

Integrated monitoring of coastal waters in the Ligurian and North Tyrrhenian seas: comparison of empirical and semi-analytical chlorophyll regional algorithms in MOMAR

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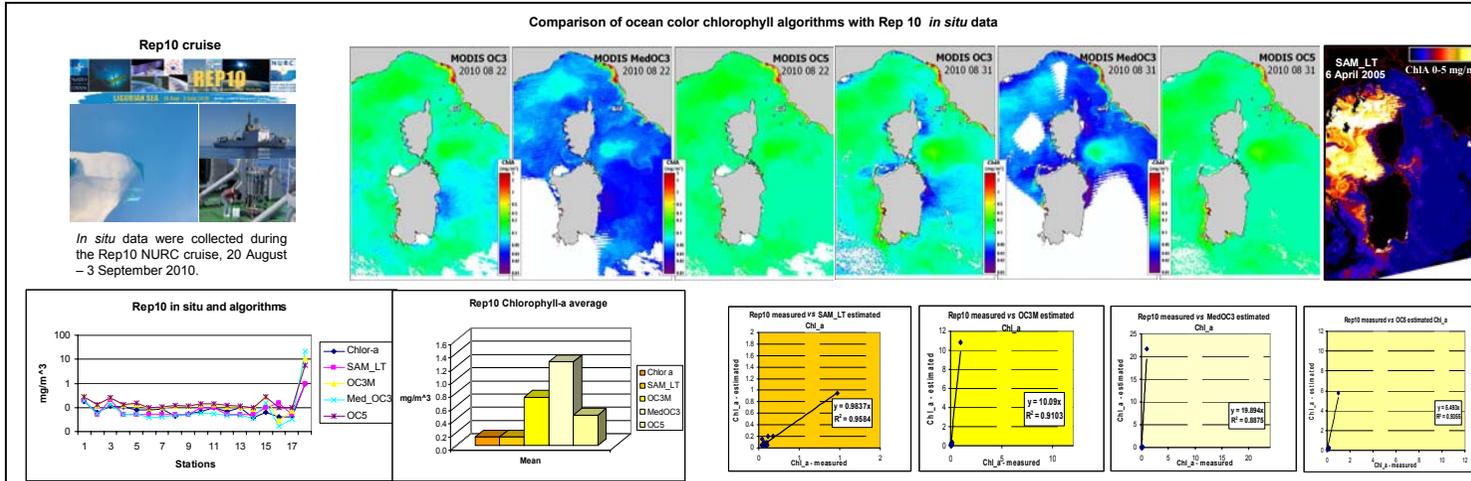
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Global ocean color algorithms, which compute chlorophyll concentration in the ocean surface, normally overestimate values in the Mediterranean sea. The objective of the present investigation is to compare the performance of both empirical (OC3M, MedOC3, OC5) and semi-analytical (SAM-LT) algorithms in the Ligurian and North Tyrrhenian sea. A prototypal tool for marine monitoring in the North Tyrrhenian area is being implemented in the framework of the EU-funded project MOMAR, leaded by Tuscan Regional Government. The satellite remote sensing component of the project mainly focuses on chlorophyll (from MODIS and MERIS) and SST (from different platforms) measurements, via algorithms calibrated for the area of interest, in order to monitor sea water quality and to use chlorophyll and SST as tracers for hydrodynamics. The current poster presents the first results of a study conducted to evaluate these algorithms versus in-situ measurements of chlorophyll concentration collected during recent oceanographic campaigns.



ALGORITHMS DESCRIPTION

OC3M Bio optical empirical MODIS global algorithm, Case 1 waters
O'Reilly, J. E., and 24 Coauthors, 2000: SeaWiFS Postlaunch Calibration and Validation Part 3. NASA Tech. Memo. 2000-206892, Vol. 11, S.B. Hooker e E.R. Firestone, Ed. NASA Goddard Space Flight Center, 49 pp.

MedOC3 Bio optical empirical MODIS algorithm, OC3 regionally adapted on North Western Mediterranean, Case 1 waters.
Santoleri R., Volpe G., Marullo S., Buongiorno Nardelli B., "Open waters optical remote sensing of the Mediterranean Seas", Remote sensing of the European Seas, 103-116, 2008

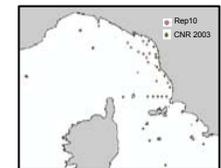
OC5 Bio optical empirical MODIS (MERIS and SeaWiFS) algorithm, suited for Biscay Bay and the English Channel, Case 1 and Case 2 waters.
Gohin F., Druon J. N., Lampert L., A five channel chlorophyll concentration algorithm SeaWiFS data processed by SeaDAS in coastal waters. J. Remote Sensing, 2002, vol. 23, no. 8, 1639-1661.

