EGU25-17787, updated on 24 Mar 2025
https://doi.org/10.5194/egusphere-egu25-17787
EGU General Assembly 2025

Past trajectory of a socio-ecosystem at the land-sea interface: the case of the northern watersheds of the Bay of Brest over the last 150 years

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The Bay of Brest (BB) is a macro-tidal estuarine environment that has been exposed to strong anthropogenic pressures over the last decades, especially after the Second World War. It is therefore considered as a regional pilot site for addressing coastal ecosystem transformations since the Industrial Revolution. We analysed 4 sediment cores collected in 2 different BB areas more or less exposed to marine hydrodynamic processes: i) Elorn sector (3 cores) and ii) Bay of Daoulas (1 core), in the inner BB, close to the mouth of the Daoulas river, with the aim of deciphering past environmental changes at a high temporal resolution (sub-decadal) over the last 150 years.

Working at a local spatial scale (BB) allows addressing robust correlations between driving forces and environmental changes, as previously demonstrated by pluridisciplinary approaches in the study area (Lambert et al., 2018; Siano et al., 2021). In this project, we are therefore building on this existing dataset (low resolution palynology on the Daoulas core and sedaDNA analyses in the 4 study cores) with the addition of new analyses (high resolution palynology in the Daoulas core and new data for the others, benthic foraminiferal assemblages, sedimentological data and ICP-AES elemental geochemistry in the Daoulas core), with a very fine study resolution (2-year resolution for the Daoulas and 2 to 16-year resolution for the others). Furthermore, statistical analyses based on paleoecological time series allow the detection of major break points, especially thanks to the palynological and sedimentological datasets.

This work then highlights 3 major thresholds (1945, 1960-170, 1980) allowing discussion of past changes in protist communities and in BB landscapes through time. These data are finally discussed in the light of reanalysis of regional precipitation signals (by modelling approaches based on NOAA data), instrumental data (nutrient concentrations) as well as historical chronicles (land-use practices and industrial-mining-war pressures) to tackle the main forcing factors responsible for coastal ecosystem transformations. We especially highlight the strong pressure of agriculture practices on trophic changes and degradation of BB's water quality, as observed through coastal observatory series (IUEM, REPHY) with the recrudescence of toxic algal blooms since the 1980's.