Towards A Virtual Ocean Colour Geostationary Satellite Using Ocean Colour Constellation Data

Marco Bracaglia[1], Gianluca Volpe, Simone Colella, Rosalia Santoleri, Federica Braga, Vittorio Ernesto Brando

1) marco.bracaglia@artov.ismar.cnr.it, ISMAR-CNR

Abstract

In coastal areas, the concentrations and the optical properties of the water components are highly variable on both temporal and spatial scales due to river discharges and meteo-marine conditions. The standard Ocean Colour Radiometry (OCR) polar orbiting satellites cannot properly capture this large temporal variability, as they provide approximately one image per day. Only an OCR geostationary sensor, like GOCI, has the needed spatial, temporal, and radiometric resolutions to adequately capture the coastal optical variability. In this work, to compensate the lack of a geostationary sensor similar to GOCI over other coastal environments, like the North Adriatic Sea (NAS), the multiple observations provided by different sensors will be used to create a Virtual Geostationary Ocean Colour Sensor (VGOCS) dataset.

VGOCS, providing multiple images of the basin during the same day, will approach the temporal resolution of a geostationary satellite at a spatial resolution of 1 km, maintaining the radiometric and spectral resolutions of each polar orbiter. The sensors that will be included in this constellation are MODIS TERRA, MODIS AQUA, VIIRS SUOMI-NPP, OLCI Sentinel 3A, and VIIRS NOOA20 (former JPSS-1). For such sensors the L2 Remote sensing reflectance (Rrs) data, provided by NASA and EUMETSAT will be used.
The problem of using data from different sensors is that they can have residual differences between each other due to different data processing, resolutions, observation geometries, and calibration procedures. In this work, such residuals will be reduced adjusting those data by a multi-linear regression algorithm that exploits the in situ Rrs, acquired at the Acqua Alta Oceanographic Tower (AAOT of the AERONET-OC network) located in the gulf of Venice. This adjustment will also reduce the larger uncertainties associated to observations usually masked in the standard processing chains, making them available in the analysis, and providing a notable increase of the spatial and temporal coverage of VGOCS. The adjusted VGOCS Rrs data will be used as input to consistently calculate the backscattering coefficient at 443nm (bbp(443)), using the Quasi Analytical Algorithm.
Here we present a case study to propose the VGOCS approach to generate analysis ready data also for other application domains.

Keywords - Analysis Ready Data (ARD)