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Modeling the seasonal evolution and the spatial distribution of chlorophyll-a in the lagoon of Venice using a 2D biogeochemical model

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The seasonal evolution of nutrients and the spatial distribution of primary production in coastal lagoons are characterized by large fluctuations, due to the interplay between physical and chemical processes.

An integrated approach is thus necessary to describe the dynamic of biogeochemical variables and their relation to the water circulation, since the transport phenomena may play a major role in primary production processes. To this regard, the main objective of the present study is the simulation of the interactions between the transport processes and the phytoplanktonic primary production in the northern Adriatic Sea and the lagoon of Venice using a coupled hydrodynamic and biogeochemical model.

The hydrodynamic model is based on the shallow water equations and adopts a curvilinear, boundary fitted reference system. The model domain includes the Adriatic Sea and the lagoon of Venice with a finer grid mesh in the coastal areas to satisfactory resolve small circulation features. The biogeochemical model is described in Pastres et al. (2001) and included the dynamics of phytoplankton, zooplankton, dissolved macronutrients and oxygen.

The advection-diffusion-reaction model was realized coupling the offline transport produced by the hydrodynamic model and the on line execution of the reaction mod-

ule.Eddy diffusion parameters of the transport module were calibrated by comparing the model output with temperature and salinity data. Preliminary results appeared to be in good agreement with field data, especially in proximity of the inlets area. The coupled model performed well in reproducing the chlorophyll-a distribution and in simulating the short term dynamic of the dissolved oxygen.