Particulate Organic Carbon (POC)

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1 - Product Summary

This algorithm returns the concentration of particulate organic carbon (POC) in mg m^{-3}, calculated using an empirical relationship derived from in situ measurements of POC and blue-to-green band ratios of remote sensing reflectances (Rrs).

Support for this algorithm is contingent on the availability of bands centered at 443 nm in the blue region and between 547 and 565 nm in the green region. This implies support for CZCS, OCTS, MODIS-Aqua and Terra, MERIS, SeaWiFS, VIIRS. For PACE OCI, an updated POC algorithm is used, and it is described here.

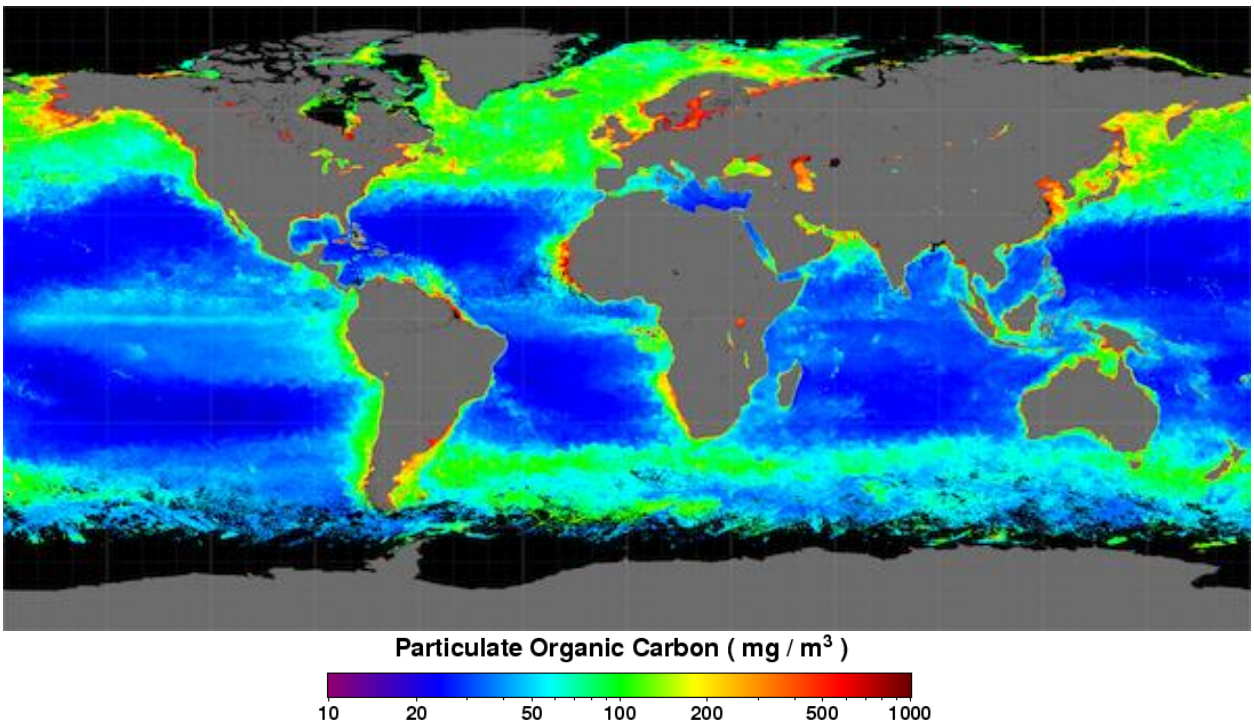

Fig. 1. MODIS Aqua POC seasonal composite for Spring 2014

Algorithm Point of Contact: Dariusz Stramski, Scripps Institute of Oceanography, and Bryan Franz, NASA Goddard Space Flight Center.

2 - Algorithm Description

The algorithm is a power law applied to a blue-to-green band ratio.

Inputs:

- $R_{rs}(443)$
- R_{rs} between 547 and 565 nm

Output:

- *poc*, concentration of particulate organic carbon in mg m^{-3}

General Algorithm:

The algorithm is a power-law relationship between a ratio of R_{rs} and *POC*:

$$poc = a \times \left(\frac{R_{rs}(443}{R_{rs}(555}\right)^{b}$$

where

- a = 203.2
- b = -1.034

In cases where $R_{rs}(555)$ is not available an equivalence is estimated from the closest native green wavelength using the empirical relationships described in convert_band.c . The input wavelengths used for the various sensors are shown in the table below.

SeaWiFS	443, 555
MODIS	443, 547
MERIS	443, 560
VIIRS	443, 551

3 - Implementation

Product Short Name	poc
Level-2 Product Suite	OC
Level-3 Product Suite	POC
Level-3 Masking	ATMFAIL, LAND, HISATZEN, STRAYLIGHT, CLDICE, LOWLW, NAVWARN, ATMWARN, HISOLZEN, NAVFAIL, FILTER, HIGLINT

For further details on the implementation in the NASA ocean color processing code, see the algorithm source code and the dependency graph.

4 - Assessment

Satellite-to-in-situ validation results are available from the SeaWiFS Bio-Optical Archive and Storage System (SeaBASS) for the following missions:

- SeaWiFS
- MODIS Aqua
- MERIS

5 - References

Stramski, D., Reynolds, R. A., Babin, M., Kaczmarek, S., Lewis, M. R., Röttgers, R., … Claustre, H. (2008). Relationships between the surface concentration of particulate organic carbon and optical properties in the eastern South Pacific and eastern Atlantic Oceans. Biogeosciences, 5(1), 171-201. doi:10.5194/bg-5-171-2008

6 - Data Access

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