Geophysical Research Abstracts
Vol. 20, EGU2018-19450-1, 2018
EGU General Assembly 2018

Beach states sequences: Quasi-3D process-based morphodynamic modeling

Nabil Kakeh, Angels Fernández-Mora, and Daniel Calvete
Coastal Morphoynamics Group, Physics Dpt., Universitat Politecnica de Catalunya. Barcelona, Spain. nabil.kakeh@upc.edu

Beach morphology, which is highly variable, is the result of the interactions between a large number of processes at different scales.
Pattern formation, changes in the average beach profile or shoreline variation are frequently observed simultaneously. To understand this complex dynamic, conceptual models have identified equilibrium profiles, beach states and transitions between them (e.g. Wright and Short , 1984).
Modeling the equilibrium and transient beach states is central to understand the underlying near-shore processes as well as to plan and design coastal engineering projects.

Current beach profile models are a useful indicator of the beach behavior and state. However, they typically do not acknowledge the strong three-dimensional nature of the near-shore zone (Fernandez-Mora et al. 2015).
Besides, some morphodynamic models are capable to reproduce certain characteristics of different morphological patterns (e.g. Dubarbier et al, 2017) but fail to reproduce the simultaneous evolution of patterns, profile and shoreline.

We aim to study the morphodynamics of transient beach states throughout numerical modeling. To this end, a novel quasi-3D process-based morphodynamic model is used. The model couples non-steady wave propagation, currents (including the effect of rollers), sediment transport and bed evolution. Innovative features of the model includes flooding and mobile shoreline, estimation of the depth-dependent velocities, and cross-shore transport. The model allows to couple the dynamics of patterns, profile and shoreline. Several numerical experiments on long-term evolution of beaches under different constant forcing conditions have been held. We analyze whether results fit with the theoretical beach states.