Geophysical Research Abstracts
Vol. 18, EGU2016-8306, 2016
EGU General Assembly 2016

Atmospheric deposition impacts on nutrients and biological budgets of the Mediterranean Sea, results from the high resolution coupled model NEMOMED12/PISCES

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Atmospheric deposition is at present not included in regional oceanic biogeochemical models of the Mediterranean Sea, whereas, along with river inputs, it represents a significant source of nutrients at the basin scale, especially through intense desert dust events. Moreover, observations (e.g. DUNE campaign, Guieu et al. 2010) show that these events significantly modify the biogeochemistry of the oligotrophic Mediterranean Sea. We use a high resolution (1/12°) version of the 3D coupled model NEMOMED12/PISCES to investigate the effects of high resolution atmospheric dust deposition forcings on the biogeochemistry of the Mediterranean basin. The biogeochemical model PISCES represents the evolution of 24 prognostic tracers including five nutrients (nitrate, ammonium, phosphate, silicate and iron) and two phytoplankton and zooplanktons groups (Palmiéri, 2014). From decadal simulations (1982-2012) we evaluate the influence of natural dust and anthropogenic nitrogen deposition on the budget of nutrients in the basin and its impact on the biogeochemistry (primary production, plankton distributions...). Our results show that natural dust deposition accounts for 15% of global PO4 budget and that it influences primarily the southern part of the basin. Anthropogenic nitrogen accounts for 50% of bioavailable N supply for the northern part. Deposition events significantly affect biological production; primary productivity enhancement can be as high as 30% in the areas of high deposition, especially during the stratified period. Further developments of the model will include 0D and 1D modeling of bacteria in the frame of the PEACETIME project.