The vertical distribution of physical parameters in the Gulf of Riga for future climate projections.

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Our goal was to investigate the vertical distribution of physical parameters (temperature, salinity) in the Gulf of Riga for the contemporay climate and for future climate projections.

The Gulf of Riga is a semi-enclosed subbasin of the Baltic Sea between Latvia and Estonia.

The area of the Gulf of Riga is about 18,000 sq. km. The maximum depth is 67 m. The island of Saaremaa partially separates it from the rest of the Baltic Sea. The main connection of the Gulf with the Baltic Proper is the Irbe Strait allowing limited exchanges with Baltic see.

The Gulf of Riga was modelled with 1D model. Calculations were made for 55 m deep water column, taking into account hypsographic curve. The General Ocean Turbulence Model (GOTM) was used. Second order dynamic k-e equation with parameterization from Cheng (2002) was used for turbulence description.

The result sensitivity was evaluated regarding models choice.

Data from European Centre for Medium-Range Weather Forecasts (ECMWF) where used for calibration and verification period. Data included ECMWF ERA 40 for time period 1957-2002, and ECMWF ERA Interim for 1989-2009.

Regional climate models (RCM) and scenarios for future climate change were obtained from Prediction of Regional scenarios and Uncertainties for Defining European Climate change risks and Effects (PRUDENCE) project.

Time period for future physical parameter vertical distribution simulation was 2071-2100. We applied the bias correction (via histogram equalisation) of RCM data. We employed the setup of hydrological models to generate the contemporary and future river run-off data series

Our results conclude that in future the Gulf won't freeze over.

In summer surface temperature will increase at least by 2 degrees Celsius. Vertical stratification will begin a month earlier - as a consequence the time period of full mixing will be shorter.