Geophysical Research Abstracts
Vol. 18, EGU2016-15098, 2016
EGU General Assembly 2016

Determination of phytoplankton groups from space: application to senegalo-mauritanean upwelling

Yala Khalil (1), Julien Brajard (1,4), Michel Crépon (1), Eric Machu (2), and Ndeye Niang (3)

(1) LOCEAN-IPSL, UPMC, Paris, France, (2) LPO, IRD, Brest, France, (3) CEDRIC, CNAM, Paris, France, (4) Clime, Inria, Paris, France

Phytoplankton groups can be estimated from ocean color spectral satellite observations using a clustering algorithm combined with in-situ measurements of pigment concentration such as PHYSAT. This algorithm (http://log.univ-littoral.fr/Physat) gives global maps of dominant groups for the last ocean color satellite sensor observing periods (MODIS, SeaWiFS).

For specific regional studies, especially in very productive regions such as the Senegalo-Mauritanian upwelling, it has been shown that the standard algorithm can present some limitations. First, PHYSAT in its published version uses thresholds on the chlorophyll-a concentration and aerosol optical thickness values to guaranty a “high-quality” estimation of the water-leaving reflectance and of the related chlorophyll-a. Second, since PHYSAT is based on mean water-leaving reflectance spectra (Ra) normalized by classes of chlorophyll-a concentration (Ra*spectra), the algorithm must be insensitive to some small regional variation of this parameter.

A regional PHYSAT-like algorithm was applied to the Senegal coast to overcome these difficulties. First, a specific atmospheric correction algorithm was applied to the satellite measurements to produce accurate water-leaving reflectances under Saharan dusts. Artificial neural network (Multilayer perceptrons) was used to estimate the chlorophyll-a concentration from the water-leaving reflectance. Then a clustering algorithm based on Self-organizing map was used to classify the spectral information (Ra,Ra*) spectra measured by the satellite. It has been shown that this new regional PHYSAT algorithm gives coherent spatial patches of Ra*. Based on expertise acquired in others ocean area, these patches could be associated with phytoplankton groups such as diatoms. In situ measurements of secondary pigments were conducted in the framework of the UPSEN campaigns (2012 and 2013) and were used to validate this approach. We show that these in-situ measurement are coherent with the remote sensing approach.