

Multidecadal variability of water temperature in the Mediterranean and Black Seas and potential connections with climate indexes

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Surface properties of Southern European seas (SES) such as temperature (SST) have been described to fluctuate over a large range of time-scales, from seasonal to interannual and decadal. At longer scales (e.g., multidecadal) there is not enough field-based information to assess whether the SES fluctuate as larger oceanic basins such as the Pacific (i.e. the PDO) or the North Atlantic (i.e. the AMO) do. In the present contribution we present long-term hindcast simulations of both the Mediterranean and Black Seas covering at least 60 years (from 1959 onwards) performed with oceanic models (based on GETM) forced at the surface with the best available reanalysis data. By applying spectral analysis to models' simulations data, multidecadal oscillations in SST are described for both basins, while for the Black Sea also the subsurface layer (the cold intermediate layer temperature, CILT) is found to fluctuate with a multidecadal periodicity. Both SST in the Mediterranean and CILT in the Black Sea seem to vary synchronous with the AMO while the SST in the Black Sea shows an oscillation shifted ~ 10 years with respect to the other two. We propose that the existence of such long-term variations could be the cause of the very different trends described in the literature for surface properties of the Black Sea, as trends are different depending on the considered time-period. This work also emphasizes the need of considering these natural oscillations when evaluating the climate change signal in the SES, especially for scenario evaluation.