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New opportunities in the analysis of port seawaters based on Sentinel-2 data and in situ spectral reflectance

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The availability of data acquired by the sensors installed on board of the twin Sentinel-2 A/B satellites allows advanced applications in the analysis of coastal environments. The Sentinel-2 satellites, in fact, carries a high-resolution MultiSpectral Instrument (MSI) that has great advantages for monitoring near-shore waters (i.e. within 2 km from the coast), thanks to its spectral configuration (13 spectral bands in the visible and near infrared range) and high spatial resolution (10, 20 e 60 m).
Recently, the Department of Biology of the University of Florence and IBIMET-CNR have applied a methodology based on Sentinel-2 data to evaluate the trophic quality of seawaters within three ports of the Tuscan Tyrrhenian coast. The method is based on a previous study aimed at characterizing seawater quality of Mediterranean ports by “in situ” spectral measurements.
The current study has concerned the application of these methods to three harbor areas in Central Italy (Viareggio, Livorno and Civitavecchia). The retrieval of spectral information on marine waters from Sentineld-2 data has been performed by applying different atmospheric correction methods: SEN2COR (v. 2.4), ACOLITE (v. 20170718.0) and C2RCC (SNAP v. 6.0). The outputs of the study have been validated by comparison with seawater measurements collected during campaigns carried out in the examined ports. Significant relationships have been observed between an index of total LAS (light attenuating substances: TSM, CHL, CDOM) with both the diffuse attenuation coefficient of PAR (Kd) and five spectral classes of in situ reflectance, which in turn allows to estimate the trophic index (TRIX) of these port seawaters. The preliminary results obtained on remote sensed reflectance indicate that C2RCC could be the most efficient method for producing spectra informative on the trophic status of port seawaters.