MODELLING THE SEASONAL CYCLE OF THE BIOLOGICAL PRODUCTIVITY IN THE LIGURIAN SEA BY MEANS OF A 1D INTERDISCIPLINARY MODEL

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A one-dimensional coupled physical-biogeochemical model has been built to study the pelagic food web of the Ligurian Sea (NW Mediterranean Sea). The physical model is the turbulent closure model (version 1D) developed at the GeoHydrodynamics and Environmental Laboratory (GHER) of the University of Liège. The ecosystem model contains nineteen state variables describing the carbon and nitrogen cycles of the pelagic food web. Phytoplankton and zooplankton are both divided in three size-based compartments and the model includes an explicit representation of the microbial loop including bacteria, dissolved organic matter, nano-, and micro- zooplankton. The internal carbon/nitrogen ratio is assumed variable for phytoplankton and detritus, and constant for zooplankton and bacteria. Silicate is considered as a potential limiting nutrient of phytoplankton growth. The aggregation model described in Kriest and Evans (2000) is used to evaluate the sinking rate of particulate detritus. The model is forced at the air-sea interface by meteorological data coming from METEO France. The DYFAMED time series data obtained during the year 2000 are used to calibrate and validate the biological model. The comparison of model results within in-situ DYFAMED data shows that although some processes are not represented by the model, such as horizontal and vertical advections, model results are in good agreement with observations and differences observed can be explained with environmental conditions.

Reference

Raick C., E.J.M. Delhez, K. Soetaert and M. Gregoire. Study of the seasonal cycle of the biological productivity in the Ligurian Sea using an 1D interdisciplinary model. Submitted to Journal of Marine Systems (2004).