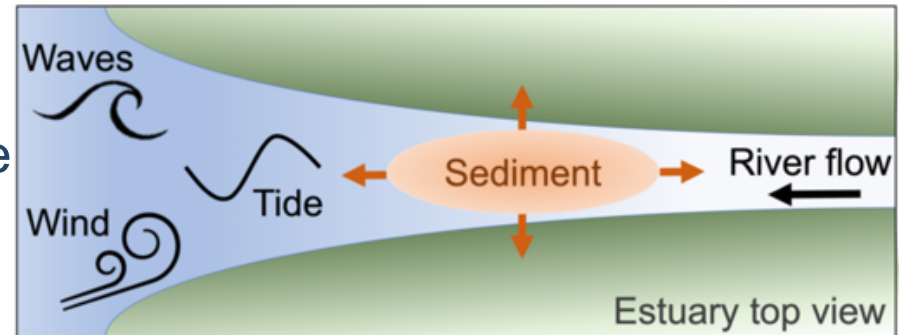


Predicting the roles and fates of estuaries under climatic and human pressures **PRESTHA + NETFLUX**

Context

- Estuaries are among the most productive habitats in the world
 - Intertidal areas, salt marches, Org. Mat., brackish water, nurseries, etc.
- Estuaries buffer particulate matters between continental and marine sources
 - Particulate supply to coastal seas \neq particulate river input
- Global changes (climatic + anthropogenic pressures)
 - SLR, liquid/solid river flow, storm events (wave/wind)
 - Dredging activities, harbour extension, channel deepening
- Need of multi-site approach
 - Toward a “universal” conceptualization and response at a global scale



Towards a global PRediction of ESTuarine HAbitat changes under climatic and human pressures [PRESTHA]

Objectives

- To predict estuarine habitat changes under global changes
 - Morphology (hypsometry), hydrodynamics, hydrology and turbidity
- To support interdisciplinary studies on estuarine ecosystems
 - Physics, sedimentary, biology, biogeochemistry and ecology

Methods

- Numerical modelling of hydro-morpho-sediment dynamics
 - Process-based and idealized models (50 to 100 years)
- To explore contrasted estuarine configurations
 - Morphology, tidal range, waves, liquid/solid river flow, SLR, dredging

