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Acidification in the Mediterranean Sea following a transient climate change scenario simulated with a high-resolution regional model

Jean-Claude Dutay[1], James orr[1], briac le-vu[1], julien palmieri[2], camille richon[3], and samuel somot[4]
[1]IPSL/LSCE, Gif sur Yvette, France
[2]NOC, Southampton, UK
[3]University of Liverpool, UK
[4]Météo-France, CNRM, Toulouse, France

Oceans contribute to the removal of 25%-30% of the atmospheric anthropogenic CO_2, which increase sea water CO_2 concentration and acidity, and decrease the Aragonite saturation state that may cause problems for calcium carbonate skeletons of marine species. The Mediterranean Sea is a specific environment with a higher alkalinity and a fast ventilation that is in favor of a more important uptake of anthropogenic CO2 relatively to global ocean, and an acidification process impacting the whole water. The future acidification of the Mediterranean Sea has not been investigated by regional model yet.

In this study, we used an eddy-permitting regional model of the Mediterranean Sea (NEMO_MED8) coupled to an oceanic biogeochemical model (PISCES) to evaluate how climate and anthropogenic CO_2 changes will modify the acidification and its annual cycle from the 1850 period to the end of the 21st century according to the future IPCC SRES-A2. Evolution of boundary conditions from Rivers and exchange at the Gibraltar strait are considered. We analyse the relative influence of temperature, salinity, DIC and alkalinity on the mean and the seasonal amplitude of acidity (H+) and aragonite saturation sate (Ω_A) and their evolution following a changing climate scenario SRES-A2.

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