# AN OPERATIONAL MODEL FOR THE TAGUS ESTUARY

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For the management of estuaries, access to online data and also to organized records of historical data for analyzing water quality events is needed. Additionally, it is important the use of an adequate modeling tool to interpolate and assess the processes responsible for water quality. Following this context, in this paper is presented an operational system built for the Tagus Estuary, in Portugal, providing historical and real-time observations and daily predictions of several atmospheric and water conditions, including hydrodynamics and biogeochemical properties (e. g.: water level, currents, salinity, oxygen, phytoplankton), to users through an Internet interface (http://www.mohid.com/tejo-op).

This tool merges several different sources of information stored in databases, and allows users to explore all available data via the internet. These sources of data comprise automatic data acquisition stations, field data campaigns, atmospheric and estuarine model predictions. One of the automatic data acquisition stations collects meteorological data, while the other station measures currents and several water properties (ex: turbidity, temperature, salinity, chlorophyll) in the Tagus mouth. Both stations and their data acquisition are now automated.

The field data campaigns were included within the scope of an outfall monitoring program, financed by SANEST SA. This company is responsible for the Costa do Estoril wastewater system. A MapServer application (a spatially enabled Internet application Ű ŞWebGISŤ) was built to provide users results obtained in these field campaigns.

The weather forecast prediction model included in this operational tool is based on the MM5 model and is operated by the Environmental Department of the Instituto Superior Técnico of Lisbon and provides daily results for final users, as well as establishes forcing conditions of the estuarine prediction model, like wind, heat fluxes exchange

between the water column and the atmosphere, and radiation.

For the estuarine model predictions, MOHID modeling system is used. This system allows the simulation of costal hydrodynamic processes coupled with biogeochemical processes. A 3D model provides users with daily predictions of hydrodynamic properties, like water level, currents, temperature or salinity. The biogeochemical parameters modeled are oxygen, cohesive sediments, phytoplankton, zooplankton, nitrate, ammonia, PON and DON.

A nested model configuration methodology is applied - larger scale models supply boundary conditions to the smaller scale domains, these ones with high resolution, and used to make small-scale predictions, helping outfall and beaches water quality monitoring. In the case of the outfall, a 3D submodel is run coupled with a Lagrangian 3D transport model. This model solves the near field using a jet integral model. This jet model computes initial dilution and plume location. These values are used as initial conditions for the Lagrangian tracers emitted to simulate the far field. High resolution (dx= 20 m) 2D nested models are also running along Costa do Estoril beaches to help explaining microbial field data results.

The model was validated specially for the mouth area where 3D processes are important and where hydrodynamic processes are less known. The hydrodynamic results are validated with tidal gauges, ADCP, ADV data and synoptic CTD campaigns. The biogeochemical processes have been validated with historical data measured in the Tagus within the scope of several research projects.