Biogeochemical Modelling Activities in the Baltic Sea Basin

Model Name	BALTSEM (**BA**ltic sea **L**ong**T**erm large **S**cale **E**utrophication **M**odel)
Model Description	BALTSEM simulates seasonal ecosystem dynamics in the Baltic Sea presented as a chain of highly vertically resolved but horizontally averaged water columns and underlying sediments. The HD module of this coupled hydrodynamical-biogeochemical model reproduces major transport mechanisms in and between 13 sub-basins starting from the Kattegat. The BGC module describes all the major biogeochemical fluxes: nutrient uptake by primary producers, grazing and nutrient excretion by zooplankton, mortality of plankton and sedimentation of particulate nutrients, mineralization in the water column and by the sediments, nitrogen fixation and denitrification, redox alterations of relevant processes.
State Variables	12 pelagic state variables: 3 phytoplankton groups (diatoms, cyanobacteria, and small summer species), zooplankton, detritus N, P and Si, ammonium, nitrate, phosphate silicate, and dissolved oxygen. 3 sediment state variables: bioavailable pools of N, P and Si in the top active layer of sediments.
On a scale between 1 and 10, please classify your model	1 Biogeochemical cycling, matter fluxes 2 3 4 **5** **6** 7 8 9 10 Ecosystem functioning
Dimension (0D, 1D, 2D, 3D)	13x1D, i.e. 13 horizontally integrated columns with high vertical resolution covering the entire Baltic Sea
Modeled Area (Marine, terrestrial, combined)	The Baltic Sea marine area comprising the Kattegat
Coupled to hydrological component	No, atmospheric and hydrologic components are considered just as given boundary conditions
Suited for climate change sensitivity studies	Yes, through scenario boundary conditions
Publications	1. Gustafsson, B.G. 2000a. Time-dependent modeling of the Baltic entrance area. 1. Quantification of circulation and residence times in the Kattegat and the straits of the Baltic sill, Estuaries, 23 (2), 231-252. 2. Gustafsson, B.G. 2000b. Time-dependent modeling of the Baltic entrance area. 2. Water and salt exchange of the Baltic Sea, Estuaries, 23 (2), 253-266. 3. Gustafsson, B.G. 2003. A time-dependent coupled-basin model of the Baltic Sea, Earth Sciences Center, Göteborg University, Rep. C47, 61 pp. 4. Savchuk, O.P., 1999. Simulation of the Baltic Sea eutrophication.

	Proceedings of the BASYS conference, Warnemünde, Germany. 108–122. 5. Savchuk, O.P. & B. Gustafsson, 2006. Integrating data and knowledge with the model: the Baltic Sea eutrophication case (Unpublished manuscript)
Institute	Department of Systems Ecology, Stockholm University Department of Oceanography, Earth Sciences Center, Göteborg University
Developer, E-Mail	Oleg P. Savchuk for BGC module, oleg@ecology.su.se Bo Gustafsson for HD module and entire software, bogu@oce.gu.se
Web Site	

Remarks