



Istituto Nazionale di Oceanografia e di Geofisica Sperimentale



Seminari di Oceanografia e di Geofisica
Sperimentale

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A one-dimensional eco-geomorphic model of marsh response to sea level rise: Wind effects, dynamics of the marsh border and equilibrium

In this study we investigate the long term evolutionary trend of tidal marshes and their possible tendency to approach equilibrium. We account of the dynamic interaction between the marsh and its adjacent environment, allowing for both variations of marsh elevation and displacement of the marsh boundary. We thus consider a 1-D configuration consisting of a tidal channel merging into a 1-D marsh. Starting from some initial configuration of the channel we model how a salt marsh forms at the landward end of the channel and determine the long term evolution of the channel - marsh configuration under different scenarios of relative sea level rise.

Previously established results on the morphodynamic evolution of a tidal channel are extended accounting for the effects of vegetation and wind driven sediment resuspension in regions where tidal stresses are too weak to mobilize sediments. Results suggest that, for sufficiently low rates of relative sea level rise the marsh platform may be able to reach an equilibrium elevation, provided wind resuspension is able to maintain a sufficiently large sediment concentration close to the marsh boundary.

This is in general agreement with recent results based on zero dimensional modeling. However, we find that the marsh boundary is unstable, as progradation or retreat is generally experienced depending on a delicate balance between tidal transport and transport driven by wind setup. In this sense, actual morphodynamic equilibrium is a rather exceptional and unstable state.

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“Antonio Michelato” room, “Ferruccio Mosetti” building
OGS, Borgo Grotta Gigante

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