

*Third International Symposium on:*  
**Functioning of Coastal Ecosystems in Various Geographical Regions**  
**June 19 - 22, 2001, Gdynia, Poland**

## **A model study of a large fall in sea water temperature along the Polish Baltic coast in September 1989**

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### **Abstract of poster presentation**

A three - dimensional baroclinic model of the Baltic Sea, based on the Princeton Ocean Model code (POM), was applied for hindcast modelling of the variability of hydrological conditions in the coastal area of the Southern Baltic in September 1989.

The model domain comprises the whole Baltic Sea, including the Gulf of Bothnia, the Gulf of Finland, the Gulf of Riga, as well as the Belt Sea, Kattegat and Skagerrak. Simplified boundary conditions of the radiation type were applied at the open boundary of the model in the Skagerrak. The model, with a horizontal resolution of ca. 10 km and 24 sigma-levels in the vertical is capable to reproduce main features of water circulation and hydrology of the sea.

The numerical experiment is started from three-dimensional monthly mean (September) distribution of temperature and salinity. Model was forced by realistic wind fields estimated from atmospheric surface pressure charts which range from 01.09.1989 to 30.09.1989. At the sea surface, temperature and salinity fluctuations are modelled with a method of "relaxation to climatology". Climatological fields of sea water temperature and salinity were estimated from monthly mean surface charts.

Hindcast simulations with numerical model showed that the time history of the recorded temperature at the Kolobrzeg station is well reproduced by the model, but the model results are underestimated. This is due to the fact that in model calculations the climatological surface heat and salt fluxes were used.

The model results showed important role of relaxation of wind field in evolution of vertical structure of termohaline and currents velocity fields. The maximum of the observed large fall in the surface layer temperature at the Kolobrzeg station are closely related to the phase of change of upwelling-favorable wind direction to opposite one (reverse). It is believed that this conclusion may help to explain occurrence of upwelling along the Polish coast related to weak upwelling-favorable winds.

From the numerical simulation a probable scenario of developing of upwelling at coast in vicinity of Kolobrzeg may be deduced.