NOAH
North Sea Observation and Assessment of Habitats

MOSSCO chlorophyll

GENERAL OVERVIEW

Dataset name:
The volumetric mass concentration [in units of mg m-3] of phytoplankton (algal) pigment chlorophyll a in the model's surface layer

Project:
North Sea – Observation and Assessment of Habitats (NOAH)

Co-Principal Investigator:
Carsten Lemmen, Ulrike Kleeberg (Web Services)

Contact:
Helmholtz-Zentrum Geesthacht (HZG),
Max-Planck-Straße 1, 21502 Geesthacht, Ulrike.Kleeberg@hzg.de

DATASET SPECIFICATIONS

Dataset Parameter(s) and supplied Unit(s):
Surface Chlorophyll [mg-Chl/m^3], mean value of the years 1992 to 2012

Date(s) available:
1992 - 2012

Validated:	**Version Date:**
Model Verification and Validation	*22.05.2018*

Current State:
final

Format:
netCDF, Vector (Esri FGDB), CSV

Citation:
Kerimoglu, O., Hofmeister, R., Maerz, J., Riethmüller, R., Wirtz, K. W., 2017. The acclimative biogeochemical model of the southern North Sea. Biogeosciences, 14 (19), 4499-4531. https://doi.org/10.5194/bg-2017-104.

Klingbeil, K., Burchard, H., 2013. Implementation of a direct nonhydrostatic pressure gradient discretisation into a layered ocean model. Ocean Model. 65, 64-77, ISSN 1463-5003. https://doi.org/10.1016/j.ocemod.2013.02.002.

Lemmen C, Hofmeister R, Klingbeil K, Nasermoaddeli MH, Kerimoglu O, Burchard H, Kösters F, Wirtz KW (2018) Modular system for shelves and coasts (MOSSCO v1.0) a flexible and multi-component framework for coupled coastal ocean ecosystem modelling. Geoscientific Model Development 11(3):915–935.

Slavik, Kaela & Lemmen, Carsten & Zhang, Wenyan & Kerimoglu, Onur & Klingbeil, Knut & Wirtz, Kai. (2017). The large scale impact of offshore windfarm structures on pelagic primary production in the southern North Sea. Hydrobiologia. https://doi.org/10.1007/s10750-018-3653-5.

Soetaert, K., P. M. Herman & J. J. Middelburg, 1996. A model of early diagenetic processes from the shelf to abyssal depths. Geochimica et Cosmochimica Acta 60(6): 1019–1040.

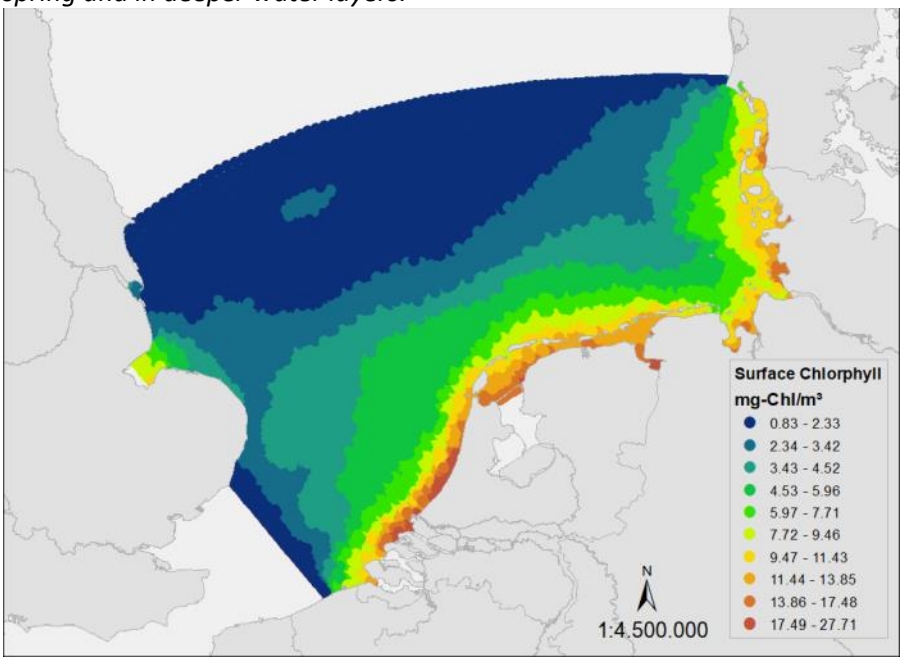
Umlauf, L. & H. Burchard, 2005. Second-order turbulence closure models for geophysical boundary layers. A review of recent work. Continental Shelf Research. https://doi.org/10.1016/j.csr.2004.08.004.

Wirtz, K. W. & O. Kerimoglu, 2016. Autotrophic stoichiometry emerging from optimality and variable co-limitation. Frontiers in Ecology and Evolution 4. https://doi.org/10.3389/fevo.2016.00131.

DATASET DETAILS

Abstract

This parameter describe the volumetric mass concentration [in units of mg m-3] of phytoplankton (algal) pigment chlorophyll a in the model's surface layer. Chlorophyll a in photoautotrophic phytoplankton is used to "harvest" sunlight energy and drive all cellular processes, especially the build-up of new biomass. In a photoacclimative model such as MAECS, cells adapt their chlorophyll to biomass ratio to ambient light concentration: when there is a lot of light (in summer and near the ocean surface), cells need less chlorophyll per biomass than in darker conditions, such as in spring and in deeper water layers.



Acquisition and Processing Description:

As a physical driver, we employed the coastal ocean model GETM (General Estuarine Transport Model, Klingbeil and Burchard, 2013) to calculate sea level, currents, temperature and salinity distributions, and to transport the biogeochemical and ecological quantities. GETM obtains state-of-the-art turbulence closure from the General Ocean Turbulence Model (GOTM, Umlauf and Burchard, 2005), and has been shown to have high skill in various studies for the North Sea. Pelagic ecology was described by the Model for Adaptive Ecosystems in Coastal Seas (MAECS, Kerimoglu et al., 2017) implemented as a FABM module; MAECS simulates pelagic nutrient, phytoplankton, zooplankton and detritus dynamics and 210 accounts for the acclimation of intracellular composition in phytoplankton (Wirtz and Kerimoglu, 2016). Soil biogeochemistry was described by the Ocean Margin Experiment Early Diagenesis (OMEXDIA) model (Soetaert et al. 1996) with additional phosphorous added (Wirtz et al., unpublished.) We employ the recently developed open

source software infrastructure Modular System for Shelves and Coasts (MOSSCO, www.mossco.de, Lemmen et al., 2018), which facilitates the exchangeable coupling of models and data sets and enables the integration of modules describing physical, chemical, geological, ecological and biogeochemical processes. The presented Net Primary Production simulations are associated with the publication Slavik et al. 2017.
Notes and Limitations: *Model output*