A biogeochemical model for North and Northwest Iberia: some applications.

García-García, Luz María; Ruiz-Villarreal, Manuel; Cobas-García, Marcos

Instituto Español de Oceanografía, A Coruña, Spain

The Coastal and Ocean modeling group at the Spanish Institute of Oceanography (IEO) has a broad experience in hydrodynamic modeling with ROMS in the area of West and North Iberia. Our main task consists of providing insight on the coastal and ocean dynamics in support to the intense IEO ecosystem and fisheries research in the area.

The NW coast of Iberia is characterized by high levels of primary production that result from relatively frequent and intense inputs of nutrients caused by upwelling, especially in spring and summer. Primary production sustains wealthy fisheries and aquaculture industries, which constitute a prime economic activity in the region.

As a first approach to understand the ecosystem variability in the area we focused on the spring bloom. A high resolution (~3 km) configuration of the ROMS physical model with atmospheric forcing coming from the regional agency Meteogalicia (http://www.meteogalicia.es), which has shown to represent the main features of the shelf and slope circulation in the area, was run coupled to the Fasham-type Fennel biogeochemical model (N2PZD2).

Any biogeochemical model aimed at providing a reliable representation of the dynamics of a certain area should be tuned according to its characteristics. In an upwelling system, the composition of phytoplankton varies from the beginning to the end of the bloom. When nutrients and irradiance are high, diatoms are the dominant group, whereas flagellates become more important when upwelling relaxes and, consequently, nutrients and light intensity decrease. In the NW Iberian coast, it has been found that Chaetoceros socialis is the dominant diatom species during the spring bloom (Bode et al, 1996, 1998). For this reason, we have decided to use parameters that are characteristic of plankton at the spring bloom. In particular, the parameters of Chaetoceros socialis have been considered for the unique phytoplankton class of the model.

We will show comparisons of the model results for 2006 and 2007 with observations at weekly and daily time scales (MODIS chlorophyll-a images, in situ observations from the “Instituto Español de Oceanografía” Pelacus cruises). The spring bloom is reasonably reproduced in the NW and N coasts in time, space and intensity. The variability between the primary production in 2006 and 2007 can be related to the oceanographic conditions thanks to the use of a numerical model. The results are promising and encourage us to move forward to increase the complexity of our models and broaden their range of application. We will show some examples of the use of the IEO models to get some insight on sardine recruitment variability and harmful algal bloom prediction.