

HCS090 - Viability of Microbial Community from Free-living and Sediment Associated Bacteria Assayed by Respiratory Activity and Growth from a Coastal area of the Current Humboldt System.

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The Humboldt Current System of northern Chile is characterized by its high autochthonous productivity and its bottom depleted oxygen condition. In this zone, it is located Semillons bay (23° S), which is part of one of the most productive upwelling centre off northern Chile (Punta Anamosa), where biological and geochemical processes are influenced by natural and anthropogenic factors, Although Semillons del Sure has been studied in the last years specially from a oceanographic and geochemistry perspective (Valdes et al, 2005), little is know about temporal or spatial variability in the proportion of colourable vs. nonculturable or active bacterial communities in this particular ecosystem. It is now generally held that the number of active or viable cells in environmental samples changes in relation to the total number of cells in the population, because a large fraction of the total cell count consist of either dead or dormant bacteria. The well established fact that a small percentage (i.e., <1%) of the total observable bacteria in environmental samples can be readily cultured has led to increase emphasis on the use of cultivation independent methods for assessing microbial community understanding. The value of studying these dynamics is depending on the ability to assign general ecological characteristics to culturable and nonculturable types. These temporal and spatial study approaches would be necessary to understand a successional microbial process for microbial communities from free-living and surface associated cells. Actually new methods for distinguishing live from dead cells or active from inactive cells are being investigated. Some techniques combine methods for enumerating total bacteria with assays for directly visualizing the active or live fraction of a population such as 5-cyano-2,3-ditolyl tetrazolium chloride (CTC) based on the formation of insoluble formazan precipitate inside cells when reduced. Here we explore the relationship between total bacterial abundance, and their proportion of active and culturable bacteria for samples obtained from Mejillones del Sur (23°S) bay. For these purpose water and sediment samples were collected in winter and summer period from eight different sampling stations along the bay, for total direct count (TDC), vital staining (CTC) and culturable bacteria by counting of Colony Forming Units (CFU). The preliminary results revealed that culturable bacterial rates for the different sampling periods were less than 1% of the TDC values for free-living and surface associated bacterial cells (Table 1). Respiring active bacteria using CTC showed that free-living and sediment associated cells represents in general about 10% of the TDC values, these is about 50 to 100 fold higher than culturable rates (Table 1). The statistical analysis using a Statistica software (version 5.0) revealed differences on bacterial activity (CTC) between free-living and sediment associated bacterial cells (ANOVA, $F=4.1$; $P<0.05$). Differences between sampling stations also were observed on the different sampling periods (ANOVA, $F=4.1$; $P<0.05$). This behaviour could be related to the system productivity found in cold season, when there is a higher availability of nutrient on column water with a low production of chlorophyll product of a decrease in solar radiation with the consequence of low utilisation of nutrients by phytoplankton. These results suggest that bacterial cells capable to reduce CTC are likely to be involved in bacterial production with the turn over of energy. Conversely, the higher proportion of non-colourable cells reported in this study (Table 1) could be associated with latter succession states since these bacterial cells direct less energy into growth and/or have a specific type of growth requirements that may not be readily provided in artificial media.

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References

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HCS094 - Near-inertial surface currents observed from Lagrangian drifters

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Keywords: Eastern South Pacific; Global distribution; Near-inertial currents ; Satellite-tracked drifters ; Wind energy flux.

Together with the tides and wind-work at lower frequencies, near-inertial waves generated by wind-stress fluctuations represent an important mechanism for internal mixing of physical and biogeochemical

properties in the deep-ocean. Based on more than 6000 satellite-tracked drifter trajectories, this study investigates the surface current characteristics associated with high frequency movements.

