

## CRUISE REPORT FROM R/V ARGOS

**Survey period:** 2002-07-29 - 2002-08-03

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

**Principal:** SMHI

### SUMMARY

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

*Surface temperatures in the Skagerrak, the Kattegat and in the Baltic were normal. The nutrients showed, for the season, mostly normal values. The salinity of the surface water in the Skagerrak and the Kattegat was normal.*

*Oxygen concentrations below 2 ml/l were found at depths greater than 80 metres in almost the whole Baltic Proper. Hydrogen sulphide was present at depths greater than 125 metres in the eastern Gotland Basin and in the Norrköping Deep, from 100 metres at the Karlsö Deep and from 90 metres in the Bornholm Basin. An inflow of fresh oxygenated water through Öresund led to elevated oxygen levels in bottom water at the station situated closest to Öresund, BY1.*

*A pronounced bloom of blue-green algae was seen on the sea surface at the northern stations in the Gotland basin.*

## **PRELIMINARY RESULTS**

The cruise, part of the SMHI's ordinary monitoring programme, started in Göteborg on July 29<sup>th</sup> and ended in the same port August 13<sup>th</sup>. During the expedition the weather was mostly sunny, with weak to moderate winds, turning from Southeast at the beginning of the cruise, to Northeast in the end.

Sampling for the EU-project HABILE was carried out at Fladen, Anholt E and at BY5. In the Kattegat, east of Läsö, a groundtruth CTD-cast was performed near the SEAWATCH buoy.

### **The Skagerrak**

Surface water temperatures varied between 18.0° and 19.0°C, typical for this time of year. The thermocline and halocline was found at depths of around 10-15 metres, and the surface salinity was close to normal.

Nitrate concentrations were below or close to the detection limit (0.1 µmol/l) on all stations, which is normal for this time of year. Surface concentrations of phosphate and silicate were between 0.04-0.08 µmol/l and 0.3-0.5 µmol/l, respectively.

The surface layer was slightly supersaturated with oxygen. Maximum fluorescence was found at about 20 m depth, with values normal for the summer.

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

Surface water temperatures varied with a North-South gradient, with 19.3°C at Fladen, to 18.6°C at W Landskrona. Most stations had a weak halocline from 5-10 m down to 20-25 m depth. The exception was Anholt E that had a distinct halocline at 12-15 m depth. The thermocline showed the same kind of weak gradient as the halocline, stretching from 4-5 m and often all the way down to the bottom. Surface salinity and temperature were both found to be normal for this time of year.

Surface concentrations of Phosphate were around 0.1 µmol/l in the Kattegatt, and 0.2 in the Sound. Nitrate concentrations were close to or below the detection limit (0.1 µmol/l) in the Kattegatt, and a little higher at W Landskrona in the Sound, at about 2.3 µmol/l. Silicate concentrations were about 0.2 µmol/l in the Kattegatt and 9.2 µmol/l in the Sound. All surface nutrient concentrations were within normal ranges for this time of year.

Oxygen saturation in the surface layer was about 100% in the whole area, except for at Anholt E where it was about 130%. The elevated values at Anholt E could well be connected to a stronger fluorescence signal seen at this station, all indicating that a moderate algal bloom was occurring in that area.

### **The Baltic Sea**

Sea surface temperature varied between 17.5°C and 20.7°C in the Baltic Sea. The lowest temperatures were found in the south, while higher temperatures were found further north. At 20-25 meters, and a little deeper on the southern stations, a distinct thermocline was found. In the south a very weak halocline was found at 30-60 m depth, in the north at 60-70 m depth.

Surface nutrient concentrations were low throughout the area, which is normal for this time of year. Phosphate varied between 0.05 - 0.18 µmol/l, while nitrate concentrations were below or close to the detection limit at 0.1 µmol/l. Silicate concentrations were between 5 - 11 µmol/l.

Elevated fluorescence values were found in the Gotland basin and at the Fårö-deep. There was also a supersaturation of oxygen at these locations, with values more than 110%. The heavy bloom of blue-green alga, which was clearly visible on the surface in this area, was probably the reason for these elevated values.

Oxygen levels in the deep waters were still well below normal on most stations. An exception was the station BY1 in the Arkona basin: Warm, oxygenated water was found in a layer close to the bottom. An inflow through the Sound between the 22-27 July of about 13 km<sup>3</sup> of water caused these elevated values. In the weeks to come this mass of water can be expected to spread throughout the southern parts of the Baltic Sea, but the volume is not large enough to influence the central Baltic Sea.

Below 70-80 meters in the central Baltic Sea, and below 70-80 meters in the southern Baltic Sea, oxygen levels below 2 ml/l were found. Below 90 m depth in the Bornholm basin, 100 m at the Karlsö-deep and 125-150 m depth in the Gotland basin, hydrogen-sulphide was found.

## **PARTICIPANTS**

Name	From
Jonas Henriksen, chief scientist	SMHI Oceanographical lab.
Tuulikki Jaako	- " -
Elisabeth Sahlsten	- " -
Eva Nyberg	- " -
Arne Sjöquist	- " -
Sara Kollberg	- " -

## **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