Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00840, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00840
EGU General Assembly 2008

Evidence for a cross shelf flux in the Southwestern Atlantic Ocean

F. Jardón (1), A. Piola (1,2)

(1) University of Buenos Aires, Buenos Aires, Argentina, (2) Servicio de Hidrografía naval, Buenos Aires, Argentina

The continental shelf of the southwestern Atlantic Ocean is one of the most productive marine ecosystems of the southern hemisphere. The southernmost region, the Patagonian shelf, presents high biological productivity ranking from phytoplankton to top predators such as marine mammals and birds. Cross shelf-break fluxes between continental shelf and deep-ocean waters, associated to the northward flowing Malvinas Current (MC), sustains the productivity of the shelf break front. The transition between continental shelf waters and the adjacent ocean forms a relatively strong thermohaline front along the shelf break.

The analysis of surface salinity data in the outer Patagonian shelf reveals that in the vicinity of 45-46ºS shelf waters are transferred offshore. In that region observed salinities ($\sim$33.8) are 0.1 less than in neighboring areas. The low salinity waters extend vertically several tens of meters, except in summer, when they are limited to within the shallow mixed layer (10-20m). Space-time variations of satellite derived sea surface temperature suggests that low salinity observations are associated with decreased cross-shelf temperature gradients ($\nabla \mathrm{T}_x$) and an offshore displacement of the MC core. The surface temperature front at the shelf break, presents seasonal variability, being more intense during November-April, when it extends southward to $\sim$48ºS, although south of 46ºS it is less intense and less persistent. The along-shelf structure of $\nabla \mathrm{T}_x$ following the 500 m isobath shows two persistent narrow bands of low intensity ($|\nabla \mathrm{T}_x| < 0.02$). These bands of decreased cross shelf temperature gradients are co-located with the regions of decreased salinity.

These observations suggest that events of low salinity, less intense cross-shore temperature gradients and the associated offshore flows are semi-permanent at that location. The area of export of continental shelf water towards the open ocean is in qualitative agreement with predictions derived from high-resolution numerical simulations. Given that the Malvinas Current is strongly steered by the bottom topography, the observation of export of shelf waters at a preferred location suggests that the cross-shore transfer is topographically induced. This research is relevant to the understanding of cross shore mass, buoyancy and nutrient fluxes around the productive Patagonia shelf break front.