We first start with a regional spectral analysis in the Eastern South Pacific (ESP) which shows slightly enhanced energy for frequencies corresponding to diurnal and semidiurnal tides (K1 and M2 respectively) whereas strong energy maxima are observed at near-inertial frequencies (NIF). In the NIF band, movements are strongly polarized, with spectral energy being largely stronger for anticyclonic motions (Figure 1a-b). In the ESP, important meridional variations of spectral energy are observed: a quasi-linear increase between 10-30°S, a local maximum at 30°S where there is resonance of the NIF with K1, and quasi-constant level of relatively high energy between 30-50°S. Averaged over the region, the inertial energy is higher during summer than during winter. Using the extended complex demodulation technique we reconstruct the 2-D distribution of the velocity amplitude for anticyclonic movements at NIF (Figure 1c). The spatial distribution shows higher amplitudes in the south of the ESP but also along the coastal transition zone. Mean counterclockwise velocity amplitudes increase from around 5-10 cm s⁻¹ North of 25°S to 10-15 cm s⁻¹ south of 40°S (Figure 1c), corresponding to inertial motions with radii of 1-3 km (Figure 1d).

We then present for the first time a global map of the near-inertial current amplitudes (Figure 1e). In contrast to what is observed in energetic areas such as the Kuroshio or Gulf Stream regions, but in agreement with the other eastern boundary current regions, the ESP inertial currents are relatively weak. Using these observations and a high-resolution blended wind product we finally provide a global map of wind energy flux into mixed-layer inertial motions.

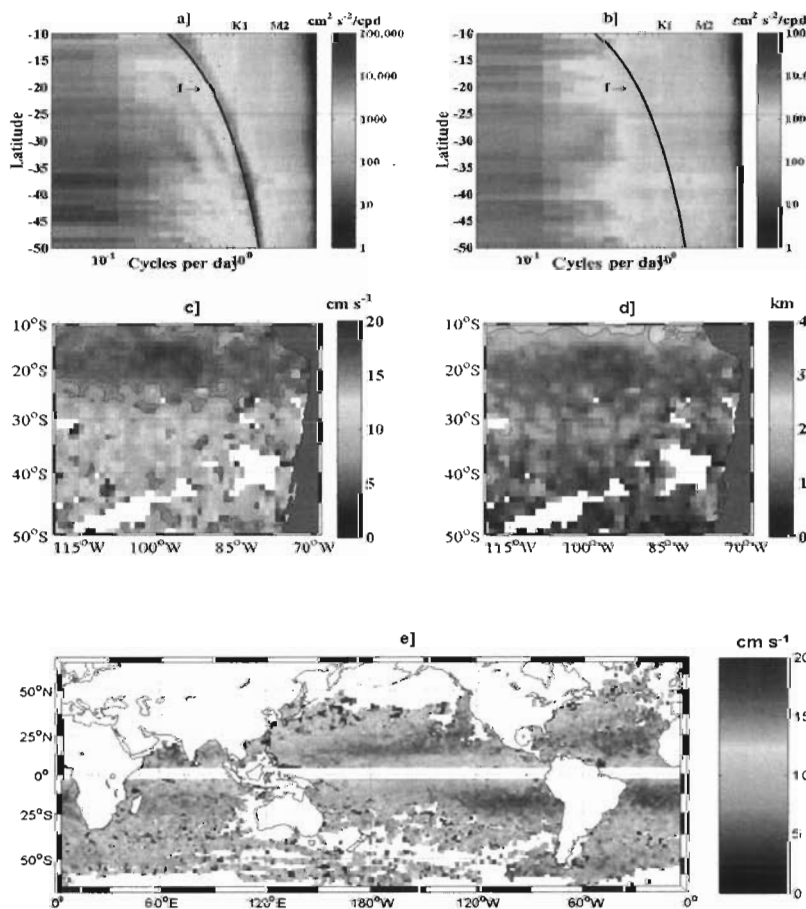


Figure 1: Characteristics of near-inertial currents in the Eastern South Pacific and in the world oceans. a-b] mean spectral energy for each latitude band of the ESP for (a) anticlockwise and (b) clockwise motions. c-d] Mean distribution of (c) near-inertial currents amplitude and (d) and corresponding radii in the ESP. e] Global map of near-inertial currents amplitude.

HCS104 - Coastal trapped waves off the west coast of South America during El Niño

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Keywords: coastal trapped waves, intraseasonal oscillations, wavelet transform

Evidence of coastal trapped waves off the west coast of South America, during the El Niño 1991-92 and 1997-98, is examined by applying wavelet analysis over sea level and alongshore wind stress time series. Wavelet transform reveals the existence of intraseasonal variability and Cross wavelet transform allows us to discriminate the sources in terms of remote and local forcings. Temperature and salinity profiles from an

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