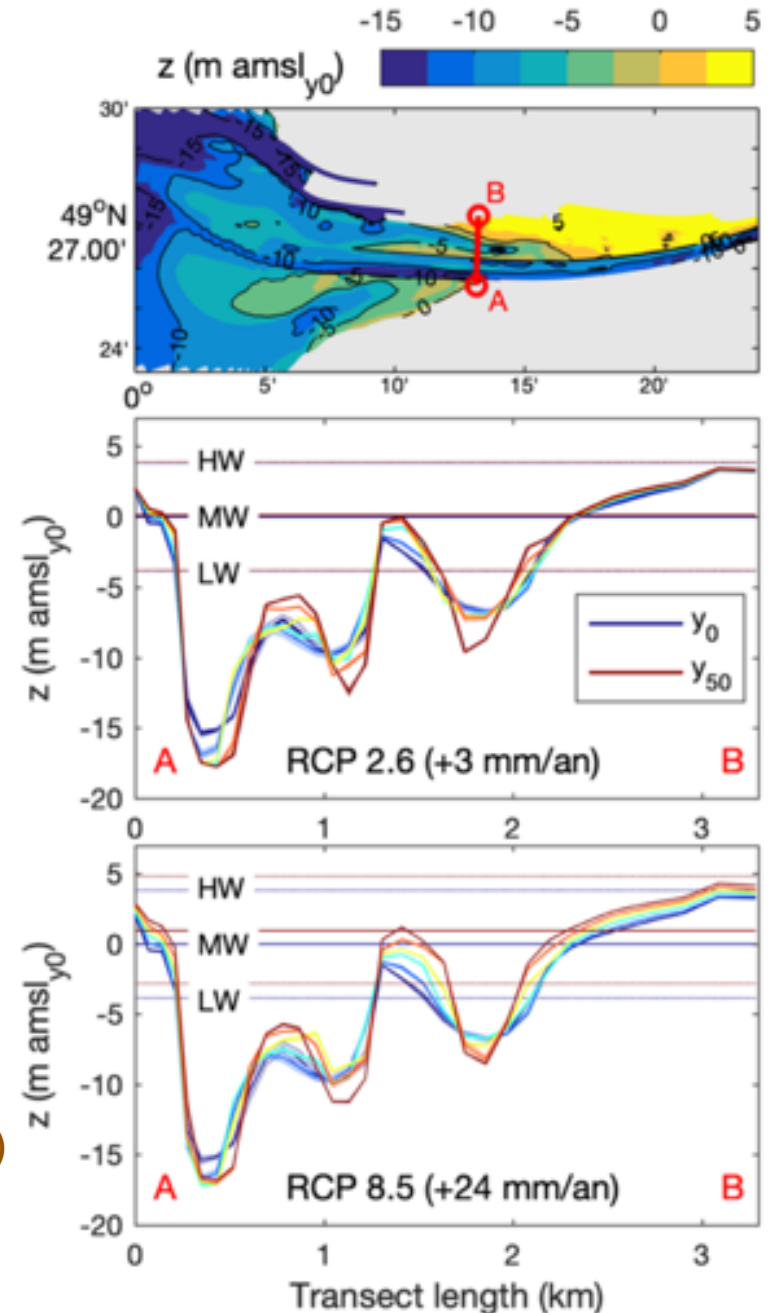
Outcomes

- Potential trajectories of estuary morphologies
- Responses to contrasted forcing conditions
- A conceptual functioning derived from multi-site modelling
- Environmental conditions (potential habitats) for interdisciplinary studies

Example



- Adaptation of intertidal areas to SLR
- 50-year morphodynamic modelling of the Seine Estuary (France)
- RCP 2.6 (+3 mm/an) and RCP 8.5 (+24 mm/an)
- MORPHOSEINE project (Seine-Aval 6, 2017-2020)



Towards a global prediction of particulate NET FLUXes between estuaries and coastal oceans under climatic and human pressures [NETFLUX]

Objectives

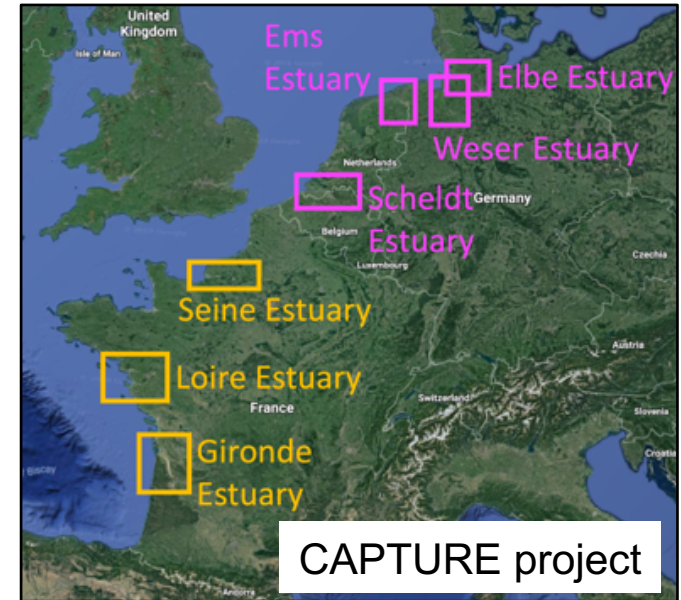
- To predict the net export of terrigenous particulate matters toward coastal seas
→ Fine sediments (e.g., mud), from seasonal to annual time scales
- To provide a global concept for worldwide tidal estuaries
→ Depending on key estuarine forcing metrics

Methods

- *In situ* monitoring networks
→ HF continuous measurements of salinity + turbidity (~10 years)
- Numerical modelling of hydro-sediment dynamics
→ Process-based numerical hindcast (~10 years)

Outcomes

- Estimation of mud and sand export to the seas
- To help quantify nutrient and pollutant transfers between continents and oceans
- A conceptual functioning derived from multi-site analysis
- To determine potential trajectories of net fluxes under climatic and anthropogenic changes



Examples



- Intercomparison of turbidity in Northern-Europe tidal estuaries
- CAPTURE project (OFB, 2021-2024)
- 20-year hindcast analysis of net sediment fluxes
- Seine Estuary, ARES project (Seine-Aval 6, 2019-2020)

