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The Mediterranean Sea biogeochemistry at mesoscale: lessons from the coupled MITgcm-BFM model simulation

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A 3D state-of-the-art hydrodynamic-biogeochemical model was implemented to describe the multi-decadal marine biogeochemistry of the Mediterranean Sea at mesoscale.
The model is based on the coupling between MIT General Circulation Model and Biogeochemical Flux Model and simulated the Mediterranean Sea at horizontal resolution of 1/12°, on 75 vertical levels not equally spaced.
Online coupling, multi-nutrients and multi-plankton framework, implicit vertical mixing are noteworthy features of the new model that allowed to reproduce biogeochemical processes from inter-annual to daily temporal scales.
Corroboration with available datasets, climatologies and other models estimates show that the new model has good and consistent performance in simulating: basin wide gradients of nutrients, overturning/anti-estuarine circulation among basins, seasonal cycle of physical (mixed layer depth) and phytoplankton dynamics, including the Deep Chlorophyll Maximum, primary production on basin and sub-basin scales. Thus, the new MITgcm-BFM proved to be an optimal tool to study mesoscale processes in the Mediterranean Sea.
Time series of 3D daily chlorophyll output have been used to investigate intensity, spatial distribution, temporal frequency and duration of bloom events in the Mediterranean Sea.