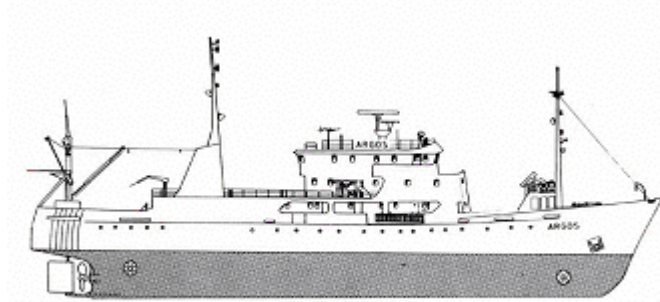


## CRUISE REPORT FROM R/V ARGOS



**Survey period:** 2006-12-04 - 2006-12-15

**Survey area:** The Skagerrak, the Kattegat, the Sound, the Baltic Proper and the Gulf of Bothnia.

**Principal:** SMHI

### SUMMARY

The expedition took place within SMHI's regular marine monitoring programme and covered the Skagerrak, Kattegat, Sound, Baltic Proper and Gulf of Bothnia.

This report is based on preliminary, part-quality controlled data.

Surface water temperatures in the Skagerrak and the Kattegat were above normal. High nutrient concentrations were found in the surface waters outside of Gullmarfjord, due to recent heavy rain. Concentrations in the southeastern Skagerrak were also high, due to influence from southern North Sea. An inflow to the Baltic was observed in the Sound.

Oxygen concentrations below 2 ml/l were found in the Baltic Proper at depths exceeding 60 to 70 metres. Hydrogen sulphide was found in the western, northern and eastern Gotland Basins at depths greater than 70 to 125 metres.

The next expedition is scheduled for January 15-20, 2007.

## **PRELIMINARY RESULTS**

The cruise, part of the SMHI's ordinary monitoring programme, began in Karlskrona on December 4<sup>th</sup> and ended in Gothenburg on December 14<sup>th</sup>.

The dominant weather during the first half of expedition consisted of moderate to strong winds from south to southwest. Air temperature was a few degrees above zero, except in the Bothnian Bay, where it was below zero.

The weekend was spent in Mariehamn.

During the second half of expedition, winds were from the same direction but considerably stronger. Air temperatures were extremely high for the season, 7 to 11°C. In spite of the very bad weather during the second half of the expedition, the sampling programme was completed thanks to the dedication of crew and scientific staff.

Water samples were taken for analysis of oxygen- and carbon isotopes for the University of Göteborg (FRISBEE-project),

### **The Skagerrak**

Surface water temperatures varied from 10°C in the central parts to 8°C in the coastal areas. This is above normal. Surface salinity was high in the open sea and the stratification weak.

Nutrient concentrations in the surface water were normal along the Å-transect. Phosphate was 0.4-0.6 µmol/l, nitrite+nitrate 4.2-5.5 µmol/l and silicate between 5 and 7 µmol/l. Nutrient concentrations in the water surface were strongly enhanced at Släggö, at the entrance of Gullmar Fjord, due to heavy rain. High concentrations were also observed at P2 in the southeastern Skagerrak due to influence from the southern North Sea.

The lowest oxygen concentration in the bottom water was measured at Släggö, 3.62 ml/l, corresponding to a saturation of 55%.

### **The Kattegat and the Sound**

Surface water temperatures were also higher than normal in this area. They increased from 8.1°C in the Sound to 8.8°C in the northern Kattegat. Surface salinities were higher than normal, ca. 28 psu in the northern part of Kattegat and 19 psu in the Sound, where an inflow to the Baltic was ongoing. Thermocline and halocline coincided and were found at a depth of 10 metres in the Sound and northern Kattegat, and as deep as 28 metres at Anholt E, though both were weak.

In the Kattegat, nutrient concentrations in the surface water were normal but they were elevated in the Sound. In the Kattegat, phosphate concentration was about 0.5 µmol/l, nitrite+nitrate 4.3-5.4 µmol/l and silicate 6.6-9 µmol/l. In the Sound phosphate was 0.7, nitrite+nitrate 7.2 and silicate 14.3 µmol/l.

The bottom water in Kattegat is now well oxygenated. The lowest oxygen concentration in bottom water was measured in the Sound at W Landskrona, 4.1 ml/l, ca. 70% saturation.

### **The Baltic Proper**

Surface water temperature varied from 5.8°C in the north to 7.8°C in the southwest, which is normal for the season. The thermocline and halocline both started at the same depth, 40 to 50 metres throughout the Baltic Proper, except for the Arkona Basin where they began at 30 metres. Surface phosphate concentrations varied between 0.4 and 0.6 µmol/l. In the eastern and northern Gotland Basins they were somewhat elevated but in the remaining parts normal. Silicate concentrations in the surface water varied from 4 to 17 µmol/l. They were normal in the Arkona Basin and in the southeastern part of the Baltic; below normal in the Bornholm and western Gotland Basins and above normal in the northern parts. Concentrations of nitrite+ nitrate in the surface layer were close to normal in the whole area, 0.6-3 µmol/l.



Oxygen concentrations below 2 ml/l were observed at depths exceeding 60 to 70 metres in the whole area. The bottom water of the Arkona Basins was well oxygenated with concentrations exceeding 5.0 ml/l.

In the Western Gotland Basin at the Karlsö Deep (BY38) hydrogen sulphide was found from 70 metres and below and from 90 metres at BY32. In the northern Gotland Basin hydrogen sulphide began at a depth of 125 metres in the Landsort Deep (BY31) and at 90 metres in the northeastern part (BY29). In the eastern Gotland Basin an intermediate flow of oxygenated water between 100 and 125 metres was found. Hence in the Fårö Deep (BY20) hydrogen sulphide was found from 90 to 100 metres and from 150 metres to the bottom and in the Gotland Deep at a depth of 100 metres and from 150 metres and below.

### **The Gulf of Bothnia**

Surface water temperatures in the Bothnian Bay varied between 2.4 °C in the centre and 4.5 °C in the southern part. In the Bothnian Sea, sea surface temperatures varied between 3.6 °C and 5.5 °C. In the Åland Sea the lowest temperature, 5.4 °C, was measured at the Sill in the south and 5.4 °C at F64 Solovjeva in the north.

Surface water salinity in the Bothnian Bay was about 3 psu. In the Bothnian Sea, and in the Åland Sea the surface water salinity was 5.0-5.5 psu. In the central Bothnian Sea a thermo- and halocline was observed at a depth of 50 -70 metres. Elsewhere stratification was very weak, which is typical for the time of year.

The lowest oxygen saturation, 55%, was measured at M6 in the Bothnian Sea, at a depth of 70 - 90 metres, where water contained 4.5 ml/l oxygen.

Surface water in the Bothnian Sea had a phosphate concentration of 0.14-0.30 µmol/l, a nitrate concentration of 1.8-4.0 µmol/l and a silicate concentration of 14.3 -23.4 µmol/l. The Bothnian Bay had lower phosphate concentrations and higher nitrate concentrations compared to the Bothnian Sea. Phosphate concentrations were 0.06-0.19 µmol/l and nitrate was 4.4-6.7 µmol/l. Silicate concentration was higher (24.9-33.4 µmol/l) than those found in the Bothnian Sea. Ammonia had the highest concentration in the south of the Bothnian Bay, at Kvarken (F16), the concentration was found to be 0.75 µmol.

## PARTICIPANTS

Name		From
V49		
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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