Numerical simulation of wave propagation in the entrance of the Tagus estuary

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Summary

A two-dimensional simulation of wave propagation is used to investigate wave transformation over the complex bottom geometry of the Tagus estuary entrance. The application of a hyperbolic numerical model based on the mild-slope equation in such large coastal area, where wave transformation is due to the simultaneous occurrence of the processes of refraction, diffraction, reflection and breaking, is done for the first time.
Wave climate analysis is obtained for a vital area, the access to the port of Lisbon, where there is no field data available. Like in other coastal areas worldwide, navigation routes and strong currents are an obstacle to find strategic locations for wave-rider stations.
Model results reveal the sheltering effects of the existent submerged sand bars in the estuary entrance against small frequency wave energy entering through the navigation channel. High frequency incoming waves are less susceptible to dissipate energy through the process of wave breaking over the bars, thus causing higher disturbance into the channel.

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