



High-resolution view on seasonal thermocline development in the Eastern Baltic Sea

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The Gulf of Finland is brackish, non-tidal basin in the Baltic Sea. There is a strong stratification in the gulf, which is sensitive to atmospheric forcing. Seasonal thermocline, its vertical location, shape, strength and other characteristics influence the spring bloom and nutrient dynamics in the gulf. The aim of the present study was to have high-resolution view to development of the seasonal thermocline near the southern slope of the gulf.

Underwater glider measurements in the section across the gulf were arranged from near coastal waters at depth of 35 m to the central part of the gulf (80-100 m depth). The 19 km long section were repeated 30 times and about 4 400 vertical profiles of temperature, salinity, chl a fluorescence, turbidity and oxygen were collected from 9 of May to 4 of June 2018. 1 km resolution SST data by MODIS (Moderate Resolution Imaging Spectroradiometer) and SLSTR (Sea and Land Surface Temperature Radiometer) were used to complement in-situ observations.

Warming of the upper layer and associate strengthening of the seasonal pycnocline from 5-7 °C to 12-15 °C and from 1.4-1.6 kg m⁻³ to 2.6-3.6 kg m⁻³, respectively, were observed during the 4-weeks period. Strengthening process of the seasonal thermocline was variable in time and space. Wind-driven basin-wide processes such as along-gulf advection of fresher/more saline water, pycnocline inclination and wind stirring caused changes in temperature and salinity along the section. Likewise mesoscale eddies and narrow (width of 2-3 m) submesoscale intrusions modified locally thermohaline fields. Structures created by physical forcing were often observed in chl a distributions as well.