Salt marshes adjustment to anthropogenic pressures and sea-level rise

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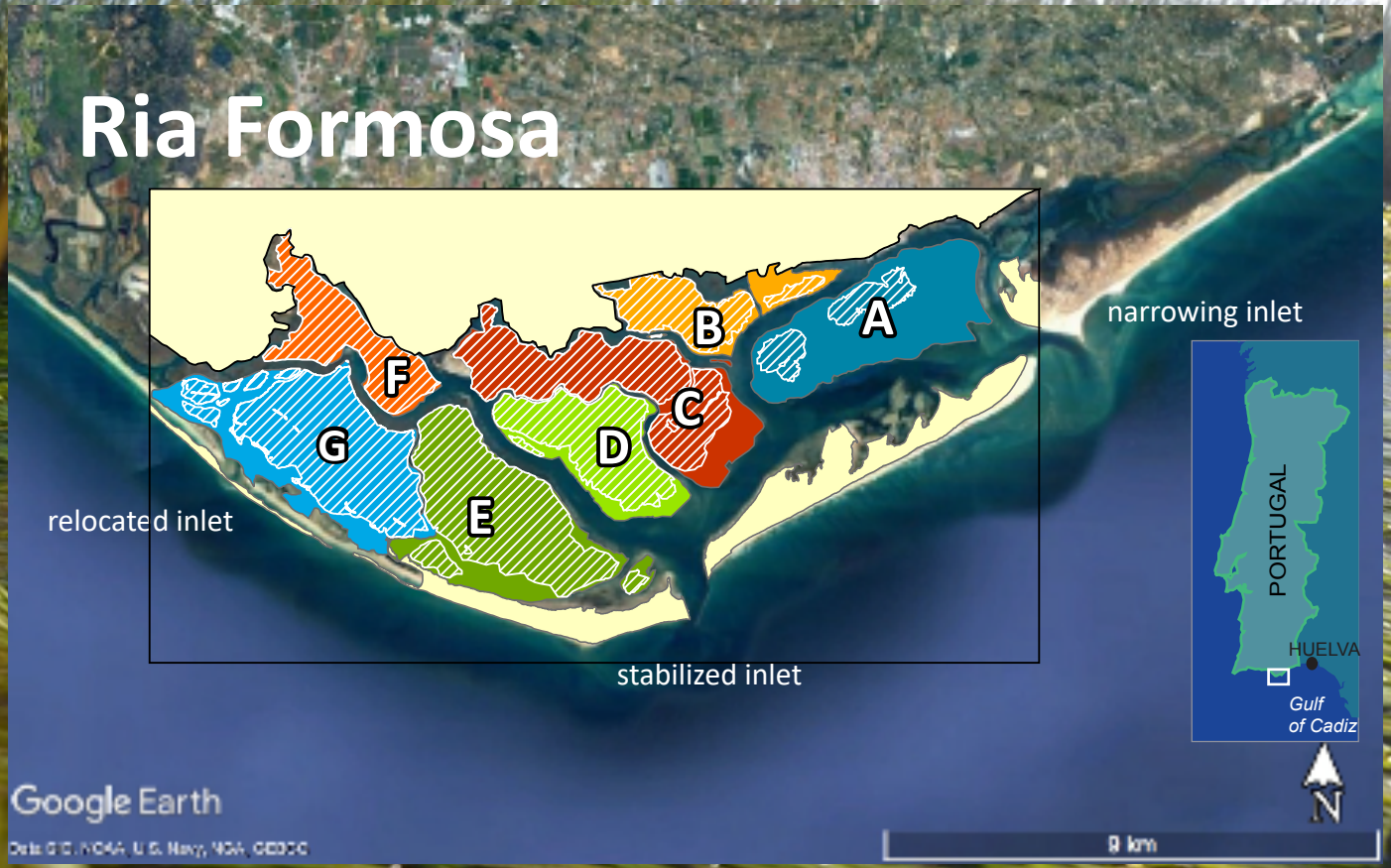
WHATS THE STORY??

