



Development of the seasonal thermally-induced front in the Baltic sea after cold winter 2010

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Water temperature in large water bodies at mid latitudes typically passes across the temperature of maximum density (T_{md}) seasonally - in spring and in autumn. It causes a principal change in mixing regime in water body. The process of gradual transition may last up to several months, favoring the development of a specific front, known in limnology as a «thermal bar». It was observed in many large lakes of the world (Ladoga, Onega, Baykal, Great Lakes of America). The temperature of maximum density is above water freezing point for the salinity below 24.7 psu. Therefore, the direct analog of the thermal bar – seasonal thermally-induced front - can be formed also in brackish basins, for instance, in the Baltic sea. As it was revealed from field observation in Ladoga lake (Naumenko, 1989), meteorological conditions are the key factor influencing the front formation and speed of its propagation. The present study is devoted to analysis of a thermal and current structure in presence of the T_{md} in the Baltic sea during spring period after rather severe winter 2009/2010 (www.io-warnemuende.de). The following field data were analyzed (1) Data of field measurements, performed by Laboratory for coastal systems study of Atlantic branch of P.P.Shirshov Institute of Oceanology on 25 of March and 8 of April 2010 on the bottom slope of the Gulf of Gdansk. 40 vertical CTD-profiles were performed every 500 m from 4 m to 68 m depth (total length of cross-section is about 20 km) and subsurface temperature and salinity along the mentioned above section was obtained during day-time of 25 March and 8 April. (2) The data of Leibniz Institute for Baltic Sea Research environmental monitoring of in frames of HELCOM program along a section in southern and central Baltic in spring period (17-27 of March; end of April – mid of May, 2010). (3) Subsurface temperature, salinity and chlorophyll-a along the sections Travemünde - Gdynia – Helsinki and Oulu - Gothenburg performed by Finnish Environment Institute for the mentioned above periods (29-30 of March; 12-13 of April; 18-19 of April; 27-29 of April 2010). (4) Subsurface temperature and salinity, measuring every hour during spring period 2010 in the MARNET stations (Kiel, Arkona basin, Darss Sill, Fehmarn Belt, www.bsh.de).

Temporal development of temperature and salinity fields and coastal-offshore exchange in relation to the climate variability are discussed.

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