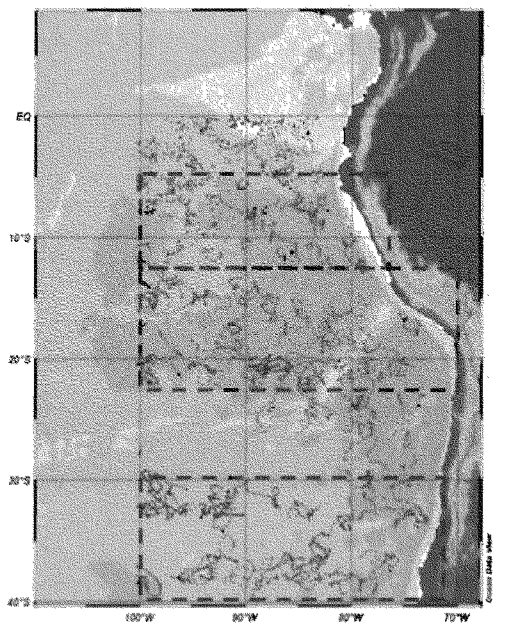

Distribution of Argo profiles for 2000-2006. The dashed line delimits the area under study: from north to south, the core of the OMZ, a transition zone, and the area of ESPIW water.

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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.

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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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Keywords: Chile, Humboldt, mesoscale structures, remote sensing

In the eastern boundaries margins, such as the Chilean Humboldt Subsytem (CHS), the presence of mesoscales structures is a recurrent phenomena. This oceanic structures generate a high variability zone between the continental shelf and the open ocean, known as the Coastal Transition Zone (CTZ).The CTZ is the transition zone between the physical process that dominate the coastal dynamics, i.e. the coastal upwelling, and the processes that dominate the oceanic dynamics, i.e Rossby waves. This zone extends from coast to 800 km offshore and can be separated in two latitudinal regions with particular conditions of kinetic energy and wind stress (Hormazabal *et al.*, 2004). The first region (northern zone), between 19ºS and 29ºS, is characterized by low eddy kinetic energy and weak but persistent equatorward wind stress. In this area, the upwelling process occurs the whole year round, either in focal points or bands that covers a great part of the coast, whereas the eddies occur only in summer but are not frequent. In contrast, the second region (central-south zone), between 29ºS and 39ºS, is characterized by high eddy kinetic energy and strong but variable equatorward wind stress. The upwelling process in this area is highly seasonal (Sept-Mar), and a high mesoscale eddy activity is observed. The difference between the mesoscale processes in both zones is mainly due to the wind stress, kinetic energy and other factors less studied, like the bottom topography, coastline shape, planetary waves influence, etc.

The most common mesoscale features in the CTZ are the frontal structures resulting from the coastal upwelling. Upwelling contributes to the nutrient enrichment, thanks to the pumping and offshore transport of deep cool rich-nutrients waters that are upwelled into the euphotic zone, as a result of the dominant along-shore winds forcing. The intense biological productivity in CTZ supports one of the most productive fisheries in the world, mainly composed by pelagic species. It is worth noting that different pelagic species dominate each zone, with similar catch levels, being the anchovy the dominant species in the northern zone and the jack mackerel in the central-south zone. The upwelling seasonality and the importance of eddies generation in the central-south zone change the plankton distribution and abundance of the dominate species. Indeed, Hormazabal *et al.* (2004) found a spatial relationship between the jack mackerel fishing zone and the edge of cyclonic eddies in the central-south CTZ.

Different data types, such as remote sensing, *in situ* data and model simulations, are available to assess the mesoscale structures. Remote sensing offers the advantage of providing synoptic observations of surface parameters, such as sea surface temperature from AVHRR/NOAA, chlorophyll-a from SeaWiFS/SeaStar and sea level anomalies from altimers of TOPEX/Poseidon, the trend being to use multi-sensor satellite data. Given the big volume of satellite data available for the oceanic studies, an automatic system for the images processing is necessary. Some methods have been developed to detect mesoscale structures, mainly based on the detection of horizontal gradients or boundaries between different water masses. The Cayula-Cornillion method has been the most widely and successfully applied. The technique to detect fronts on individual daily images, then combines the fronts located over a week or month with weighting factors based on front gradient, persistence and proximity to other fronts (Cayula & Cornillon, 1995).

The construction of mesoscale activity indices is relevant to study the marine ecosystems in order to resume and transfer into a quantified information the long-term time series of satellite data,. The indices developed till now are generally based on large scale features. However, in order to understand the fish response, it could be more useful to analyse the mesoscale ocean dynamics from the detection and tracking of the mesoscale structures over long periods of time. This mesoscale approach has begun to develop. In fact, the Workshop on the Indices of Mesoscale Structures (WKIMS) developed by an ICES Group in February 2006 is a first intent to define mesoscale indices. Indices such as gridded index (i.e. density of fronts) and structure index (length, position, advection path, etc) are proposed to describe the fronts. For the eddy activity two types of indices may be considered: the structures indices such as eddy size, rotational direction, lifetime, etc., and aggregated indices such as spatial map of eddy density averaged over a time period, eulerian map of eddy mean transport direction and velocity, etc. The researchs in this field are challenging especially to construct and to automatize the mesoscales indices, which have as ultimate goal to relate the time-series of mesoscales indices with time series of fish populations. This approach should allow understanding how the physical processes are related with the enrichment, concentration and retention mechanisms of the lower levels of the food web in the CHS.

In this work, we proposed to implement automatic front detection tools on a sequence of satellite images in order to characterize oceanic mesoscale structures in coastal upwelling areas and to explore some interactions between physical and biological processes. Maps of Sea Surface Temperature fronts and chlorophyll are presented, derived from a sequence of high resolution NOAA/AVHRR and SeaWiFS data. The Cayula & Cornillon algorithm and other edge detector algorithms are implemented using the Interactive Data Language (IDL) and applied to a set of satellite images from the CHS. A comparative approach between the northern and central-south zones off the CTZ will be carried out. A preliminary result shows the interest of combining conventional gradient-based methods and more modern edge detector methods whose advantages are largely complementary and should bridge the gap between multiple frontal detections and automatic pattern recognition.

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