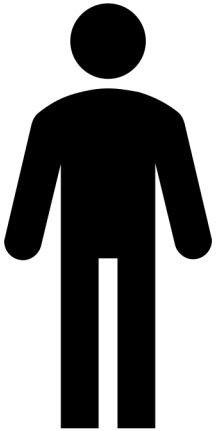
The salt marshes and tidal flats represent more than 2/3 of the total area of the lagoon

Ria Formosa

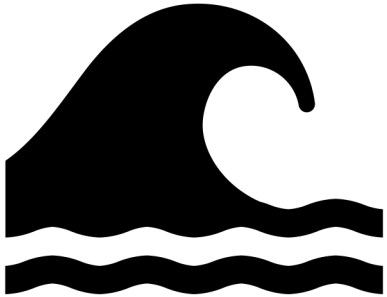


The way that we identified marshes

PAST



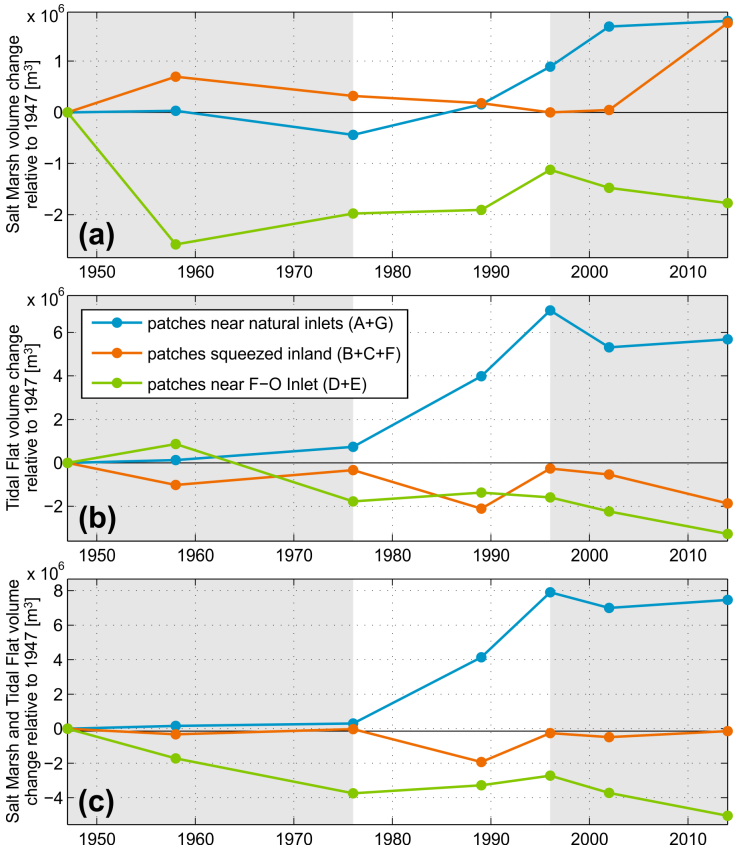
Human pressures



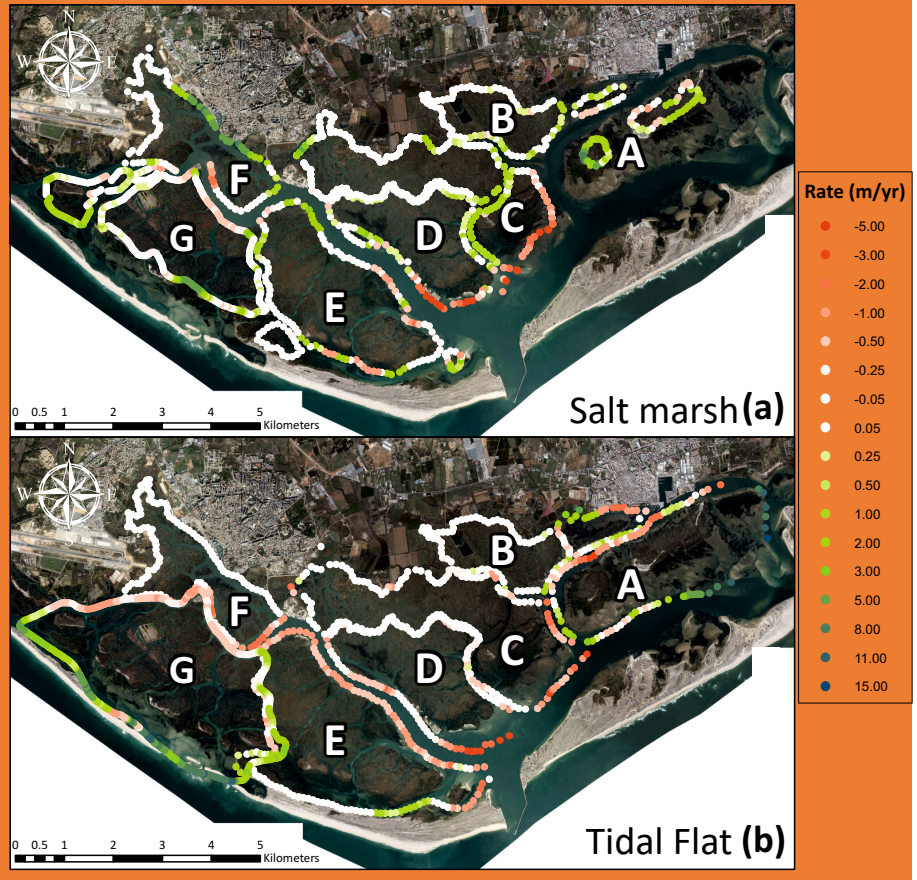
Sea-level rise

- Salt marshes in the Ria Formosa showed lateral expansion in the past
- Erosion associated with artificial inlet stabilization and dredging along the main navigable channels
