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Analysis of a Coupled Hydro-Sedimentological Numerical Model for the Western Tombolo of Giens

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Abstract : The western Tombolo of the Giens peninsula in southern France, known as Almanarre beach, is subject to coastal erosion. We are trying to use computer simulation in order to propose solutions to stop this erosion. Our aim was first to determine the main factors for this erosion and successfully apply a coupled hydro-sedimentological numerical model based on observations and measurements that have been performed on the site for decades. We have gathered all available information and data about waves, winds, currents, tides, bathymetry, coastal line, and sediments concerning the site. These have been divided into two sets: one devoted to calibrating a numerical model using Mike 21 software, the other to serve as a reference in order to numerically compare the present situation to what it could be if we implemented different types of underwater constructions. This paper presents the first part of the study: selecting and melting different sources into a coherent data basis, identifying the main erosion factors, and calibrating the coupled software model against the selected reference period. Our results bring calibration of the numerical model with good fitting coefficients. They also show that the winter South-Western storm events conjugated to depressive weather conditions constitute a major factor of erosion, mainly due to wave impact in the northern part of the Almanarre beach. Together, current and wind impact is shown negligible.

Keywords : Almanarre beach, coastal erosion, hydro-sedimentological, numerical model
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