

NORTH SEA, BALTIC SEA, BARENTS SEA

INSTITUTE: Geophysical institute, University of Hamburg

MODEL NAME: ECOSMO (Schrum et al. 2006)

MODEL DOMAIN: North Sea, Baltic Sea, Barents Sea

STATE VARIABLES:

- Hydrodynamics: temperature, salinity, sea surface elevation, transport, vertical exchanges coefficient, turbulent air-sea exchange, ice dynamics
- Ecosystem components: nitrate, ammonium, nitrite, phosphate, silicate, small and large phytoplankton, cyanobacteria, small and large zooplankton, detritus, biogenic opal, 2 types of sediment, oxygen
- Carbonate system (in progress)

OBJECTIVES:

Bio-physical processes in the North Sea, Baltic Sea and the Barents Sea, Lower trophic level ecosystem dynamics,

Objectives:

- Identify physical processes impacting for seasonal and inter-annual variability on lower trophic level ecosystem dynamics in NS and BS. Such as tides, stratification, mixing.
- Disentangle atmospheric impacts (e.g. wind, temperature) and anthropogenic impacts (e.g. river nutrient loads).
- Continuous long term simulations.

VALIDATION:

An earlier version of the model has been validated in detail by Janssen et al (2002), Schrum et al. (2005) (Physics) and Schrum et al. (2006) (Biology)

Validation of the updated version (work in progress):

Physics:

- Temperature, Salinity, Ice vs in situ data (see Janssen et al (2002)), Årthun and Schrum (2010), Årthun et al. (submitted).

Biology

- Nitrate & Phosphate: Model vs in situ data (from ICES) (1960-2000)
Taylor diagram for different regions → in progress
- Zooplankton vs in situ Data (years: 1986, 1987; see Schrum et al. 2006) → in progress
- Baltic Sea: Nitrate, Phosphate, Silicate vs data (from BALTIC NEST) → in progress
- Barents Sea: Carbon, Nutrients → in situ

Reference:

2002. Statistische Analyse mehrjähriger Variabilität der Hydrographie in Nord- und Ostsee. PhD-thesis, in German, Institute of Oceanography, University Hamburg, 150 pp.

Schrum, C., Alekseeva, I., and St.John, M. 2006. Development of a coupled physical–biological ecosystem model ECOSMO Part I: Model description and validation for the North Sea. *J. Mar. Sys.* **61**: 79–99. doi:10.1016/j.jmarsys.2006.01.005.

Schrum, C, Harms, I, Hatten, K (2005): Modelling Air-sea exchange in the Barents Sea By using a coupled regional ice-ocean model. Meteorologische Zeitschrift, 14, No. 6, 1-3, DOI: 10.1127/0941-2948/2005/0075.

Årthun, M & Schrum, C (2010). Ocean surface heat flux variability in the Barents Sea. Journal of Marine Systems, 83, 88-98.

Årthun, M, Ingvaldsen, R, Smedsrud, LH, Schrum, C (2010): Dense Water formation and circulation in the Barents Sea. Submitted to Deep Sea Research.