



# NH35C-0483 - Loss of Geomorphic Diversity in Flood-Regulated Shallow Tidal Embayments



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23:00 - 01:00



Convention Center - Poster Hall, D-F

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## Abstract

Conventional engineering measures, such as surge barriers and mobile floodgates, are being adopted in many coastal cities worldwide, threatened by the increasing flooding hazard due to rising sea levels. Famous examples include London, the Netherlands, New Orleans, St. Petersburg and Venice. However, the question of how flood regulation affects the morphodynamic evolution of shallow tidal embayments still lingers. Storm-surge barriers may importantly modify the propagation of tides, surges and wind waves, changing sediment transport and, thus, the morphological evolution of regulated tidal environments, in particular in sediment-starved systems.

Combining field data and numerical modelling, we investigate the effect of the Mo.S.E. storm-surge barriers, designed to protect Venice from flooding, on the morphodynamic evolution of the Venice lagoon. Artificial reduction of water levels within the lagoon affects the interaction between tide propagation and wind waves, increasing sediment resuspension on tidal flats. Resuspended sediment hardly accumulates on salt marshes, contributing to their vertical accretion and offsetting the negative effect of relative sea-level rise, owing to the reduction of marsh flooding determined by reduced water levels. Although barrier closures temporarily reduce the sediment export toward the open sea, this does not point to preserve the characteristic lagoonal morphology, hindering salt-marsh accumulation and promoting tidal-flat deepening and channel infilling.

We conclude that the operations of flood barriers can promote a significant loss of geomorphological diversity, which will critically impact the ecosystem services provided by the shallow tidal environments they are meant to protect, thus increasing the costs related to their conservation and restoration.

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