Observation of irregular wave transformation in the surf zone over a gently sloping sandy beach on the French Atlantic coastline

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Résumé en anglais	The dissipation of the sea-swell frequency band energy (nominally $0.09 < f \leq 0.3$ Hz) and the distribution of low frequency band energy (nominally $0.005 \leq f \leq 0.09$ Hz) on a transect crossing the surf and swash zones of a fine grained, gently sloping barred beach are investigated with data from a five element synchronous pressure sensor line deployed for 8 d. In this paper, we suggest a rational method to determine the frequency cut-off between the low frequency band and the sea-swell frequency band from the cross-shore evolution of the sea surface elevation energy density spectra. Sea-swell wave heights are depth limited, consistent with previous works whereas low frequency wave heights are independent of the local water depth. In models of surf zone hydrodynamics, wave energy dissipation is often parameterized in terms of γ, the ratio of the sea-swell significant wave height to the local mean water depth. The observed values of γ are well correlated with β/kh (where β is the beach slope, h the mean water depth and k the local wavenumber corresponding to the local centroidal frequency and depth) but the linear regression through the data differs significantly from previous work. Finally, the evolution of the energy distribution in both frequency band indicates the local (not only dependent on the depth) behaviour of two phenomena: the phenomenon of merging shocks and the distribution of low frequency band into two components – principally infragravity motions ($0.005 \leq f < 0.05$ Hz) or first subharmonic motions ($0.05 \leq f < 0.09$ Hz).
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