Geophysical Research Abstracts
Vol. 13, EGU2011-8036-1, 2011
EGU General Assembly 2011

Eddy induced coastal plankton community changes in a coupled numerical model of the Gulf of Lion

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The role that mesoscale physical structures play in driving plankton community shifts and transporting matter is key to the understanding of food web dynamics at the regional scale. In order to evaluate the impact of (sub)mesoscale eddies in the Gulf of Lion (NW Mediterranean Sea) on the plankton food web, we have used an offline biogeochemical-hydrodynamic model. We confronted the outputs of the model to field data from and in situ cruise and to remotely sensed SeaWiFS-derived surface chlorophyll estimates. Using the wavelet-analysis defined contours of an anticyclonic eddy, we studied the structure of the planktonic ecosystem in and around the eddy, throughout the eddy's life. We compared the surface chlorophyll signal of this eddy to a SeaWiFS image and showed good agreement in position and intensity. The distribution of dominant plankton groups in the area of the eddy is analyzed. The anti-cyclonic eddy drives phytoplanktonic growth via the concurrent processes of upwelled nutrients near the coast and advection of these nutrients around the eddy's edge.
This study is a part of the LATEX (LAgrangian Transport EXperiment) project, which has been launched to study the role of submesoscale structures on the shelf-offshore exchanges in the Gulf of Lion. The LATEX strategy combines use of data from an inert tracer release (SF6) experiment, Lagrangian drifters, satellites and Eulerian moorings as well physical-biogeochemical numerical modelling.