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Coastal sea level rise in southern Europe and the nonclimate contribution of vertical land motion

G. Woppelmann (2) and M. Marcos (1)

(1) IMEDEA, CSIC-UIB, Esporles, Spain (marta.marcos@uib.es), (2) University La Rochelle-CNRS, UMR LIENSS, La Rochelle, France (gwoppelm@univ-lr.fr)

In this study, we extend the advanced approach of combining tide gauge and satellite altimetry data with supplemental equations from adjacent tide gauge records of at least 30 years of common data to investigate the relative importance of the nonclimate contribution of vertical land movement to the observed rates of sea level change along the coasts of southern Europe. The sensitivity tests proved that the advanced approach is robust and accurate at the submillimeter per year level of around 0.4 mm/yr in estimating rates of vertical land movements. It enabled identifying stations displaying large rates of vertical land movements that must be taken into account when predicting future sea level rise and appraising the exposure to its impacts on populations and assets. The average rate of coastal climate-related sea level rise in the Mediterranean Sea was consequently revisited to be of 1.7 mm/yr over the past century, whereas the Atlantic northern Iberian coast revealed a significant high rate of sea level rise in excess of 3.4 mm/yr for the past 70 years. Future work should consider applying this powerful approach to other geographic contexts as a useful source of supplementary data for geodynamic studies.