we propose a proxy which might reflect fish abundance and test it in different upwelling ecosystems: the Canary, the Benguela and the Humboldt Current systems. In each system the Regional Oceanic Modeling System (ROMS) with an eddy-permitting resolution coupled to a biogeochemical model (Nitrate-Phytoplankton-Zooplankton-Detritus - NPZD) has been run over the last 30 years in order to investigate ecosystem changes at a decadal scale. ROMS is forced by NCEP reanalysis at the surface and SODA at the open boundaries of the regional oceanic domain. The three-dimensional outputs of the ROMS-NPZD model (temperature, salinity, turbulence, food and nutrients) are used to link latitudinal distribution of fish biomass to its environment variability.

HCS105 - Photosynthesis and fish production in the Peruvian upwelling system

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In a seminal paper entitled Photosynthesis and Fish Production in the Sea Ryther (1969) explained why coastal upwelling systems could produce almost half of the world fish catch while comprising only ~1% of the area of the global ocean. While many of the basic concepts from that paper are correct several discoveries and advances have occurred since the paper was published. Here we review those advances together with the details of the oceanographic processes along the coast of Peru which might impact fish production on seasonal, interannual and multi-decadal time scales.

HCS018 - Downward fluxes of particulate organic carbon and carbonate in coastal and oceanic areas off Chile: the contribution of functional groups of the plankton

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The contribution of key species and functional groups of the plankton to vertical fluxes of particulate organic carbon (POC) and carbonate (CaCO3) to the deep sea were studied in sediment trap samples deployed in the oceanic area off Coquimbo, Chile during 1993-1998. The mean C-organic / C-carbonate ratio was 0.09 at 2,300 m depth in the central Humboldt Current System (HCS) off Chile, indicating a potential net export of carbonate to the deep-sea.
The carbonate flux was dominated by foraminifers and secondarily by coccolithophorids, contributing with 55 and 102% of total carbonate flux. The contribution of the carbonate flux to the total carbon flux (POC + carbonate) was 91%. This suggests that the deep-water delivery of biogenic CaCO3 is the main pathway by which carbon is removed from the upper ocean biosphere in the central HCS off Chile.
The POC flux at 100 m depth was studied by using drifting sediment traps along the central-northern HCS during the period 1997-2005. The POC flux was dominated by diatoms and faecal material of zooplankton during the spring/summer and winter/autumn periods, respectively. Key groups contributing to this flux are chain-forming diatoms of the genera Chaetoceros, Skeletonema and Thalassiosira, and the faecal material produced by euphausiids and appendicularians. During the non-productive period (mean primary production (PP) ~1000 mgC m-2 d-1), the POC flux was dominated by faecal material and a relatively high proportion (~24%) of the PP was exported below 100 m depth. By contrary, during the productive period (mean PP ~7000 mgC m-2 d-1), the POC flux was equally composed by faecal material and phytoplankton and a relatively low proportion (~5%) of the PP was exported below 100 m depth.

This research was funded by Grant Fondecyt 150100007

HCS121 - Lagrangian description of the connection between Equatorial Pacific and Peruvian current system in a high-resolution numerical model

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Keywords: Lagrangian description, numerical floats, Peru-Chile Undercurrents, Regional ocean model system.

Historically patterns of the ocean currents in the eastern south tropical Pacific have been deduced from eulerian current measurements or geostrophic flow estimates that lack spatial/temporal resolution to provide a reliable description of true Lagrangian pathways. As a result, limited information exists regarding the connections between equatorial currents and the Peruvian current system. Making use of the Lagrangian submodel developed for ROMS model outputs, we investigate these connections under climatological conditions (Penven et al, 2005). Preliminary results show that the model reproduces the two main branches of the eastward zonal flow that are of interest to us (Fig. 1). The first branch is the Equatorial Undercurrent (EUC) located between 1 °N and 1 °S. The second one is the South Extension of EUC (SEEUC) located between 3 – 4 °S. Both extend to depths of 50 to 150 m and are present year round which is consistent with existing observations. Most importantly, a first set of Lagrangian trajectories suggests that the subsurface poleward currents off Peru (Peru-Chile Undercurrent – PCUC - and Peru-Chile Countercurrent - PCCC) are both fed not only by the SEEUC, but also directly by the EUC.

Reference

Penven, P., V. Echevin, J. Pasapera, F. Colas, and J. Tam (2005), Average circulation, seasonal cycle, and mesoscale dynamics of the Peru Current System: A modeling approach, J. Geophys. Res., 110, C10021, doi:10.1029/2005JC002945.

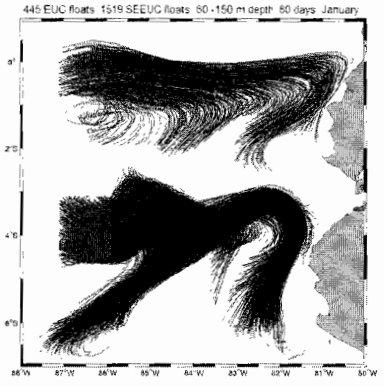

Figure 1. 60 days trajectories for 1964 floats released in January. Red points represent initial positions of the floats. The ensemble of trajectories illustrates the main subsurface pathways.

HCS126 - Modeling the egg and early larval anchoveta (*Engraulis ringens*) transport/retention in the southern spawning area of the Humboldt Current

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Keyword: IBM, eggs, larvae, anchoveta, spawning, Humboldt Current.

The anchoveta (*Engraulis ringens*), a multiple spawner, reproduces in the central-south region off Chile (34°–41°S) during winter and early spring. In this area, seasonal and shorter time scale fluctuations in the winds patterns through the year contributes to the upwelling variability and trigger changes in oceanographic conditions such as mixed layer depth, oxygen concentrations, temperature, mesoscale features (filaments and fronts) and circulation patterns (advection and retention). These changes in oceanographic conditions, when interacting with the biological characteristics (eggs buoyancy and quality) and temporal and spatial characteristics of the spawn (location, depth, and timing of the spawning) modulate the overall distribution and survival of the early stages of this species throughout the spawning region (Parada et al., 2003; Llanos-Rivera & Castro, 2004). In this study we assess the variability of oceanographic conditions and characteristics of the spawn in two locations in the central-south spawning area: the Talcahuano area (34° - 37°S) and the Lebu-Corral area (37.5° - 40.5°S) during winter-early springs 2004 and 2005. Egg density and distribution given by egg surveys carried out during 2004 and 2005 were used to initialize an individual-based model of anchoveta early stages coupled to an hydrodynamic model of the area to study the transport/retention patterns from two spawning locations to potential nursery areas.
The overall oceanographic conditions varied during the anchoveta reproductive season. In winter (main spawning peak) north winds northerly winds (>50km/h) dominated and freshwater from precipitation and

Montes I., Colas F., Capet X., Echevin Vincent, Penven Pierrick, Pasapera J., Tam J. (2006)

Lagrangian description of the connection between equatorial Pacific and peruvian current system in high-resolution numerical model

In : *Climate ocean dynamics, ecosystem processes and fisheries : the Humbolt current system : book of extended abstracts*

La Paz (BOL) ; La Paz : IMARPE ; IRD, p. 49-50

International Conference on The Humboldt Current System : Climate, Ocean Dynamics, Ecosystem Processes and Fisheries, Lima (PER), 27/11/2006-01/12/2006