

HCS037 - Variability of phytoplankton biomass in upwelling systems: a comparative approach

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Keywords: Ocean colour, phytoplankton, remote sensing, upwelling systems, biomass index

The spatio-temporal variability as well as trends in phytoplankton biomass in three upwelling systems (Humboldt, Benguela and Canary ecosystem) are investigated over a nine year period using SeaWiFS ocean colour data and a model of vertical profile of chlorophyll. Composite reconstructed images of chlorophyll a revealed that the surface concentration always reach maximum values near the coast and decreased in an offshore direction, allowing observation of the spatial extent of phytoplankton distribution in relation to coastal upwelling. A vertically integrated index of chlorophyll biomass is estimated as the integration of the chlorophyll a concentration from the coast to an offshore minimum level of 1 mg·m⁻³ and a maximum depth of 100 m and was used to examine the average seasonality and annual variability in phytoplankton biomass as well as temporal trends during the period investigated.

Ekman offshore transport is computed to estimate the part of the variability of the biomass due to the local forcing of the upwelling compared to other sources of variability. The data indicates that the level of biomass seems globally higher than previous estimates and that the interannual and seasonal variability is generally very high but also quite variable between systems as well as within every system. The different patterns of variability depicted could be partly explained as a combination of different planktonic structure associated to different modes of forcing of the upwelling. Our biomass index appears to be robust and generic enough to be applied to various upwelling systems. As a reasonably good index of variability in phytoplankton biomass, it provides an important and necessary step towards a reliable estimation of the primary production of these systems, that also requires a better understanding of the differences in the structure and the functioning of the planktonic communities (for example important differences observed in P/B ratios) that could explain large differences observed further in the trophic chain and therefore in the global efficiency of the upwelling systems.

HCS073 - Using Argo data to document water masses variability in the Humboldt Current System

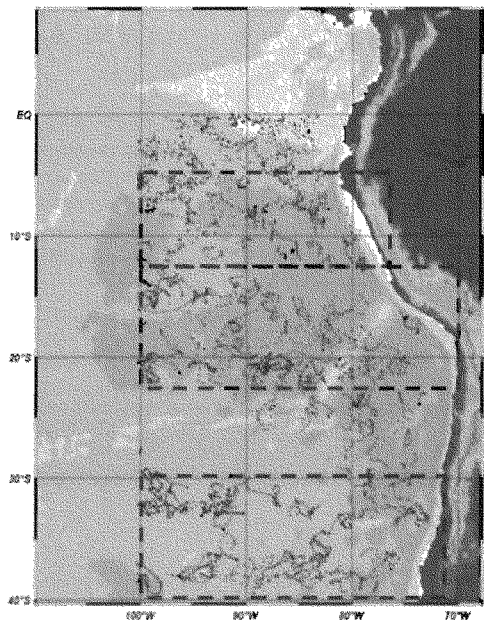
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The Argo program, formally endorsed by CLIVAR, aims at providing an enhanced real-time capability for measurements of temperature and salinity through the upper 2000 m of the ocean and contributes to a global description of the seasonal cycle and internal variability of the upper ocean thermohaline circulation. To achieve this goal, the deployment of 3000 profiling floats throughout the world ocean should be reached in 2006. The increasing number of floats already deployed in the Eastern South Pacific (ESP) can already provide information on the variability of upper ocean water masses (0-1000m) in the area. The ESP present a specific structure of water masses, some originating from the tropical Pacific, and some from the Southern ocean. In the near surface layers (0-200m) warm and salty Subtropical Surface Water (STSW) and colder and fresher Sub-Antarctic Surface Water (SASW) are transported by various branches of the Humboldt Current System and meet around 30-35 S [Stramma *et al.*, 1995; Chaigneau & Pizarro, 2005]. Around that location, low salinity water at 150-250m forms the Eastern South Pacific Intermediate Water (ESPIW), of still badly known origin [Schneider *et al.*, 2003]. In subsurface (200-1000 m) are found salty and oxygen-depleted waters (Equatorial Subsurface Water, ESSW) and fresher, oxygen-rich Antarctic Intermediate Water (AAIW) [Mc Cartney, 1977]. All available Argo temperature/salinity profiles between equator and 40 S and East of 100 W (more than 4000 for 2000-2006) are first quality controlled by reference to existing climatology. Because of some still uneven distribution of profiles, they are grouped in 3 latitude groups, allowing a description of the main characteristics of water masses; depending on available data, in some of the groups, seasonal variability can be apprehended. This work is focused mainly on the Oxygen Minimum Zone (OMZ) associated with ESSW, and on the salinity minimum of the ESPIW at 30-40 S. Argo data and outputs from a regional circulation model are also compared, in terms of main structure and seasonal variability. This preliminary study shows that since 2003-2004, the network of Argo profilers provides enough coverage to study upper ocean water masses and their variability. With a continuing effort of countries participating in Argo to maintain the full network coverage, interannual variability in the Humboldt Current System will be also accessible in a few years.



Distribution of Argo profiles for 2000-2006. The dashed line delimits the area under study: from north to south, the core of the OMZ, a transition zone, and the area of ESPIW water.

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HCS075 - Predicting anchovy recruitment in the southern Benguela: comparing rule-based and statistical approaches

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Keywords: Anchovy, Benguela, expert system, recruitment, robustness

The South African anchovy fishery on anchovy (*Engraulis encrasicolus*) is a recruit fishery, the management of which can benefit from a prediction of recruitment as early as possible into the fishing season. An expert system developed by Miller and Field (2002), designed to predict above median, median, likely below median and highly likely below median recruitment, proved robust to the large changes in abundance observed in 1999/2000. In view of additional recent changes in the distribution of small pelagic fishes in the southern Benguela, we update this expert system with recent input data, and explore its sensitivity to changes in input data series. Finally, we compare the semi-quantitative prediction of the expert system to quantitative prediction of anchovy recruitment using generalised linear and additive models.

Reference

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HCS076 - Physical and biological processes associated to mesoscale structures identified by satellite images in the Humboldt system off northern and central-south Chile

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