



Modelling of terrestrial Dissolved Organic Carbon in Öre estuary (Baltic Sea)

Alexander Sokolov

Baltic Nest Institute, Stockholm University Baltic Sea Centre, Stockholm, Sweden (alexander.sokolov@su.se)

Rivers are the largest source of terrestrial carbon input into the Baltic Sea. We studied the fate of terrestrial DOC in the Öre estuary in the Baltic Sea. This estuary is a small fjord-like bay in the north part of the Baltic Sea. Size of the bay is about 8 by 8 km with maximum depth of 35 metres. River Öre has a small average freshwater discharge of 35 m³/s. But during spring time freshwater discharge can increase significantly. For example, in April 2015 the discharge changed from 8 m³/s to 160 m³/s in 18 days. During such events, the river plumes generated by the flow of buoyant river water transport significant amount of organic matter into the coastal zone.

To study river plume and fate of terrestrial DOC a finite element based three dimensional baroclinic model TELEMAC-3D is used. The TELEMAC modelling suite is developed by the National Laboratory of Hydraulics and Environment (LNHE) of Electricité de France (EDF). Terrestrial DOC was modelled as passive tracer using first-order decay model with degradation rate as a function of water temperature. DOC from the river was assumed to have labile, semi labile and refractory components. Modelling domain was approximated by an unstructured mesh with element size varies from 50 to 500 m. In vertical direction, a sigma-coordinate (with 20 layers) was used. Open sea boundary conditions were obtained from a large-scale model HIROMB-BOOS model provided by COPERNICUS marine environment monitoring service.

The model was calibrated using observations obtained by field campaign in Öre estuary in 2015.

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