

{rokbox title=|Map of the Balearic Islands, with the location of the BalearsMeteo barometric stations and the available tide gauges :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-characterization-atmospheric-disturbances-generating-meteotsunamis-balearic-islands-villalonga-et-al-2024-thumb.jpg|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-characterization-atmospheric-disturbances-generating-meteotsunamis-balearic-islands-villalonga-et-al-2024.jpg|/rokbox}

**Joan Villalonga**, Sebastià Monserrat, Damià Gomis and **Gabriel Jordà**, 2024. [Observational Characterization of Atmospheric Disturbances Generating Meteotsunamis in the Balearic Islands.](#)

Journal of Geophysical Research: Oceans, 129, e2024JC020910.

<https://doi.org/10.1029/2024JC020910>

**Abstract:** The high-frequency sea level oscillations (SLO) associated with meteotsunamis can have hazardous consequences for coastal populations. They are triggered by high-frequency atmospheric disturbances generating an oceanic response that is amplified mainly by Proudman and harbor resonance. So far, the lack of high-resolution data had prevented a comprehensive characterization of these atmospheric disturbances, even in an extensively studied “hot spot” as Ciutadella (Balearic Islands). Here, we analyze atmospheric disturbances triggering meteotsunamis in Ciutadella during 2021 using data from an ultra-dense meteorological network (BalearsMeteo). Atmospheric pressure time series with a sampling rate  $\leq 1$  min are used to estimate propagation speed and direction, spectral energy content, and the spatial homogeneity of atmospheric disturbances linked to meteotsunami events. We find that the spatial structure of the disturbances are rather heterogeneous, but the inferred propagation velocities are consistent with the occurrence of Proudman resonance on the continental shelves located upstream of Ciutadella (speeds between 24 and 36 m/s and directions from  $210^\circ$  to  $260^\circ$ ). Although during meteotsunami events these velocity estimates undergo some changes both in time and in space, they show two key characteristics: (a) the atmospheric pressure disturbances are mostly non-dispersive; and (b) the largest SLO are observed when the speed and direction of propagation velocities are more homogeneous in space and time. Nevertheless, an empirical relationship between the analyzed atmospheric features and the SLO amplitudes could not be established. That is, the prediction of meteotsunami amplitudes remains challenging due to the intricate interplay of atmospheric and oceanic processes.

Keywords: