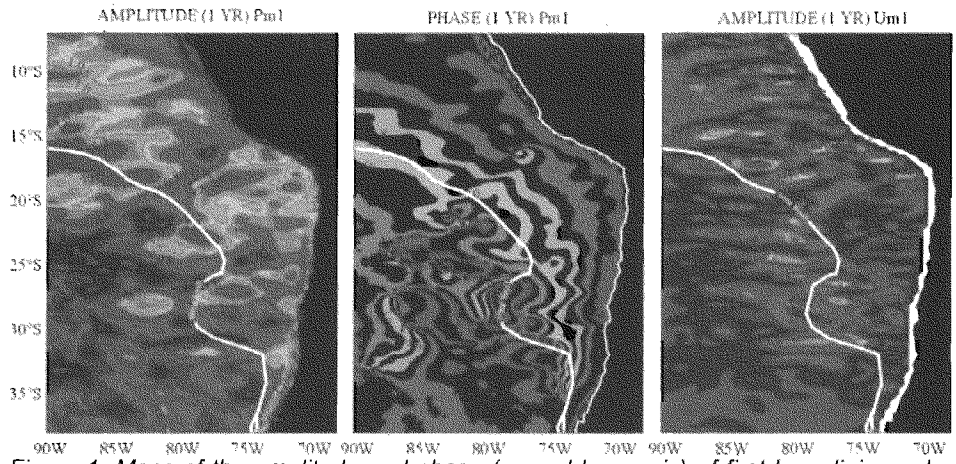

Figure 1. Maps of the amplitude and phase (annual harmonic) of first baroclinic mode contribution to the simulated sea level anomalies (units is cm). The amplitude of the annual harmonic of the corresponding zonal currents is displayed on the right panel (unit is cm/s). The thick white line correspond to the mean position of the O_2=1 mL/L iso-line at 300 m.

HCS157 - Fish scale preservation and Scale Deposition Rate during the last two hundred years in a coastal upwelling system of northern Humboldt Current, Mejillones bay, Chile

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Keywords: Fish scales, Marine sediment, Upwelling, Mejillones Bay, Chile

The Punta Angamos upwelling system (23°S) is known as one of the most productive marine regions off the Chilean coast. Mejillones del Sur Bay, which forms part of this system, acts as a center of sedimentary deposition for the abundant biological productivity of the zone. This bay is located off the world's driest desert (Atacama), and thus material of continental origin which reaches coastal sediments in the area is limited solely to wind-transported particles. Primary productivity measurements in this bay have given average annual production of 1070 g C m^{-2} y^{-1}, while dissolved oxygen profiles measured over an annual cycle showed that, at depths greater than 50 meters, oxygen is depleted which strongly restricts the presence of benthic macrofauna (Gonzalez et al., 1998). These factors have favored the rapid accumulation of diatomaceous organic-rich sediments, in which there is very little bioturbation. These characteristics are ideal for the reconstruction of local paleoceanographic conditions at the scale of the last centuries and millennia (Ortlieb et al., 2000).
In this environment, fish scale records were analyzed from both a spatial distribution (12 surface sediment samples recovered between 15 m and 120 m water depth) and a temporal perspective (42 cm sediment core). Biogenic remains were sorted, using a batch of sieves from 63 to 500 microns mesh size. Fish scales were identified and counted from the material retained in the 500 micron mesh size sieve. The chronology of this core was established from a CF-CS model based on excess ^{210}Pb profiles and further confirmed by radiocarbon ages corrected for local reservoir effects, yielding an average sedimentation rate of 1.67 mm y^{-1}; and an estimated age of 1740 AD for the base of the core. Based on sedimentation rates, scales abundance and area of sample we estimate the Scale Depositional Rate (SDR) which permits to interpret variation in term of fish population abundance.
In general, were observed a good preservation of scales in sediments of Mejillones bay and the dominance of three species; anchovy (*Engraulis ringens*), sardine (*Sardinops sagax*) and jack mackerel (*Trachurus symmetricus murphyi*). The former are the most abundant, in superficial sediment as well as downcore. Bathymetric segregation was observed in scales preservation within Mejillones bay. Sardine scales were more abundant in shallow zone (between 10m and 60 m water depth) while anchovy scales were more abundant in deeper zone (> 60 m water depth) (Fig. 1, left). Possibly, this situation is related to a more coastal behaviour of sardine population distribution and a more pelagic distribution of anchovy populations. The nearly anoxic conditions of the water column and the hydrodynamic conditions of the bay (Valdes & Ortlieb, 2001) favored the preservation of fish scales in the sediments, with higher surface abundances at the same depth stratum where the sediment core was collected.
Figure 1 shows the SDR records for anchovy, sardine and jack mackerel from the Mejillones sediment core, which marks a secular increase of fish scales, probably linked to a more intense upwelling activity which generated nutrient availability. The change in biomass, starting by an increase of sardine

