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Wave attenuation service of saltmarshes and shelly cheniers: a spatio-temporal study in Mont-Saint-Michel Bay, France

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A consequence of Global Change might be an increase of coastal risks. Indeed, sea-level rise conjugated with spring tides, can lead to hazardous sea-levels, in worldwide coastal areas subject to unprecedented demographic densification (exposure), thus risks. Coastal ecogeosystems have the potential to alleviate hazards by reducing wave energy due to their topographic complexity (drag coefficient). This attenuation service is nonlinear, it evolves with time and depends on meteorological and environmental factors.
This study focusses on the variability of the wave attenuation service (WAS) provided by saltmarshes and shelly cheniers, both major ecogeomorphic features of the Mont-Saint-Michel Bay (France).
The protocol consists in WAS comparison of six geo-ecosystems configurations: (1) lower marsh, (2) middle marsh, (3) upper marsh, (4) single shelly chenier, (5) multiple shelly cheniers, and (6) levelled shelly cheniers. All field sites are within a 4 km distance. Wave measurements, using pressure sensors, were carried out for three tide cycles at high water levels (> 12m above the national tidal datum epoch) in order to maximize the likelihood of extreme sea-level conditions. Wave height data are recorded, simultaneously, at a 2 Hz frequency for 13 stations along cross-shore transects. For each tide cycle, approximatively 15 million data allow to compute the wave attenuation along saltmarshes and cheniers.
This comparative study has enabled each system configuration to be scored according to its mean wave attenuation over three tides, but also in respect to its time variability in attenuation. Such added values about natural coastal barriers hold great promise to be integrated into expected spatially-explicitly modelling of the wave attenuation service by ecogeosystems.