DRIVERS AND OUTCOMES OF SALT MARSH EROSION

A. D'Alpaos[1], M. Roner[1], L. Tommasini[1], A. Finotello[1,2], M. Ghinassi[1], and M. Marani[3]

andrea.dalpaos@unipd.it

[1] Department of Geosciences, University of Padua, Padua, Italy
[2] Department of Environmental Sciences, Informatics and Statistics, Ca Foscari University of Venice, Venice, Italy
[3] Dept. of Civil, Environmental, and Architectural Engineering, University of Padua, Padua, Italy

Salt marshes are **widespread features** of tidal landscapes and exert a primary control on the **ecomorphodynamic evolution** of these environments, delivering valuable **ecosystem services**:

- Filter nutrients and pollutants;
- Serve as efficient blue-carbon sinks;
- Host diverse habitats for plant and animal species;
- Provide storm protection by dissipating wave energy;

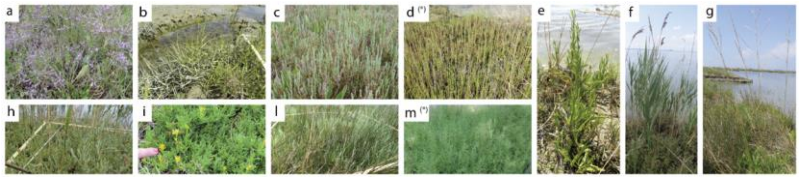
Recent studies suggest that the great majority of **salt marshes** worldwide are being **lost due to the lateral erosion** of their margins.

However, it still remains poorly understood whether different local soil properties (e.g., water content, dry bulk density, organic matter content, inorganic grain size) and vegetation cover actively affect the resistance, and ultimately the erosion, of salt-marsh margins.

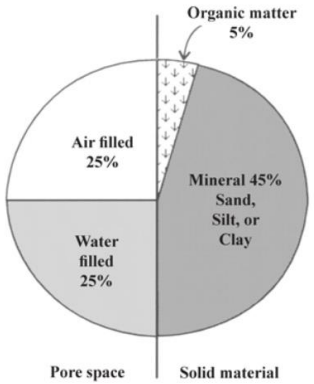
AIM of the STUDY

We quantify the relative importance of **soil properties**, **vegetation cover**, and **incoming wave power** on marsh lateral erosion, and how they feedback into marsh-edge morphology

Vegetation cover

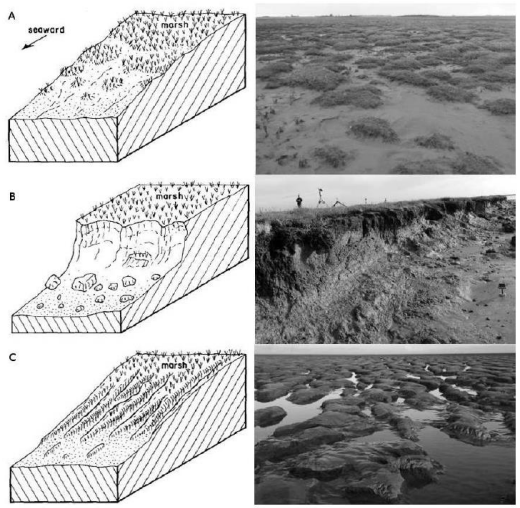


Soil properties

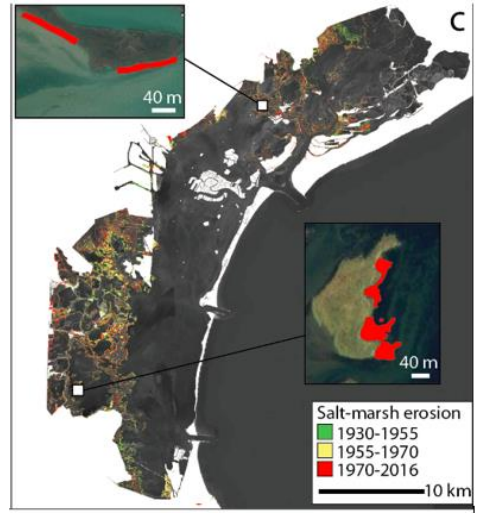


Waves

Marsh-edge morphology



Mode of edge erosion (uniform vs. irregular)