abundance at 1850, followed by an increase of anchovy abundance at 1860, may reflect a decrease of SST reaching colder conditions around 1860. A short period with moderately enhanced SDR also took place just before the secular shift, from ca. 1830 to 1850.
Since 1860 the anchovy SDR followed a multidecadal pattern of variation, with periods around 30 years until the present, and the highest SDR were reached in the late nineteenth century, overlapping partially with the period of highest anchovy SDR. Low SDR values followed this period until 1975, and then SDR values increased again up to the present.

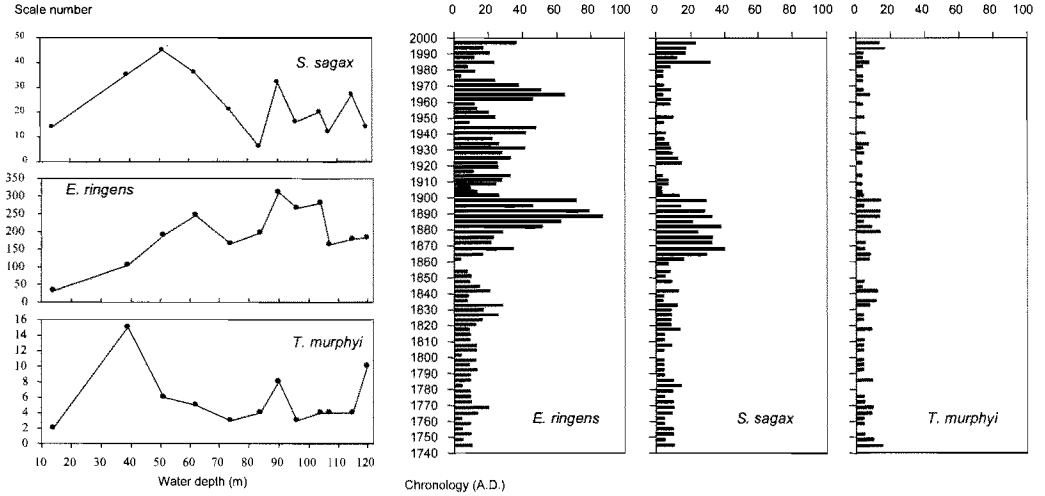

Fig. 1: Abundance of scale in surface sediment (left) and SDR in core sediment (right), in Mejillones bay.

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HCS162 - Regional atmospheric circulation simulations in Chile during October 2000: upwelling impact of mesoscale wind variability forcing a regional ocean model

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Keywords: Atmospheric circulation, Coastal Jet, Mesoscale, Regional Models, Upwelling

The study of regional oceanographic processes has undergone considerable development in recent years due to the expansion of in-situ observation networks, the increasing availability of satellite data, and the development of high resolution numerical models. Coastal zones are of special interest in regional applications as they are often the place of intense ocean mesoscale circulations which play a key role in coastal and deep-ocean exchange. In the case of the South American (SA) coastline, the regional wind-driven upwelling is modulated by ocean disturbances originally in the equatorial Pacific. Thus, an accurate representation of the atmosphere is likely to be important in studies seeking to evaluate coastal to deep-ocean transfer and to clarify the mechanisms associated with coastal wind variability.
In this study we use the WRF (Weather Research and Forecasting) regional atmospheric model to simulate the near surface atmospheric circulations along the SA coast between 15°S - 40°S using a multiple nested domain with grid spacing as low as 6 km. Simulations were performed for a sustained coastal jet event in October 2000 during which there was significant atmosphere-ocean interaction. A comprehensive validation of the model against in-situ meteorological and QuikScat satellite observations show that WRF was able to adequately simulate the low level winds in the vicinity of the coastline. However, while the model was capable of producing a well developed marine boundary layer (MBL), the

Valdés J., Marinovic L., Gutierrez D., Vargas G., Ortlieb Luc, Sifeddine Abdelfettah (2006)

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