Geophysical Research Abstracts
Vol. 14, EGU2012-4467-4, 2012
EGU General Assembly 2012


# Intrinsic low-frequency variability of the Argentine Basin flow, and its interaction with the Antarctic Circumpolar Current

G. Sgubin (1), S. Pierini (1), and H. A. Dijkstra (2)

(1) Università di Napoli Parthenope, Dipartimento di Scienze per l'Ambiente, Naples, Italy (giovanni.sgubin@uniparthenope.it), (2) Utrecht University, Institute for Marine and Atmospheric Research Utrecht, Department of Physics and Astronomy, Utrecht, The Netherlands

The dynamics of the Argentine Basin flow is of climatic relevance, as it yields strong mixing between Antarctic water masses (carried by the Malvinas Current) and subtropical water masses (carried by the Brazil Current). Such mixing is regulated by the Zapiola Anticyclone, a counterclockwise current that encircles the Zapiola Rise, the main topographic feature of the Argentine Basin. Recent observations have evidenced a clear variability of the Zapiola Anticyclone over periods that range from a 25-day oscillation (associated with topographic Rossby normal modes) to an interannual signal controlled by the local topography.

We investigate the intrinsic variability of the Argentine Basin flow by using the sigma-coordinate Princeton Ocean Model. The periodic domain of integration includes the Pacific/Atlantic sector of the Southern Ocean, so that the Antarctic Circumpolar Current is also simulated; moreover, the forcing is provided by steady climatological surface heat and momentum fluxes. Results show several phenomena of both high and low-frequency variability which are found to be particularly sensitive to background stratification and the degree of smoothing of the bottom topography.

The high-frequency variability is characterized by an anticyclonic wave around the Zapiola Rise: this is interpreted as a superposition of topographic Rossby normal modes which appear to be triggered by the intrinsic low-frequency variability. The latter evidences two distinct regimes of the flow with very different variance, that are connected by rapid transitions. A relatively low variable regime is characterized by a permanent Zapiola Anticyclone located over the Zapiola Rise; a more variable regime is characterized by strong eddy activity, mostly concentrated in the southern part of the basin, where the Sub-Antarctic Front is located. In general, the Argentine Basin circulation is found to be strictly related to fluctuations of the position of the Antarctic Circumpolar Current fronts. Finally, interesting agreement is found when comparing our model results with altimeter data.