Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07179, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07179
EGU General Assembly 2008

Cross-sectional equilibrium configurations of tidal channels: modelling the interplay of morphodynamic and biological processes.

A. D'Alpaos (1), S. Fagherazzi (2), and S. Lanzoni (1)

(1) Dipartimento IMAGE and International Center for Hydrology "Dino Tonini", University of Padova, Padova, ITALY (adalpaos@idra.unipd.it / Phone: +390498275757; lanzo@idra.unipd.it / Phone: +390498275426)

(2) Department of Earth Sciences, Boston University, Boston, MA 02215, USA (sergio@bu.edu)

A mathematical model is presented which allows us to investigate the morphodynamic and biological processes governing the cross-sectional evolution of a tidal channel and of the adjacent marsh platform, from the initial channel formation to its long-term morphodynamic equilibrium. Equilibrium configurations of the marsh-channel system are the result of the interplay of erosion and deposition processes, governed by sediment availability, vegetation type and sea-level rise rates. Our results show that channel cross sections adapt quite rapidly to changes in water flux and that, although channel cross-sectional shape varies during the evolution, the cross-sectional area is dictated by the tidal prism and related discharges. The equilibrium cross-sectional geometry is shown to depend on the flowing tidal prism, which is in turn determined by the marsh equilibrium elevation within the tidal frame. The model allows us to investigate the response of the system to different scenarios of sediment supply, colonization by halophytes and changing sea level.