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A COUPLED PHYSICAL - BIOLOGICAL 1D MODEL FOR THE CENTRAL MEDITERRANEAN SEA

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In the framework of a project aimed at studying the plankton productivity in different regions of the Mediterranean Sea, we performed a series of numerical experiments in typical central Mediterranean conditions in order to obtain the first information about the basic processes which control the plankton dynamics. The model is a one-dimensional physical-biochemical coupled upper ocean model which is similar to that described previously for the Black sea ecosystem by Oguz et al. (1996). The physical model is based on the one-dimensional version of the Princeton Ocean Model which includes the level 2.5 Mellor-Yamada turbulence closure parametrization. At first stage the vertical advective transport is not considered here. The biochemical model involves interaction between the inorganic nitrogen (ammonium and nitrates), single phytoplankton and zooplankton groups and detritus. The coupling with the biological model is provided by vertical mixing coefficients The model therefore is in its simplest possible form to describe a typical pelagic ecosystem and may be regarded as a first step to understand the first order biological processes and to gain some experience and confidence for our future efforts on more sophisticated ecohydrodinamic modelling. The seasonal mixed layer structures under the external climatological forcing functions (wind stress and heat and salt fluxes) are reproduced reasonably well and are in agreement with experimental data. The yearly variability of the mixed layer follows the yearly variation of the vertical eddy diffusivity and two particular mixing regimes have been identified at the end of May with two maxima separated by a transition zone of weak mixing which coincides with the base of the mixed layer. A series of sensitivity experiments on the biochemical model are performed in order to analyse the different responses of the model in different ecological conditions. The seasonal biological response successfully simulate observed features inferred from the available in situ and CZCS data.

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