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Assessing future climate change in the Iberian Upwelling System using a multi-model mean ensemble

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The Western Iberian Peninsula is the northern limit of the Canary Upwelling System, a region of strong mesoscale activity, seasonal variability and therefore very likely to be sensitive to climate change. We have previously developed and validated a dynamical downscaling methodology, which allows us to realistically reproduce the system dynamics with the Regional Ocean Modelling System (ROMS). It consists in setting up large-scale low-resolution ($\sim$20 km) configurations in the Northeast Atlantic Ocean which are meant to obtain boundary conditions for an intermediate, medium-resolution that in turn provide boundary conditions for the final study area, which has a resolution of about 3 km and comprises the Gulf of Cadiz and about 270 km offshore West Iberian Peninsula coast.
The present circulation is simulated using the Comprehensive Ocean-Atmospheric Data Set (COADS) as forcing. For the future, we present a multi-model mean ensemble as forcing. This method has been demonstrated to be a good approach to obtain a realistic future climate simulation, since it minimizes the individual uncertainties of each model. In this way, ensemble-based simulations provide a good comparison with observed data and are thus more likely to be able to replicate future conditions.
Thus, we present results of ROMS simulations forced with the multi-model mean ensemble for the present (and compare it to the COADS-forced simulations) and for the future period of 2071-2100 in respect to the SRES-A2 scenario. In general, there is an increase in temperature and decrease in salinity, likely due to an increase in air temperature and water flux from the pole that characterize this future scenario. Other atmospheric future conditions include an increase in northerly wind intensity along the coast, which is reflected in an increased intensity in upwelling during summer.