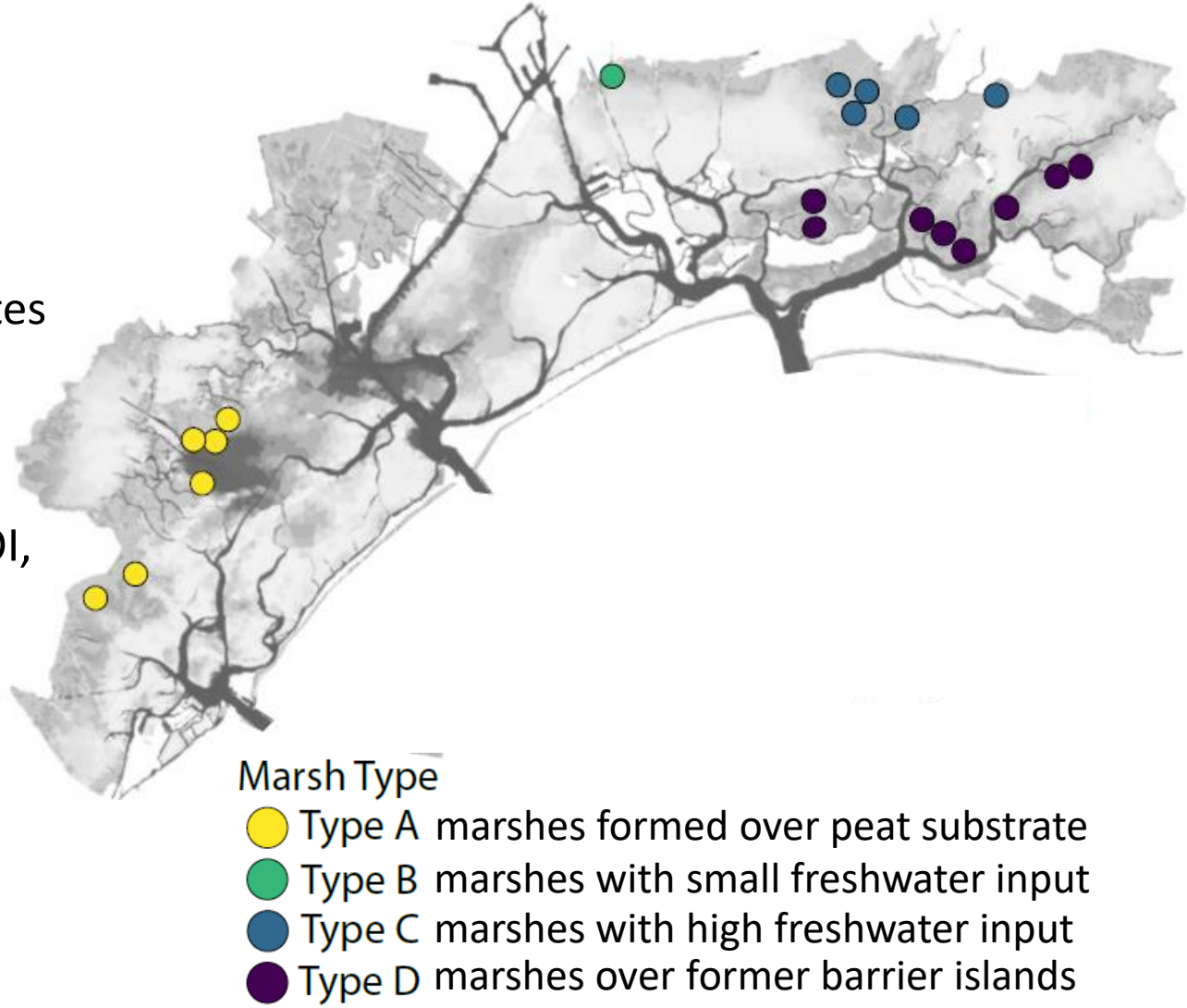
Materials and Methods

We investigate, by means of

1) **numerical modelling** (Wind Wave Tidal Model by Carniello et al., 2011) combined with
2) **field observations** (**linear** and **volumetric** erosion rates determined from aerial photos and topographic surveys) and
3) **laboratory analyses** (**sedimentological** analyses on undisturbed cores, analyses of **organic content** by LOI, **dry bulk density**, **grain size** of the inorganic fraction through a laser granulometer, **soil water content**),

