pelagic fish may be a powerful factor in years when high recruitment occurs. Changes in pelagic fish condition appear to reflect food availability and will reduce energy reserves for the migration and subsequent spawning on the Agulhas Bank.

HCS027 - Modelled and observed interannual variability of the circulation and mesoscale dynamics of the Peruvian Current System

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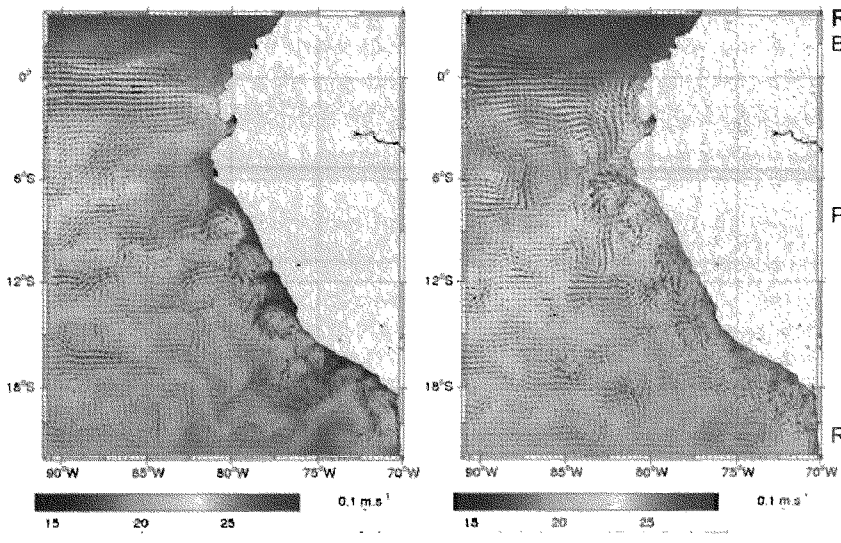
A configuration of high-resolution (isotropic grid of 1/9°x1/9° and 32 discrete vertical levels) of the Regional Oceanic Modelling System (ROMS) was run on the period 1992 to 2000 over the domain extending from 5° N to 25° S. The study area is part of the Eastern Boundary Current System that it is located in the South-eastern Pacific Ocean, known as the Humboldt Current System (HCS). A predominantly alongshore strong wind stress forces a strong coastal upwelling, that occurs throughout the year and creates a narrow coastal region of colder coastal SST that expands and connects to the equatorial cold tongue, these features convert the HCS in a unique area with the most productive fishery. There are five types of water masses: Subsurface Equatorial Waters (AESS) coming from of the Equatorial Undercurrent, Tropical Surface Waters (TSW), Cold Coastal Waters (CCW) associated to the Peruvian Coastal Current, Template Waters of the Sub arctic Region (TWSR) and Antarctic Intermediate Waters (AIW). The main objective of this work was to investigate the structure and dynamical mechanism and mesoscale physical variability in the interannually varying circulation. We focused on the period from 1997 to 1999 encompassing the occurrence of strong El Niño and La Niña events to analyze of interannual variability on the coastally trapped waves. Four experiments were performed: first the model was run using ten years of mean months wind stress combined from the ERS and QuickSCAT Data Set corresponding period (1992-2000); a second experiment consisted in climatological wind stress; the third experiment used forcing with climatological boundary, and finally the fourth experiment is developed using interannual boundary. On the other hand, remotely-sensed satellite data observations of sea surface anomaly, wind stress and sea surface temperature are used to examine space-time propagation characteristics of the mesoscale eddy activity, to obtain a more complete view of the surface circulation. The results presented here show that the model is capable of simulating some of the general features and patterns of interannual variability of the circulation. We found that the wind contributes to the development of interannual sea surface temperature (SST) anomalies due to seasonal variations of the winds stress. The comparison of mean Eddy Kinetic Energy (EKE) simulated and observed, show that in the model the EKE is relatively low compared to the satellite data. The model can capture the features and variabilities of the sea surface temperature. Elevation sea level showed a complex field of onshore and offshore intrusions combined with the effects of mixing along the upwelling front. Furthermore, aspects of the large-scale circulation and associated energetic structures, as the warm water tongue which extends from the equator to northern Chile, confirmed that the role of baroclinic instability of upwelling alongshore currents is the primary eddy generation mechanism of eddies whose diameter follow a equatorward increase and strongly correlated to the Rossby radius of deformation.



References

Bakun A. and C.S. Nelson, 1991. The seasonal cycle of wind stress curl in sub-tropical eastern boundary current regions. Journal of Physical Oceanography, 21, 1815-1834.

Penven, P., V. Echevin ,J. Pasapera, and J. Tam. Mean circulation, seasonal cycle and mesoscale dynamics of the Peruvian Upwelling System : a modelling approach, Journal of Geophysical Research, in press, 2005.

Romea, R. D. and R. L. Smith, 1983. Further evidence for coastal trapped waves along the Peru Coast. Journal of Physical Oceanography 13, 1341-1356.

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