

Changes of near-bottom water properties in polish zone generated by the inflow 2014

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Since 11 years, in winter 2014 for the first time large amount of water - more than 200 km³ (Morholtz, 2015), were pushed into the Baltic Sea from the North Sea. This process has been classified as a Major Baltic Inflow (MBI). The inflow water brought to the Baltic Proper large amounts of salt (4 Gt) and oxygen.

Oxygen and salt-rich, dense inflow waters are a phenomenon increasingly rare, since the early 80s average occurrence is once per decade. Therefore, the number of measurements both the situation during the process and changes of the water properties after termination of driving forces are limited. Institute of Oceanology PAS observed inflow and changes taking place afterwards during 6 r/v Oceania's cruises in the period December 2014 - December 2015. Refreshing of the bottom layers occurred in the Bornholm Deep and Słupsk Furrow, but in the Gdańsk Deep there was no change in the anoxic layer.

In the Bornholm Deep effects of increased amount of oxygen quickly vanished, depleting the concentration of oxygen at a rate of 1 mg/l within a month. The initial high oxygen content of the inflow water (approximately 10 mg/l) was reduced and after 10 months anaerobic conditions returned. In the Słupsk Furrow this process was five times slower than in the Bornholm Deep, rate of the oxygen concentration was 0.2 mg/l per month. At the same time bottom salinity in the Polish zone remained relatively high.

In November 2015 appearance of the warm (12 °C) and oxygenated (6 mg/l) layer of water below the halocline in the Bornholm Deep was observed. This inflow resulted in lifting the halocline to a depth that allowed the dense waters to pass through the Słupsk Sill.