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Spatio-temporal variability of the Senegalo-Mauritanian upwelling from satellite observations

Salam Sawadogo (1), Ousmane Farikou (2), Awa Niang (3), Julien Brajard (4), Michel Crépon (4), and Sylvie Thiria (4)

(1) L.T.I. / Ecole Polytechnique de Thiès, Thiès, Senegal (s_sawadogo@yahoo.fr), (2) L.T.I, / Ecole Supérieure Polytechnique, UCAD, Dakar, IUSTA (Abéché) Senegal (farikou@yahoo.fr), (3) L.T.I. / Ecole Supérieure Polytechnique, UCAD, Sénégal (awaniang@ucad.sn), (4) IPSL/LOCEAN, Université. Paris 6, France (Julien.Brajard@locean-ipsl.upmc.fr).

The Senegalo-Mauritanian upwelling is a very productive upwelling occurring along the West coast of Africa. It extends from 26°N down to 10°N. It has been well documented during the past decades from in-situ and satellite observations. The analysis of satellite-derived chlorophyll concentration (Lathuilière et al, 2008) showed that the upwelling can be split into two regions, one north of 21°N where the seasonality is very weak, the other south of that longitude, where the upwelling presents a strong seasonality.
The aim of the present study is to find some objective criteria for decomposing the physical biochemical phenomenon into different spatio-temporal phases leading to coherent interpretation of that phenomenon. In the present study, interest is focused on the south part of the upwelling, between 10°N-21°N mainly facing the coast of Senegal and Mauritania, which presents a strong seasonal variability.
Its seasonal and inter-annual variability south of 20°N was analyzed by processing ocean color data from 1998 to 2007 (Chl-a concentration) provided by the SeaWiFS satellite radiometer and sea surface temperature by the NOAA/AVHRR instrument.
We used a classification methodology based on these two parameters consisting in a neural network topological map and a hierarchical ascendant classification.
We showed that six classes can explain most of the variability of this region in temperature and Chl-a concentration, and among these classes, one allowed us to explain the variability of the upwelling. Its extent is maximum in February-March, minimum in August September. The interannual variability is linked to that of the wind. The classes can be considered as statistical indices allowing us to investigate the variability of the upwelling.

Lathuiliere C., V. Echevin, M. Levy (2008)- Seasonal and intraseasonal surface chlorophyll-a variability along the northwest African coast- J. Geophys. Res, 113, C05007, doi:10.1029/2007JC004433