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Neural-variational algorithm adaptation from SeaWiFS to MODIS sensor for analysis of atmospheric and oceanic parameters

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Particularly interesting because of its socio-economic contribution, the Canary upwelling system encompasses a number of regions with very special characteristics. The wind that blow over this system induces a permanent upwelling off Mauritania and a seasonal upwelling in the south off Senegal, which boosts the development of phytoplankton. To refine the understanding of the phytoplankton in this region (its distribution, variability, response to physical forcings), we combine a number of tools and methods to arrive at a better estimate, and a better monitoring of the concentration of chlorophyll-a (Chl-a), an input parameter for primary production models. Remote sensing of ocean color has particularly interesting advantages, both in terms of global sampling and data acquisition frequency. This method is all the more interesting since ocean color algorithms can be adapted to reduce bias when standard methods have limitations. The regional ocean color algorithm called SOM-NV (Self-Organized Map-Neuro-variational) offers the advantage of making atmospheric correction in the presence of absorbent aerosols, especially desert dust, which sweeps this area permanently and which compels the standard algorithm to apply a mask when atmospheric optical thickness exceeds a threshold of 0.3. This contribution of SOM-NV in the process of atmospheric correction allowed us to 1 : obtain a better reflectance spectra, and as a consequence offer a better estimate of the Chl-a concentrations ; 2 : acquire a larger number of pixels by processing pixels with an optical thickness greater than 0.3 ; 3 : go beyond the general distribution towards the distribution of dominant groups according to the Physat spectral method. The synthesis of 16 years of data from the MODIS-Aqua sensor, allowed us to revisit the seasonality of Chl-a distribution and its cross-shore particularityand an extension towards the open sea which differs according to the season. The highest coastal values are measured in winter and spring, when upwelling intensifies, while the lowest values are measured in summer, when warm, nutrient-poor equatorial waters freplace upwelling waters along the Senegalese coast. This change in water masses impacts phytoplankton communities. According to the work of some authors, nanoplankton gradually replaces diatoms, known to be present during the upwelling season. This makes this region a particularly interesting

zone for monitoring dominant groups of phytoplankton, knowing that the change in community impacts the upper levels of the marine food chain, with phytoplankton playing a leading role.

Keywords: Phytoplankton, ocean color, upwelling, atmospheric correction, dust