



Coastal sea level trends in Southern Europe

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Tide gauge records covering 10 years or more in the Mediterranean Sea and in the Atlantic Iberian coast are used to provide updated estimates of sea level trends. Sea level trends obtained from the longest records (>45 years) are smaller in the Mediterranean (0.3 ± 0.4 to -0.7 ± 0.3 mm/yr) than in the neighbouring Atlantic sites (1.6 ± 0.5 to 1.9 ± 0.5 mm/yr) in the period 1960-2000. The five tide gauge records that cover most of the 20th century show negative accelerations between -0.3 ± 0.3 and -1.5 ± 0.4 mm/yr/century. Decadal sea level trends are also derived and are not consistent with global values in particular for the 1990s, during which the Mediterranean has shown enhanced sea level rise of up to 5 mm/yr compared to the global average. The atmospheric and steric contributions to the observed trends and variability for the period 1960-2000 are also provided. The atmospherically-induced sea level is obtained from a barotropic model forced by wind and pressure and the steric variations are computed from climatological data sets of temperature and salinity. The atmospheric contribution accounts for 20 to 50% of the observed yearly variability and has negative trends from -0.2 ± 0.2 to -0.9 ± 0.2 mm/yr over the entire region for the period 1960-2000. Also the steric forcing contributes with negative trends ranging from -2.5 ± 0.6 to 0.0 ± 0.2 mm/yr. Sea level trends corrected for atmospheric, steric and post-glacial rebound effects are provided for each time series, revealing that the differences between Mediterranean and nearby Atlantic sites are reduced. Sea level trends from shorter records are also computed. These show a large scatter of values with 90% lying between -3 and 7 mm/yr covering periods from 8 to 20 years and a median value of 2.05 ± 0.82 mm/yr. The coherency of the short time series is tested against the longer nearby records.