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Tidal and subtidal hydrodynamics and energetics in a constricted estuary

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Abstract

The dynamics of coastal plain estuaries are mainly associated with variable tidal forcing and local winds in combination with bathymetric complexity and coastline irregularity. Specific features, such as constricted areas, can potentially affect and energize the hydrodynamics of these types of systems. Particularly, tidal range and tidal currents can be significantly amplified where the incoming tidal wave becomes constricted. In this work, the impact of a narrow constriction on a mesotidal estuary was analysed at tidal and subtidal time scales. Tidal hydrodynamics, energy fluxes and energy dissipation were determined for the entire Cádiz Bay (southwestern Spain) using the Delft3D numerical model. Field observations were used to analyse tidal propagation and energy dissipation along the bay constriction and to calibrate and test the numerical model. The results indicate that the presence of the constriction transformed and distorted the tide and increased

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