



BALTEX Survey on

Biogeochemical Modelling Activities in the Baltic Sea Basin

Model Name	BIOLA (Biogeochemical Lake Model)
Model Description	The model is a biogeochemical lake module coupled to a one-dimensional hydrodynamic model (PROBE). The model simulates the change in lake stratification and water quality due to weather, inflow and biogeochemical processes in the lake and in the sediments. It simulates changes over time (daily time step) in nutrient and biological state at different depths. The model is calibrated for the conditions of the lake to be modelled. The model was originally developed for eutrophication remedy scenarios in eutrophic lakes.
State Variables	dissolved inorganic nitrogen, phosphate, phytoplankton, cyanobacteria, zooplankton, detritus, oxygen, planktivorous fish, piscivorous fish, macrophyte, sediment organic carbon, sediment phosphate, sediment nitrate, sediment ammonium, heat energy, momentum (in x- and y-direction), turbulent kinetic energy and dissipation ($k-\epsilon$)
On a scale between 1 and 10, please classify your model	1 Biogeochemical cycling, matter fluxes 2 3 4 x 5 6 7 8 9 10 Ecosystem functioning
Dimension (0D, 1D, 2D, 3D)	1D (vertical profile)
Modeled Area (Marine, terrestrial, combined)	terrestrial; lakes
Coupled to hydrological component	no, but need inflow of nutrients to the lake
Suited for climate change sensitivity studies	yes, but the climate change impact on inflow of nutrients to the lake (and other external sources) has to be given
Publications	Pers, B.C., 2005. Modeling the Response of Eutrophication Control Measures in a Swedish Lake, <i>Ambio</i> 34(7): 552-558. Arheimer, B., Andréasson, J., Fogelberg, S., Johnsson, H., Pers, B.C. and Persson K., 2005. Climate Change Impact on Water Quality: Model Results from Southern Sweden, <i>Ambio</i> , 34(7): 559-566. Dahl, M. and C. Pers, 2004. Comparison of four models simulating phosphorus in Lake Vänern, Sweden, <i>Hydrology and Earth System Sciences</i> , 8(6): 1153-1163. Pers, B.C., and I. Persson, 2003. Comparison of a biogeochemical model in different lakes, <i>Nordic Hydrology</i> , 34(5): 543-558. Pers, B.C., 2003, BIOLA Biogeochemical Lake Model Manual, SMHI Report Series Hydrologi 91, Swedish Meteorological and Hydrological Institute, Norrköping, 121 pp. Pers, B.C., 2002, Model description of BIOLA – a biogeochemical lake model,

	SMHI Report Series RH 17, Swedish Meteorological and Hydrological Institute, Norrköping, 69 pp.
Institute	Swedish Meteorological and Hydrological Institute
Developer, E-Mail	Charlotta Pers, charlotta.pers@smhi.se
Web Site	www.smhi.se go to research and then hydrology

Remarks