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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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**Introduction**

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 exposure, thus risks. Coastal ecogeoecosystems have the potential to alleviate hazards by *reducing wave energy* due to their topographic complexity (drag coefficient). The *attenuation service* is nonlinear. It evolves with time and depends on an environment component, meteorological and environmental factors. (Koch and al., 2007)

1. To estimate this non-linearity of this natural protection and
2. To rank the environmental components according to their efficiency in the reduction of hazards are the objectives of this study. This study focuses on the variability of the *Wave Attenuation Service (WAS)* provided by *shelly cheniers* (site a) and *saltmarshes* (site b), both major ecogeomorphic features of the Mont-Saint-Michel Bay (France).

**Materials and Methods**

1. Deployment of *pressure sensors* (NKE SP2110) along cross-shore transects selected according to ecogeoecosystem diversity, for three various events.
2. Pressure data acquired at a frequency of 2 Hz are corrected and converted into water heights, from which the wave signal is extracted for the determination of *significant wave heights* (Hs).
3. WAS is determined from the average of significant wave height calculated over two hours of high tide during four consecutive tides, then turn into *attenuation per unit of distance (%/100m)* to be easily compared between study sites.

**Results**

**Event #1**

- November 2017
- Atmospheric pressure
  - Min.: 1006 hPa
  - Max.: 1027 hPa
- Wind conditions
  - Mean: 10,6 km/h
  - Max. wind gust: 72 km/h

**Event #2**

- December 2017
- Atmospheric pressure
  - Min.: 1033,9 hPa
  - Max.: 1038,9 hPa
- Wind conditions
  - Mean: 14,1 km/h
  - Max. wind gust: 90,9 km/h

**Event #3**

- March 2018
- Atmospheric pressure
  - Min.: 1019 hPa
  - Max.: 1016,9 hPa
- Wind conditions
  - Mean: 10,9 km/h
  - Max. wind gust: 64,6 km/h

**Discussion**

Preliminary results of this study confirm the ability of coastal ecogeoecosystems to *mitigate the wave height* up to 78%/100m and, therefore reduce the flood risks on human and material assets.

During the three campaigns, no storm conditions were recorded. Nevertheless, we can observe the variability of the WAS depending on wave and wind conditions, especially the atmospheric pressure variabilities that can provide sea surges (positive or negative) and, therefore increase locally the water depth and making the fringe marsh WAS less efficient (event #3, site b).

Statistically, saltmarshes appear to be the most efficient ecogeoecosystem in low energy (up to 78%/100m). However, shelly marsh WAS is very important too (up to 41.1%/100m) and at the contrary of saltmarshes, we can make the hypothesis the shelly chenier WAS is not dependent on seasonally, as it is the case for saltmarshes WAS (standard deviation : 29,9 [saltmarshes] vs. 0.9 [shelly cheniers]) and it will not vary significantly with the succession of the wintry storms, because of its morphological adaptability and flexility.

Based on the third study site (i.e., levelled shelly cheniers for recreational activities, exhibiting the lowest WAS (31.3%/100m) irrespective of the meteorological conditions, we can point out upfront that the coastal management (conservation) is a crucial point to be accounted in the coastal risks.

**References**