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The challenges of coastal oceanography. Prediction limits and new applications based on Sentinel data

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The increasing quality and quantity (resolution in space, coverage in time, combinations of sensors in the Sentinel family) of information provided by Copernicus offer the possibility to analyse and predict coastal meteo-oceanography at an unprecedented level. This is a unique opportunity to develop the Copernicus coastal dimension to tackle the pressures of increasing population and activities.

The combination of ocean/atmosphere/land observations from the Sentinel (S) 1/2/3, aligned with the availability of an increasing number of high-resolution numerical simulations (e.g. wave and current fields) in the Copernicus Marine Environment Monitoring Service (CMEMS) catalogue, should allow users to access proven representations of the coastal environment at a new level of understanding (e.g. wave diffraction at coastal "obstacles"), coupling (e.g. incorporating the land discharge into the coastal sea) and reliability for applications (e.g. hazards for coastal navigation). By adding periodic bathymetric up-dating and incorporating new assimilation routines it will be possible to achieve a new level of analysis for coastal seas.

In the paper we shall present the CEASELESS project that addresses the multiple scales coexisting in littoral areas by developing new shallow water parameterizations, introducing them into coupled model suites (wind-wave-surge-current-land discharge) and producing new standards for coastal simulations and analyses. This will demonstrate the technical feasibility of an operational coastal service. The set of derived products will be ingested into the users' work routines, proving the economic feasibility of such a coastal extension. The level of conflicts in squeezed coastal zones, expected to grow in the face of climate change, will, thus, benefit directly from CEASELESS, establishing tangible contributions for a wide range of economic sectors. The mutual validation of satellite data, numerical results and in-situ observations will generate reciprocal profit for enhanced competiveness of coastal oceanographic products and their future evolution.