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TOWARDS LONG-TERM SIMULATIONS OF TIDAL INLETS: PERFORMANCE ANALYSIS AND APPLICATION OF A PARTIALLY PARALLELIZED MORPHODYNAMIC MODELING SYSTEM.

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Summary. The ability to simulate and forecast the long-term dynamics of tidal inlets/lagoons is fundamental to assess the social, ecological and economical impacts of both human interventions and climate changes. Portuguese coasts exhibit many complex and contrasting tidal inlets and, due to their strong dynamics, associated to a severe wave climate and a meso-tidal range, the prediction of their evolution remains a challenging task.

LNEC's morphodynamic modeling system, MORSYS2D (Fortunato and Oliveira, 2004, Bertin et al., 2009) consists of a wave propagation model, a circulation model and a bottom update model that simulate morphological evolutions under the combined action of tides, waves, river flows and winds. This system has been able to simulate accurately bottom level evolutions of both wave-dominated beaches and wave-dominated tidal inlets but its application has been restricted to relatively short-term periods (about one year) to keep an acceptable computation time (about one month). In order to assess long-term evolutions of coastal systems, MORSYS2D is now evolving towards a highly-efficient, partially parallelized system to improve its computational performance.

This paper presents the MORSYS2D system and analyses its performance. Different strategies are proposed to reduce computation time, including the use of high performance computing facilities. The system is then applied to the Óbidos lagoon (Portugal). Results agree with observations of the evolution of a meander and the formation of sandbars. A comparison between different grid resolutions shows that, at short time scales (a year), a coarse grid can reduce the computation time significantly, without compromising accuracy.

References.

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