



Physical characterization of the Guadiana Estuary using the hydrodynamic model MOHID

María Concepción Calero (1), Jesús García-Lafuente (1), Erwan Garel (2), Javier Delgado-Cabello (1), Juan Moreno-Navas (1), and Flávio Martins (2)

(1) University of Malaga, Málaga, Spain (conchi.calero@ctima.uma.es), (2) University of Algarve, Faro, Portugal

Guadiana Estuary is an intertidal estuary situated in SW of Iberian Peninsula, the latest 50 Km of which constitutes the natural border between Spain and Portugal. Tidal influence extends to about 80 Km upstream. The Guadiana River presents a high seasonal irregularity with wet winters and dry summers. Recently the river flow has been modified drastically by several dams constructed along the river. One of them is the Alqueva dam, opened in 2002, which is the biggest reservoir in Western Europe. It is placed to 120 Km upstream from the mouth of the estuary and is the last water control in the system being the main dam affecting the flow.

A hydrodynamic model based on the MOHID system has been developed to study the hydrodynamics of the Guadiana Estuary. Tidal forcing and fresh water discharges were used in the boundary conditions. The model has been validated by comparing the model outcomes with in situ data measurements in several points along the estuary.

Different scenarios have been simulated in order to know tidal progression and asymmetries in the circulation between wet and dry periods. Those phenomena are important because they influence the ecosystem and the distribution of sediments into the estuary and nearest coast. With a discharge of 300 m³/s the friction dominates over the amplification of the tide signal throughout the estuary while with smaller discharges the opposite effect occurs between 30 and 60 km. The difference in duration between floods and ebbs is greater the greater the discharge and the currents do not invert downstream at 50 Km with a discharge of 500 m³/s. Determining a regime of freshwater inputs from the Alqueva dam can be determinant to maintain the natural range of variation between dry and wet periods prior to the inauguration of the dam.