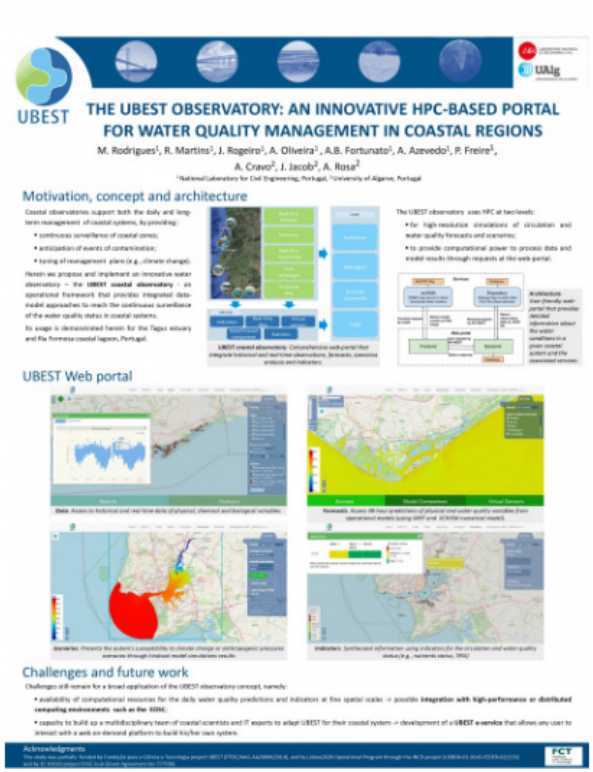
22. The UBEST observatory: an innovative HPC-based portal for water quality management in coastal regions, Marta Rodrigues, Ricardo Martins, João Rogeiro, Anabela Oliveira, André B. Fortunato, Alberto Azevedo, Paula Freire, Alexandra C



Coastal margin observatories offer the flexibility to support both responses to emergencies and the long-term coastal management of coastal regions. However, existing coastal observatories for water quality are typically field data repositories, and model hindcast/forecast products are not frequently integrated with these data hubs. Herein, we propose and implement an innovative observatory, the UBEST coastal observatory. The UBEST observatory is an operational framework that provides integrated data-model approaches to reach the continuous surveillance of the water quality in coastal systems. In particular, this tool provides several flexible data-model services that can support both the application of the European Water Framework Directive and the emergency response in case of contamination events.

The UBEST observatory portal (http://portal-ubest.lnec.pt/) relies on a user-friendly web-portal that provides detailed information about the water conditions in a given coastal system and the associated services (data repository and WFS/WMS map server). Several layers of information, with different levels of aggregation are available: i) historical data, ii) real-time data from monitoring networks, iii) daily forecasts of physical and biogeochemical variables simulated with operational models, iv) simulations of scenarios of climate change and anthropogenic pressures, and v) indicators that summarize both the physical behavior and the water quality status of the systems. The applicability of the observatory is demonstrated at two coastal sites, the Tagus estuary and the Ria Formosa. The UBEST observatory is easily customizable, so other coastal systems can be easily added to the observatory portal.

The implementation of this concept of observatories poses several challenges, including the requirement of significant computational resources. High Performance Computing (HPC) is a powerful resource in this context that enables coastal observatories for water quality. In UBEST, HPC is used i) for high-resolution simulations of circulation and water quality forecasts and scenarios and ii) to provide computational power to process data and model results through predefined tasks or user requests at the web-portal.

Challenges still remain for a broad application of the UBEST observatory concept. One of such challenges is the availability of computational resources for the daily water quality predictions and indicators at the required fine spatial scales, which can be addressed through integration with high-performance or distributed computing environments such as the European Open Science Cloud (EOSC). Another challenge is the capacity for building up a multidisciplinary team of coastal scientists and IT experts to adapt UBEST for their system of interest. A potential solution may be the development of a UBEST e-service, where any user can interact with a web on-demand platform to build his/her own system. This concept has already been demonstrated for coastal hydrodynamic predictions in the EOSC-hub computational infrastructure (service OPENCoastS available at https://marketplace.eosc-portal.eu/services/opencoasts-portal).

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