

{rokbox title=|Mediterranean tide gauges operated by Puertos Del Estado :: Image: Authors|
thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-extreme-sea-level-events-mediterranean-microtidal-region-ramos-et-al-2025-thumb.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-extreme-sea-level-events-mediterranean-microtidal-region-ramos-et-al-2025.jpg{/rokbox}

Jorge Ramos-Alcántara, Miguel Agulles, Damià Gomis and **Gabriel Jordà**, 2025.

[Quantifying the contributors to extreme sea level events in a Mediterranean microtidal region at high spatio-temporal resolution.](#)

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Abstract: A comprehensive characterization of extreme sea levels at different spatio-temporal scales is presented for a largely microtidal region, taking the Spanish Mediterranean as a case study. The classical view of extremes as a consequence of the concurrence of storm events and high tides may lead to an incomplete picture for the Mediterranean coasts, where the tidal regime is small and processes operating at high frequencies can contribute significantly to extreme levels. Our approach bases on the analysis of tide gauge records with a high sampling frequency (1 min), in order to consider other contributors beyond storm surges and tides. To have a basin-scale view, we first analyse the tide gauges operated by Puertos del Estado, which are distributed over all the Spanish Mediterranean coasts and cover at least from 2010 to 2022. Next, we focus on a more reduced domain to take advantage of the unprecedented spatio-temporal resolution of the VENOM tide gauge network, operating since 2020 in the Balearic archipelago. Last, we analyse the role of waves in local extreme sea level events by propagating waves towards the coast in the Bay of Palma. The wave run-up estimates are calculated considering the type of coastal protection and are used to simulate the potential flooding that could occur in the future under an unfavourable climate change scenario. Our results highlight the importance of high-frequency sea level records to study extreme events, and the key role of processes such as meteotsunamis and waves in the occurrence of extreme sea levels.

Keywords: Extreme sea levels, Mediterranean Sea, Tide gauge, Storm surge, Wave runup