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Operational high-resolution modelling of oil spills for coastal and port management

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Coastal oceanography predictions are affected by sharp gradients that result in errors well in excess of those found in deeper more isotropic domains. This limits the potential of forecast applications, such as the capacity of port authorities to respond swiftly to oil spills. The result is a higher vulnerability to environmental impacts within the harbour's influence zone.
Operational systems (OS) constitute a convenient tool to bolster this short-term response capability and to improve the general port turn-out but requires a smart combination of models and measurements to circumvent the above mentioned limitations. The paper will present and discuss the modelling tools developed by UPC and Puertos del Estado for a number of important Spanish ports, in order to facilitate the preservation of coastal and harbour water quality (SAMOA project). A link to satellite data is being carried out within the CEASELESS H2020 project so as to combine synergistically in situ and remote data with numerical simulations.
The transport and dispersion model will be discussed in detail, being an evolution of the Medslik_II (1.01) code, adapted to the small-scale and complex coastal and harbour domains here considered. It also incorporates and is prepared to work with the latest CMEMS products as boundary conditions and as internal drivers. Some of the model enhancements are a fully-3D simulation ability to account for underwater sources, identification of spill origin by backtracking, and an efficient handling of rotated grids, amongst others.
The spill transport and weathering is driven by 3D hourly currents and water temperatures derived from CMEMS products and provided by Puertos del Estado. The discussion will also cover the effects of meteorological discretizations, based on hourly atmospheric parameters obtained from AEMET's high-resolution products (Spanish Meteorological Agency).
The presentation will end with an overview of applications and limitations depending on met-ocean conditions and domain geometry, using preliminary results to support these conslusions, which suggest a promising new field for CMEMS products and their usefulness for port and coastal management.