BUDGET OF BIOGENIC ELEMENTS IN THE NW MEDITERRANEAN OVER THE PERIOD 2004-2008 USING A 3D PHYSICAL-BIOGEOCHEMICAL COUPLED MODEL

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Abstract
The biogeochemical cycles of the major elements and the associated structure of the planktonic functional groups are investigated in the northwest Mediterranean Sea in relation with the seasonal and interannual variability of the hydrodynamic/atmospheric forcing.
Keywords: Western Mediterranean, Models

A 3D physical-biogeochemical coupled model has been implemented to represent cycles of biogenic elements (carbon, nitrogen, phosphorus and silica) and pelagic plankton groups in the NW Mediterranean Sea.

The hydrodynamic mesoscale SYMPHONIE model [1] has been used forced by high resolution atmospheric fluxes. The biogeochemical model is defined by three size groups of phytoplankton and of zooplankton, hetrotrophic bacteria, two size classes of particulate organic matter, dissolved organic matter and four inorganic nutrients. The representation of the phytoplankton processes is derived from the model ECO3M [2] that has been increased in complexity in the present work. The heterotroph model is an adapted version of the stoichiometric model developed by [3] and applied at the study area by [4].

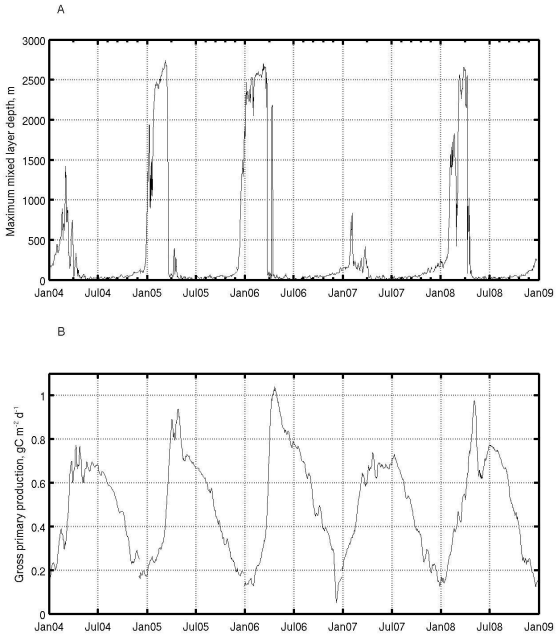

Fig. 1. Interannual variation of the simulated (A) maximum mixed layer depth (m) and (B) mean primary production (gC m^{-2} d^{-1}) over the north-western Mediterranean sea for the 2004-2008 period.

The calibration and validation of the coupled model were performed through comparisons with complementary observations: data at the DYFAMED deep station in the Ligurian Sea, data of SOMLIT coastal stations and satellite images. The model results reasonably reproduce the recorded spatial and temporal variations.

Then the model was used to estimate a budget of the biogenic elements in the area over the period 2004-2008 characterized by a varying intensity of the major physical (deep convection, shelf dense water cascading, general circulation) (Figure 1A) and biogeochemical processes (Figure 1B).

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