{rokbox title=|Maps of the tide gauges selected in each band :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-reconstruction-mediterranean-coastal-sea-level-tide-gauge-records-ramos-et-al-2022-thumb.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-reconstruction-mediterranean-coastal-sea-level-tide-gauge-records-ramos-et-al-2022.jpg{/rokbox}

Jorge Ramos-Alcántara, Damià Gomis and **Gabriel Jordà**, 2022. **Reconstruction of Mediterranean coastal sea level at different timescales based on tide gauge records.** Ocean Sci., 18, 1781–1803, 2022. https://doi.org/10.5194/os-18-1781-2022

Abstract: A coastal sea level reconstruction based on tide gauge observations is developed and applied to the western basin of the Mediterranean sea. The reconstructions are carried out in four frequency bands and are based on an optimal interpolation method in which the correlation between tide gauge data and all coastal points has been determined from the outputs of a numerical model. The reconstructions for frequencies lower than 1 month use monthly observations from the Permanent Service for Mean Sea Level (PSMSL) database and cover the period from 1884 to 2019. For the reconstruction of higher frequencies, hourly observations from the Global Extreme Sea Level Analysis (GESLA-2) dataset are used and cover from 1980 to 2015. Total sea level is retrieved with high accuracy from the merging of the different frequency bands. Results of a cross-validation test show that independent tide gauge series are highly correlated with the reconstructions. Moreover, they correlate significantly better with the reconstructions than with altimetry data in all frequency bands, and therefore the reconstruction represents a valuable contribution to the attempts of recovering coastal sea level. The obtained reconstructions allow us to characterize the coastal sea level variability, estimate coastal sea level trends along the entire coastline, and examine the correlation between western Mediterranean coastal sea level and the main North Atlantic climate indices. The limitations and applicability of the method to other regions are also discussed.

Keywords: