EGU23-12602, updated on 06 Jun 2023
https://doi.org/10.5194/egusphere-egu23-12602
EGU General Assembly 2023

The Copernicus Marine High-Resolution Coastal Service: status and evolutions

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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 traditional medium resolution ocean colour systems (e.g. SeaWiFS, MODIS-AQUA, MERIS, Sentinel-3/OLCI) and high resolution land sensors (e.g. Sentinel-2/MSI). Each of these sensors offers specific advantages in terms of spatial, temporal or radiometric characteristics, enabling the provision of different types of ocean colour products by Copernicus Marine to support different types of end users.

With the High-Resolution Coastal Service (HROC), Copernicus Marine provides high resolution ocean colour products based on Sentinel-2/MSI data for European coastal waters. It offers 12 different products which are categorized in three groups: 1) near real time (NRT) daily products, 2) aggregated monthly products and 3) gap-filled daily products. The products are generated for the coastal waters (20km stripe for the coastline) of all European Seas and are provided in a 100m spatial resolution. The primary variable from which it is virtually possible to derive all the geophysical and transparency products is the spectral Remote Sensing Reflectance (RRS). This, together with the Particulate Backscatter Coefficient (BBP), constitute the category of the optics products. The spectral BBP product is generated from the RRS products using a quasi-analytical algorithm. The transparency products include turbidity (TUR) and Suspended Particulate Matter (SPM) concentration. They are retrieved through the application of automated switching algorithms to the RRS spectra adapted to the local water conditions. With this approach we address the high variability of different water types with small scale changes. The geophysical product consists of the Chlorophyll-a concentration (CHL) retrieved via a multi-algorithm approach with optimized quality flagging. High-Resolution products are available from the 1st of January 2020 to current day, and we will present our experiences after 2 years of operational processing together with an overview of the integrated service improvements (e.g. improvements of flagging, cloud shadow identification and flagging of bottom reflection) and planned improvements for 2023. This includes the development of a correction procedure for the strong detector banding that can be observed over water in S2/MSI imagery, especially in the eastern part of the swath for summer/high sun images. In this procedure the per-band and per-detector geometry will be considered to generate corrected L1C imagery which can then be processed by the HROC

processor.

The functionality and the handling of the products will be demonstrated by examples of use cases. It will be highlighted how the products can serve eutrophication monitoring for the EU Water Framework Directive (WFD) in the Southern North Sea or for spatial planning applications in the Baltic Sea. The combination with in-situ data and other spatial information is key for a holistic picture of the environment.