The core of the Baltic CIL: shall we introduce the Bornholm Intermediate Water?

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Cold Intermediate Layer (CIL) is apparent in the thermohaline structure of the Baltic Sea every year, typically from April to December. Within the CIL, water temperature, salinity, oxygen content, and other parameters are highly inhomogeneous in vertical, reflecting a complicated process of its formation. The core of the CIL (the layer of the coldest waters) has its T,S-index allowing to identify the south-western part of the sea as the source of these waters. At the beginning of spring warming, a combination of environmental factors favors the subduction of the cold surface waters into the intermediate layers of the Baltic Proper, where they adjust to the density field, making up the coldest layer right above the permanent pycnocline.

For spring 2006, CTD measurements from 2 expeditions of research vessels “Professor Shtokman” of the Shirshov Institute of Oceanology and “Gauss” of Leibniz Institute for Baltic Sea Research in Warnemünde (IOW) were analyzed, along with the CTD measurements from ICES open database, and meteorological information. Remote sensing data provide observations of the abrupt transformation of SST field in the Bornholm Basin in early spring 2006, when the coldest surface water occurred within the coastal zones and its temperature was close to or below the temperature of maximum density (Tmd). The beginning of spring warming in the region and further heating of the cold surface water from temperature below the Tmd induce horizontal exchange, which favors the penetration of winter-cold (1.1–2.1 °C) surface waters of moderate salinity (7.6-8.1) into the intermediate layers in March. This water was observed in the Gdansk and Gotland basins in April-May 2006 as the core of the CIL. On the basis of vertical T,S-profiles and T,S-diagrams, the range of parameters of the CIL core waters in spring 2006 was determined (T: 1.4–2.1 °C; S: 7.6–8.1), which corresponds to the upper mixed layer in the vicinity of the Bornholm Island in March, 2006. Since this relation has already been confirmed for other years, and having in mind the importance of the process of the CIL formation for the entire Baltic Sea conveyor belt, we suggest to term waters of the CIL core as the Bornholm Intermediate Waters (BIW). Obviously, the T,S-index of the BIW shall vary from year to year, reflecting the severity of the past winter and the conditions of the particular spring. However, the BIW location right above the pycnocline, the lowest (for the current year) temperature, and its characteristic salinity of 7.6-8.1 seem to be repeatedly confirmed by field observations in the Baltic Proper in spring.

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