SAM-LT Bio optical semi-analytical MODIS algorithm, locally tuned for Tyrrhenian-Ligurian sea, Case 2 waters.
Maselli F., Massi L., Pieri M., and Santini C., Spectral Angle Minimization for the Retrieval of Optically Active Seawater Constituents from MODIS Data Photogrammetric Engineering & Remote Sensing, Vol. 75, No. 5, May 2009, pp. 595-605.

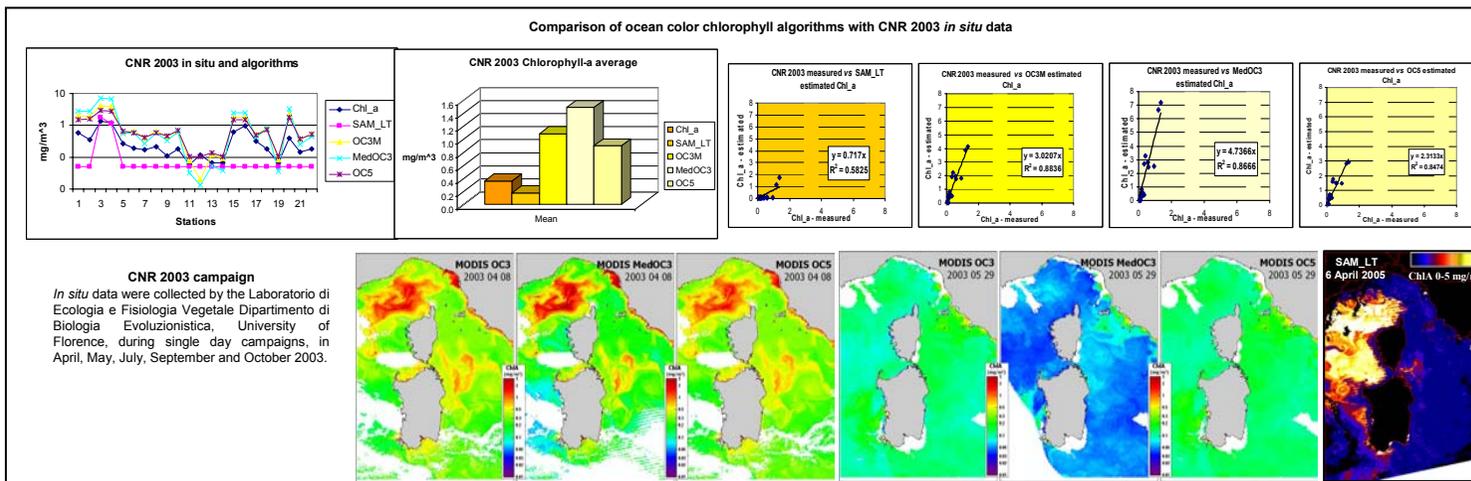
Global algorithms overestimate in Mediterranean oligotrophic basin (0.1mg/m³). Reflectance shift compared to SeaBAM data:
• Rrs blu 30% lower
• Rrs green 18% higher

The MODIS ocean color empirical algorithms for chlorophyll-a, based on the green/blue Rrs ratio, are known to overestimate in the Mediterranean area. This overestimation is here confirmed, in particular it is high for OC3M and also, to a lesser extent, for MedOC3. The overestimation is not so high for OC5, which in fact, unlike the former two, also works for Case 2 waters, in fact it is based not only on the blue/green ratio, but also on the Rrs_412 (which concerns CDOM and NAP absorption, and also atmospheric overcorrection), and Rrs_547 (which reveals the backscattering mainly due to suspended matter). According to our observations, the MODIS SAM_LT ocean color semi analytical algorithm for chlorophyll-a does not overestimate, but it is scarcely sensitive to medium – low chlorophyll-a concentrations, in fact it is locally tuned for Case 2 waters of Tyrrhenian-Ligurian sea.

Rep10 and CNR 2003 stations



| Campaign | Period | Number of stations |
|----------|---|--------------------|
| Rep10 | 19 August - 3 September 2010 | 19 |
| CNR 2003 | April May July September and October 2003 | 22 |



MOMAR

(Integrated system for monitoring and control of the marine environment) is an EU-funded Transnational Cooperation project, leaded by the Tuscan Regional Government. It implements a prototypal tool for marine monitoring. The main objective is the creation of a monitoring tool for the North Tyrrhenian Sea shared among four maritime regions (Tuscany, Corsica, Sardinia and Liguria)