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# External forcing of meteorological tsunamis at the coast of the Balearic Islands

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High frequency sea level observations at four coastal sites at the Balearic Islands (three in Mallorca and one in Menorca) have been used to examine the external forcing responsible for above normal seiches in certain harbours. Anomalously amplified harbour seiches in this region are known to be mainly associated with the passage of atmospheric pressure perturbations that generate long ocean waves in the open sea that travel northeastward, in the direction from Mallorca to Menorca. In Ciutadella Harbour (Menorca), sea level oscillations regularly reach amplitudes that are potentially dangerous to harbour infrastructure and boats. At other sites, seiches are normally smaller but have similar behaviour, indicating a local response to the external forcing. This external energy formed during the large amplitude events has been estimated based on spectral analysis of coastal measurements and found to have periods predominantely in the range of 5 to 50 min. Forcing characteristics differ among events but are similar for the same event, even for sites located far apart. Near identical responses are found for two specific sites, Ciutadella (Menorca) and Cala Ratjada (Mallorca). This suggests that sea level measurements at Cala Ratjada could be used to forecast destructive events in Ciutadella Harbour as part of a Mediterranean Tsunami Warning System ICG/NEAMTWS.