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The first application of full scale *Posidonia* seagrass mimics to investigate wave flow and energy dissipation

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Submerged vegetation is recognised to affect flows, however most knowledge in the flow dynamics in and around canopies comes from laboratory or field measurements carried out under unidirectional flows. The physical processes controlling wave transformation over submerged canopies are not fully understood. Experiments have been performed on the interaction between submerged vegetation and waves but, to our knowledge, this is the first study using a full scale artificial *Posidonia* seagrass meadow to investigate vegetation-induced wave height attenuation and wave energy dissipation under controlled conditions. Tests at natural scale avoid scale effects, which are difficult to quantify, especially for flexible vegetation mimics. The experiments were performed in the Canal d'Investigació i Experimentació Marítima wave flume in Barcelona (100 m length, 3 m width and 5 m depth). A meadow of artificial seagrass with a total length of 10.7 m, consisting of approximately 8000 four leave plants was constructed. The mimics were made from an expanded polypropylene with material properties very similar to real *Posidonia* leaves. The meadow was exposed to waves of different spectra, typical of Mediterranean conditions, under 4 different water depths and therefore 4 different submergence ratios h_s/D (h_s = height of seagrass, D = water depth). Two different seagrass densities and configurations were tested.
The presence of the meadow has an important effect on wave induced spectral flows within and above the canopy. The short period components of the flow penetrate within the canopy, whilst longer period components of the flow are reduced, as found for coral reef canopies in previous studies. The significant wave height decay along the seagrass meadow was measured. Spectral wave height decay and velocities reduction are greater for the denser meadow and for higher submergence ratios.