

## Model experiment of hypothetical CO<sub>2</sub> leakages from potential CCS site at the Baltic Sea

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One-dimensional fully-coupled benthic pelagic biogeochemical model BROM (Bottom RedOx Model)[1] was used for simulations of seasonal variability of biogeochemical parameters in the upper sediment, Bottom Boundary Layer and the water column in the area close to B3 oil field in the southern Baltic Sea. B3 oil field is considered as a sub-seabed geologic carbon dioxide (CO<sub>2</sub>) storage.

As input physical forcing we used the results of running GETM model (General Estuarine Transport Model) [2]. For boundary conditions we used data from World Ocean Database[3] and porewater concentrations measured in the field cruise which was a part of the project ECO2. Chosen station of field data included natural CO<sub>2</sub> injections.

The model allowed us to simulate baseline ranges of seasonal variability of main nutrients, pH, Alkalinity, TIC and calcite/aragonite saturation as well as vertical fluxes of carbon in this region. The experiments of potential leakages were provided after reaching steady state conditions.

Results of model experiments with different scenarios allowed us to estimate the impact of CO<sub>2</sub> leakages on marine environment and its restoration time both for upper sediments and water column.

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[1] Yakushev et al. (2017) *Geosci. Model Dev.* **10**, 453-482.

[2] Lessin et al. (2014) *PLoS ONE* **9(11)**

[3] Boyer et al. (2013) *NOAA Atlas NESDIS* **72**, 209