

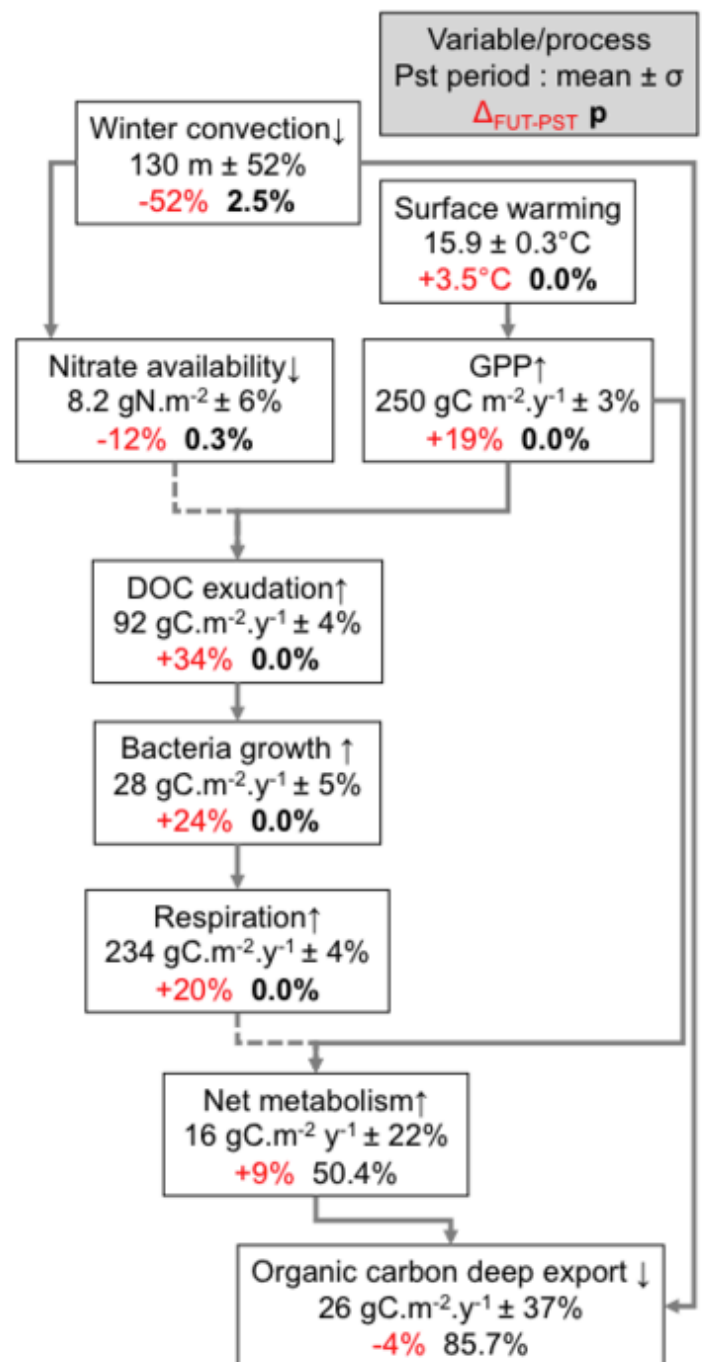
# Impact of climate change on the Northwestern Mediterranean Sea pelagic planktonic ecosystem and associated carbon cycle

M. Herrmann, C. Estournel, F. Diaz, F. Adloff ; LEGOS, LA, MIO, CNRM

The northwestern Mediterranean Sea (NWMS) is biologically one of the most productive Mediterranean regions. NWMS pelagic planktonic ecosystem is strongly influenced by hydrodynamics, in particular by deep convection that could significantly weaken under the influence of climate change. Here we investigate the response of this ecosystem and associated carbon cycle to the long-term evolution of oceanic and atmospheric circulations. For that we developed a tridimensional coupled physicalbiogeochemical model and performed two groups of annual simulations under the climate conditions of respectively the 20th and the end of 21st centuries.

Our results suggest that the evolution of oceanic and atmospheric circulations does not modify the NWMS pelagic planktonic ecosystem and associated carbon cycle at a first order. However, differences mainly induced by the deep convection weakening and the surface warming are obtained at a second order. The spring bloom occurs 1 month earlier. Resulting from the decrease in nutrients availability, the bottom up control of phytoplankton development and bacteria growth by the nitrogen and phosphorus availability strengthens and the microbial loop intensifies as the small-sized plankton biomass increases. Carbon net fixation and deep export do not change significantly.

The choice of the biogeochemical initial and boundary conditions does not change the representation of the ecosystem seasonal cycle, but the associated uncertainty range can be one order of magnitude larger than the predicted interannual and long-term variabilities. The uncertainty range of long-term trends associated with the physical forcing (hydrological, atmospheric, hydrodynamical, and socioeconomic) is much smaller (<10%).



**Read more about it :** [Herrmann et al. \(2014\), Impact of climate change on the Northwestern Mediterranean Sea pelagic planktonic ecosystem and associated carbon cycle, J. Geophys. Res. Oceans, doi:10.1002/2014JC010016](https://doi.org/10.1002/2014JC010016)