

MedCLIVAR: Mediterranean Climate Variability. Sea level rise and its forcing.

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Sea level change is one of the major risks for coastal regions. At global scale, climate change is projected to increase sea level by increasing the oceanic mass from melting ice-caps and glaciers and also by increasing the oceanic volume through thermal expansion. At regional scale, changes in the atmospheric forcing and in the ocean circulation make that sea level rise is not expected to be spatially uniform. Land movements further increase the spatial variability of sea level rise as it can be observed at the coast, amplifying or reducing the consequences of the climate contributions. The Mediterranean Sea in particular, being a semi-enclosed basin, has been experiencing sea level rise differently from the global mean. This presentation intends to report the significant progress achieved during the last years in understanding Mediterranean long-term (interannual to interdecadal) sea level variability, paying particular attention to the processes responsible for the observed changes. The nucleus of the presentation focuses on mean sea level changes and its different contributors: the steric component (changes in the density of the water column due to changes in temperature and salinity), the mass component (accounting for the addition/subtraction of both, water and salt) and the atmospheric component (due to the mechanical forcing of atmospheric pressure and wind). The estimated trends indicate that Mediterranean mean sea level has been rising at a much lower rate than global mean sea level during the last decades due to both, the marked negative contribution of the atmospheric component and the slightly negative steric component. Long-term changes in the seasonal cycle and in extreme events are also examined. Open issues such as the role of the Strait of Gibraltar, the uncertainties associated with the computation of the different sea level components, the heat and freshwater fluxes or the land movements, are also pointed out. This contribution is part of the forthcoming book on Mediterranean climate variability promoted by the MEDCLIVAR community.