



A framework for coastal morphodynamic modeling considering climate change scenarios

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The knowledge about morphodynamic processes is essential in Coastal Engineering studies. Given the high degree of complexity of coastal systems, only a thorough knowledge of these processes allows a decisive role in the valorisation and conservation of a territory of recognized strategic importance. The study of the erosion processes in the Portuguese coast, due to its specificities, is an opportunity for the technical and scientific community to develop innovative methodologies and solutions that can be adopted at other locations.

The MarRISK project aims to contribute to the improvement of the sustainable management of coastal zones through the consolidation of knowledge about the processes that increase coastal risks, including those resulting from climate change. This way, it aims to fill the gaps and develop tools capable of converting the processed information into climate services that are useful for decision makers responsible for territorial planning, and other stakeholders who perform activities related to the coast and the sea. In this work, a morphodynamic modelling framework for coastal processes is presented, applied to the Portuguese northwest coast.

For this case study, the construction, calibration and validation of wave climate propagation models is shown. SWAN software is applied in the implementation of a regional model of the northwest coast of the Iberian Peninsula, which allows application of a downscaling methodology, enabling the use of high resolution Delft3D local models. The interaction between SWAN and Delft3D coupled models allows for simulation of the wave climate propagation to nearby coastal locations. Results for the modeling of the coastal processes that govern the sedimentary dynamics within the sea-land interface are carried out integrating the XBeach software application with the SWAN + Delft3D modeling system. Results of the application of these modeling tools are presented for different climate change scenarios obtained by Meteogalicia from the Coupled Model Intercomparison Project (CIMP5/CIMP6).

Keywords: Climate Change, Erosion risk, Morphodynamics, SWAN, Delft3D, XBeach.