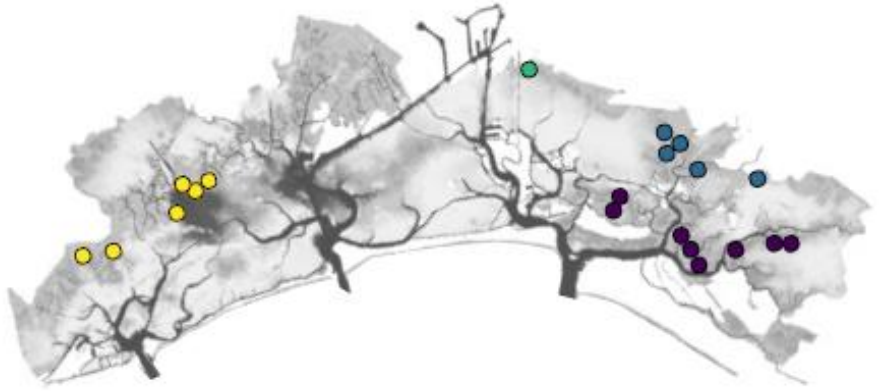
the **interplays** between **incoming wave power**, **soil properties** and ecological features influence the erosion rates of salt-marsh margins in the Venice lagoon (Italy).

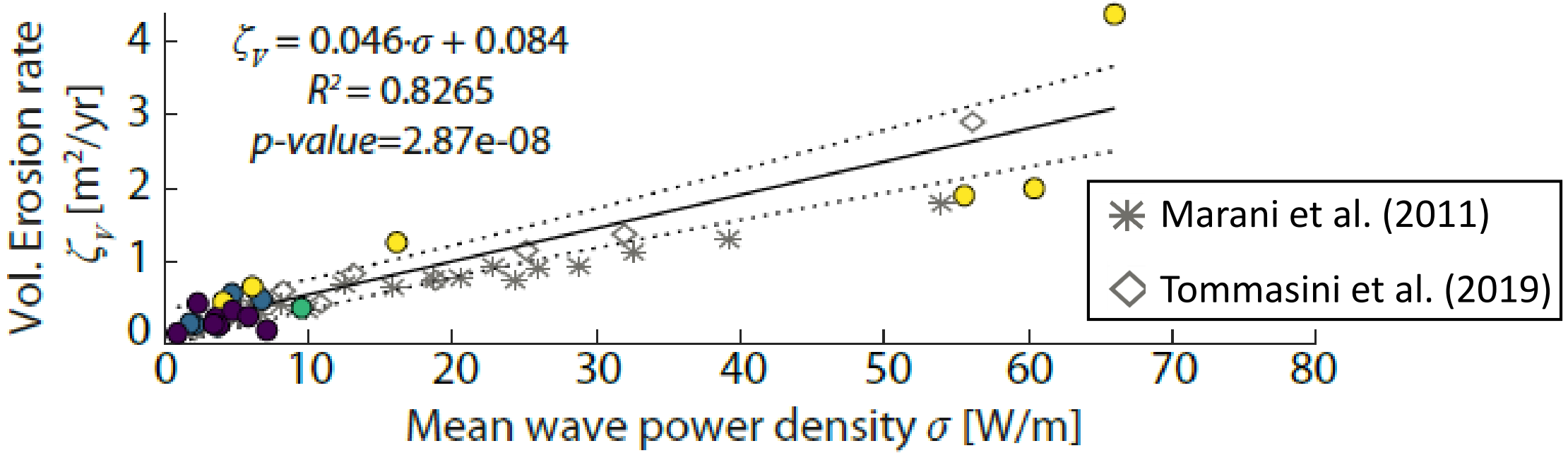
We considered **20 different study** sites within the Venice Lagoon and **83 alongshore transects** (100 m long)



Erosion rate vs. Wind-Wave power

Wind-waves are the primary driver for the lateral erosion of salt-marshes.





Erosion rate vs. soil properties

Salt-marsh erosion is weakly correlated with soil characteristics and vegetation cover