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# Multi-scale ocean colour synergy products for coastal water quality monitoring

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High-quality satellite-based ocean colour products can provide valuable support and insights in the management and monitoring of coastal ecosystems. Today's availability of Earth Observation (EO) data is unprecedented including medium resolution ocean colour systems (e.g. Sentinel-3/OLCI), high resolution land sensors (e.g. Sentinel-2/MSI) and geostationary satellites (e.g. MSG/SEVIRI). Each of these sensors offers specific advantages in terms of spatial, temporal or radiometric characteristics. In the Multi-Sync project, we developed advanced ocean colour products (i.e. remote sensing reflectance, turbidity, and chlorophyll a concentration) through the synergetic use of these multi-scale EO data taking advantage of spectral characteristics of traditional medium resolution sensors, the high spatial resolution of some land sensors and the high temporal resolution of geostationary sensors.

To achieve this goal a multi-scale DINEOF (Data Interpolating Empirical Orthogonal Functions) approach was developed to reconstruct missing data using empirical orthogonal functions (EOF), reduce noise and exploit spatio-temporal coherency by joining several spatial and temporal resolutions. Here we present the capacity of DINEOF to extract multi-scale information through the integration of Sentinel-3, Sentinel-2 and SEVIRI datasets.

The functionality of the advanced multi-scale products will be demonstrated in a case study for the Belgian Coastal Zone (BCZ) highly relevant to the user community: sediment transport modelling near the harbour of Zeebrugge in support of dredging operations. As stated in the OSPAR treaty (1992), Belgium is obliged to monitor and evaluate the effects of all human activities on the marine ecosystem. Dredging activities in and near Belgian harbors fall under this treaty and are performed daily to ensure accessibility of the port by ships. Optimization of these dredging activities requires monitoring data which is typically acquired through in situ observations or modelling data. In this case study we take advantage of Sentinel-3, Sentinel-2 and SEVIRI data characteristics to provide a satellite product that meets the end user requirements in terms of product quality and temporal/spatial resolution.