- Marsh progradation near the natural inlets of the system, fed by sediment influx pulses

VOLUMETRIC CHANGES



BOUNDARY CHANGES



Land Cover Changes - Sea-Level Affecting Marshes Model (SLAMM, v. 6.7)

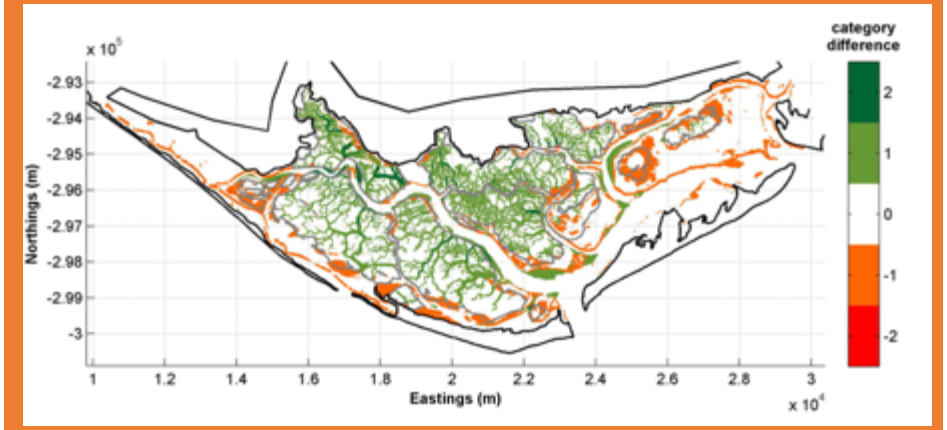
LiDAr data

Site-specific parameters
(e.g. great diurnal tide, salt elevation, etc)

Long-term boundary displacements

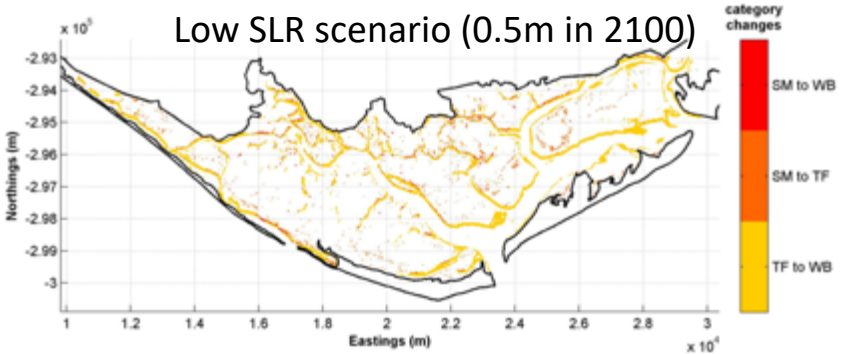
Sea-level Rise:
Low sea-level rise scenario
High sea-level rise scenario

HINDCAST
(1947-2011)

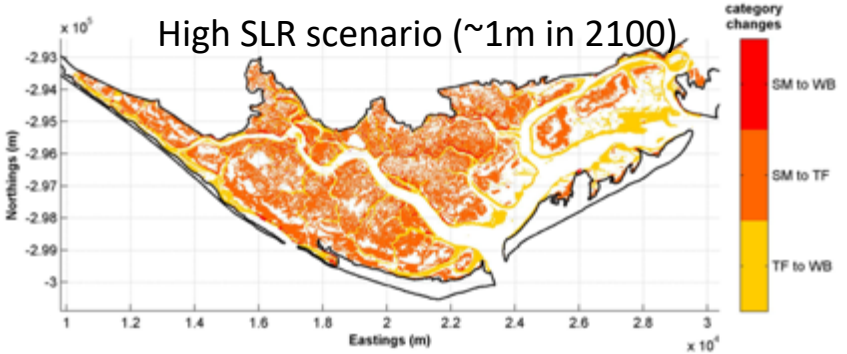


FORECAST
(2011-2100)

