Geophysical Research Abstracts, Vol. 8, 09938, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09938

Observing circulation around Zapiola Rise from satellite altimetry and ARGO profilers

M. Saraceno (1) and C. Provost (2)

(1) College of Oceanic and Atmospheric Sciences (COAS), 104 COAS Admin Bldg, Oregon State University, Corvallis, OR, 97331-5503, USA (msaracen@coas.oregonstate.edu / fax: +1 541-737-2064), (2) Laboratoire d'Océanographie et de Climatologie: Expérimentation et Analyse Numérique (LOCEAN), Université Pierre et Marie Curie, Tour 45-55, 4éme étage, 4, place Jussieu, 75005 Paris, FRANCE, (cp@lodyc.jussieu.fr / fax +33 1-44273805)

The observation of a mud wave field in the sea-bed of the Argentinean basin, measurements resulting from current meters and hydrographic cruises show the existence of a deep anticyclonic current around the Zapiola Rise (ZR), a sedimentary edge centered at 45ºS, 45ºW. Satellite data show particular features around the ZR: sea surface temperature (SST) intensity gradient shows a relative minimum year round over the rise [Saraceno et al, 2004] and color satellite measurements show a delay of three months for the spring bloom relative to adjacent areas [Saraceno et al, 2005]. Using monthly climatology of satellite retrieved images of color, SST and SST magnitude gradients, the region surrounding the ZR can be classified as an isolated biophysical region from June to December [Saraceno et al, 2006]. In the present work, the circulation around the ZR is analyzed based on satellite altimetry data and two ARGO profiling floats that were trapped by the anticyclonic circulation around the ZR. Mean velocities estimated from the trajectory of the profilers (12 cm/s) compares well with mean velocities obtained from bottom current meters, suggesting a strong barotropic component of the current between the bottom (approximately at 4500m) and the navigation depth of the profilers (1500 db). Comparison between velocities at the surface (estimated from satellite altimetry) and at 1500 db (estimated from the ARGO profilers) along the trajectory of the profilers shows a mean vertical shearing of 25 cm/s.

The transport associated with the current around the ZR is estimated along four sections that cross the ZR meridionally and longitudinally making the strong assumption that the current is barotropic. Preliminary results show that the transport estimated in-

dicates the presence of an enormous variability between January 1993 and December 2003. At low frequency, the transport time series suggests that the current was mainly anticyclonic, and that it could have flown in the opposite direction (i.e. cyclonically) for short periods of time. At high frequency, peaks in the time series suggest a circulation which oscillates between -185 Sv (cyclonic circulation) and +240 Sv (anticyclonic circulation). Considering a vertical shear of 25 cm/s between surface and 1500 db, the transport is decreased by 20% compared to transport obtained considering a purely barotropic current.

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