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Simulation of morphodinamic processes in small coastal systems: application to the Aljezur coastal stream (Portugal)

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In small and shallow coastal streams, morphological changes may have a dramatic effect on tidal propagation and distortion, on hydrodynamics and, ultimately, on the transport and fate of water-borne material. Hence, the ability to simulate the morphodynamic evolution of these dynamic and complex systems can be required for water quality studies. This work aimed at implementing, validating and exploring the morphodynamic modelling system MORSYS2D (Fortunato and Oliveira, 2004, Bertin *et al*., 2009) in the Aljezur stream, a small and dynamic coastal system located in south-west Portugal.

Four extensive field campaigns were carried out in 2008 and 2009 to measure bathymetry, water levels, waves and currents, in both the estuary and the adjoining beach. Between the two 2009 campaigns, bathymetry was measured on a monthly basis. Data revealed significant morphological changes, including channel migration and the formation of sandbars.

The morphodynamic modelling system MORSYS2D consists of a wave model (SWAN – Booij *et al.*, 1999), a circulation model (ELCIRC – Zhang *et al.*, 2004) and a sediment transport and bottom update model (SAND2D, Fortunato and Oliveira, 2004), and is controlled by a script that runs the models, manages the transfer of information between them and performs control checks.

The model was shown to reproduce successfully the waves, the water levels and the velocities. Preliminary morphodynamic simulations revealed that the model is highly sensitive to small changes in the initial conditions, the parameterization of friction and the sediment transport formulation.

This presentation will describe the calibration and validation of the morphodynamic modelling system and will investigate on the circumstances that can lead to the inlet closure (including wave action and river flow).

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