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Modelling the Ligurian Sea ecosystem by means of a 1D coupled physical-biogeochemical model. Improvement of model results using sequential data assimilation.

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A 1D 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 GHER (University of Liège, Belgium). The ecosystem model contains nineteen state variables describing the carbon and nitrogen cycles of the pelagic food web. Silicate is considered as a potential limiting nutrient of diatoms' 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 the METEO France meteorological data. The DYFAMED time series data of year 2000 are used to calibrate and validate the biological model (Raick et al., 2005).

By combining the numerical model and the available observations, data assimilation techniques are useful to improve the state estimation of the ocean. A Singular Fixed Extended Kalman filter (Pham *et al.*, 1998) has been implemented in this way. Twin experiments are first performed to choose the suitable experimental protocol, which is then applied to perform real data assimilation experiments using DYFAMED data (Raick et al., submitted).

To be coupled in a 3D environment, the ecosystem model is too complex. Our ongoing work is to perform a simplification, by studying simplified structures in comparison with the original ecosystem model. The advantage of deriving a simplified model from the complex one, is that we would be able to identify the most important processes of the Ligurian Sea ecosystem.

References:

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