole area. The CTD fluorescence showed low activity at all stations with the exception of BCSIII-10 where higher fluorescence was found at 20-35 meters depth. The oxygen saturation at these depths was slightly over 100%. At BY38 in the western Gotland Basin sparse surface accumulation of *Aphanizomenon* sp. were observed at the surface.

PARTICIPANTS

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APPENDICES



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

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