Low SLR scenario (0.5m in 2100)

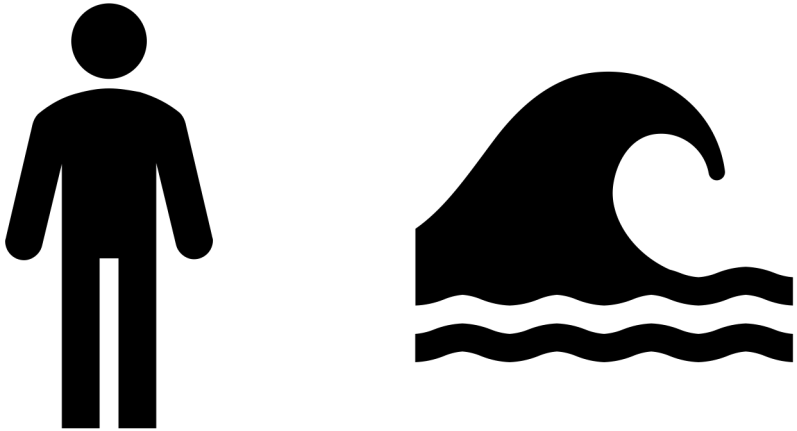


High SLR scenario (~1m in 2100)



Land cover changes

FUTURE

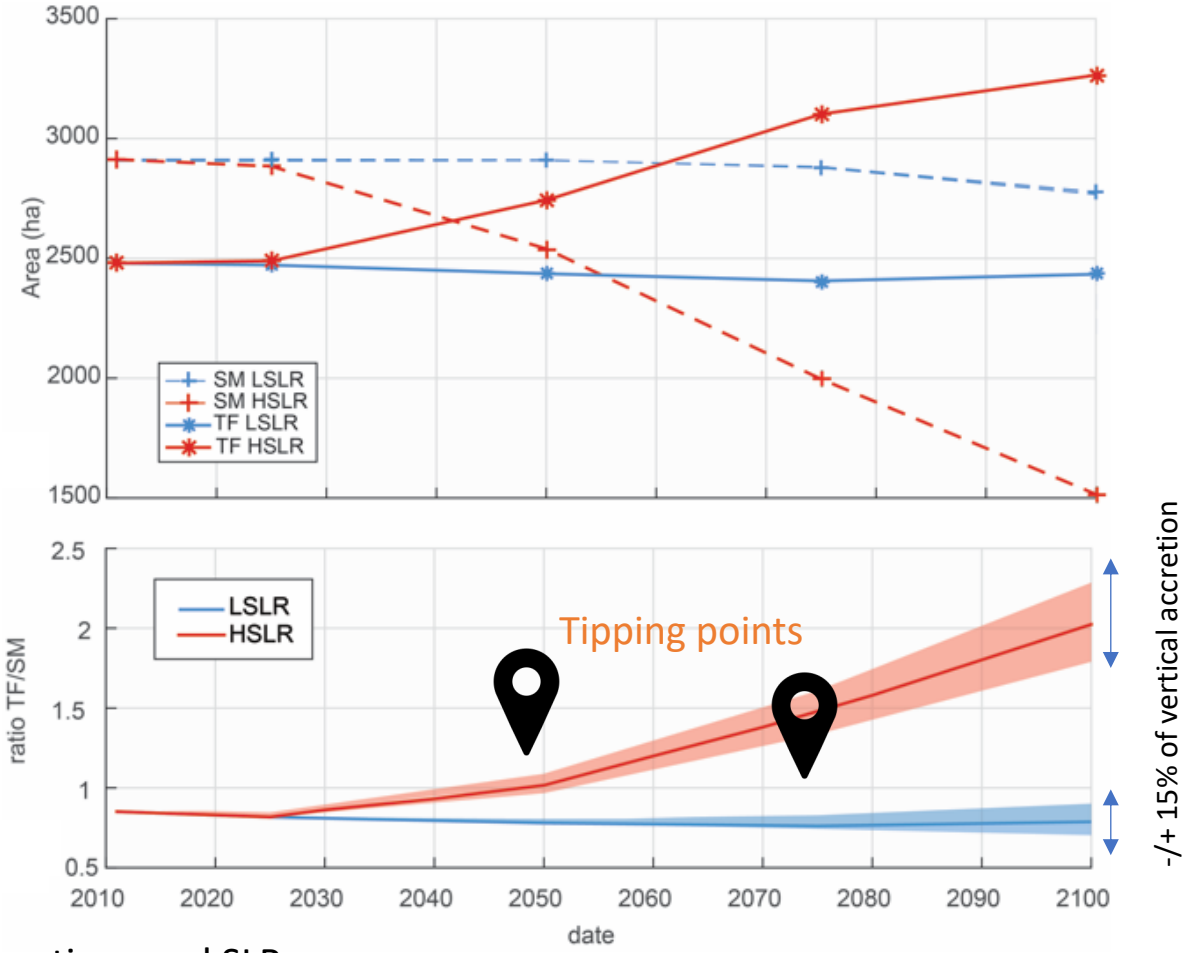


Under a Low SLR rate scenario, the system appears capable of accreting in pace with future sea-levels

Under a High SLR rate scenario, sediment gains are not in pace with the imposed sea-levels

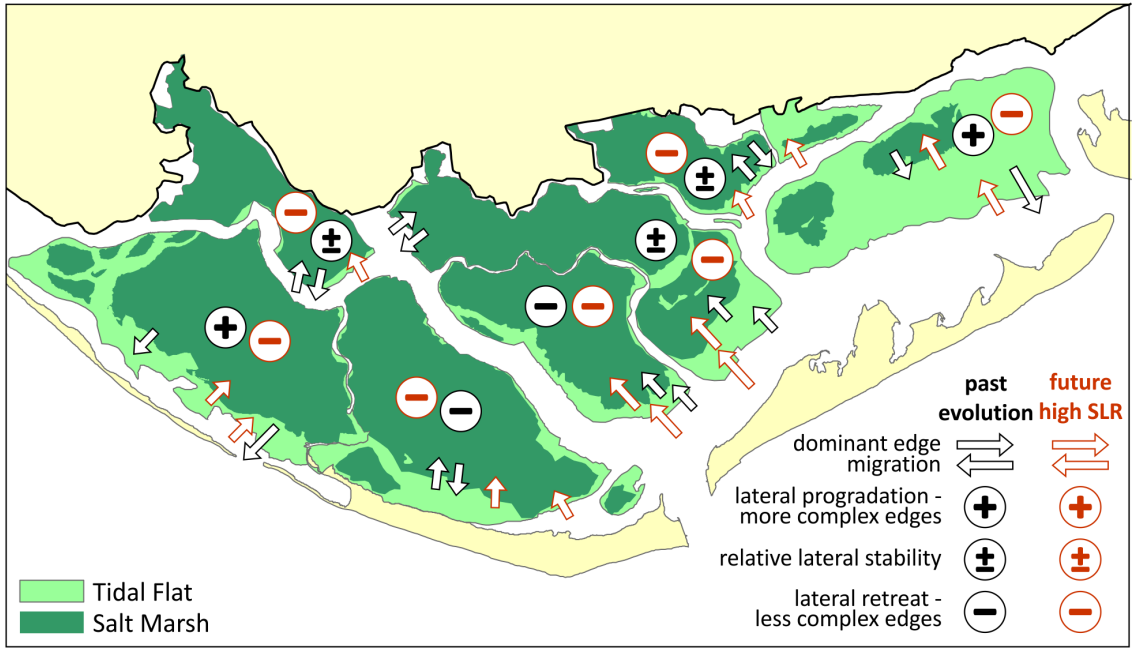
Progressive **shrinking of the salt marsh**, as it migrates landwards, with unvegetated features gaining ground and an overall increase of lower elevation vegetation

FUTURE



Cumulative effect of human interventions and SLR

WHY DO WE CARE?



Past human interventions have caused major alterations in the sedimentary processes and geomorphic configurations of marshes

- In the future sea-level rise will potentially lead to major changes **in salt marsh stability and/or survival** in the next ~100 years

- Under future high sea-level rise conditions **land cover trajectories show regime shifts in the salt marsh ecogeomorphological** states and tipping points of state non-reversal