Geophysical Research Abstracts, Vol. 8, 05766, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05766

A long time series analysis of temperature, salinity and currents in Terra Nova Bay (Antarctica)

Andrea Cappelletti (1), Paola Picco (2), Roberto Meloni (3)

(1) ENEA,via V.Viviani 23, 56124, Pisa, Italy (cappelletti@pisa.enea.it), (2) ENEA, Centro Ricerche Ambiente Marino, cp 224, 19100 La Spezia, Italy (paola.picco@santateresea.enea.it) , (3) CNR ISMAR, Pozzuolo di Lerici, La Spezia,Italy (roberto.meloni@sp.ismar.cnr.it)

In the framework of the Italian National Program of Antarctic Research (PNRA), oceanographic observation have been carried out in Terra Nova Bay polynya (Ross Sea, Antarctica) from 1995 up to now. In this work temporal series of current, temperature and salinity from fixed moorings D (74°55'.11 S, 164°20'.04 E, 1100 m depth) and L (74°44'.57 S, 164°08'.25 E, 135 m depth) are analyzed and compared to investigate the relative importance of the surface forcing and the advection from currents in the dynamic of coastal and open-sea circulation processes. Data used are: temperature, salinity and current at different depths between 55 m and 900 m for mooring D and between 26 m to 133 m for mooring L, sampled each thirty minutes (one hour in some cases) from 1995 to 2002; the (half-)hourly data have been used to perform spectral and correlation analysis in the diurnal frequency range, whereas the daily averaged data have been analyzed to investigate the low-frequency processes and the seasonal and interannual variability. As some small changes in the location of deployment and sensors composition occurred, data have been grouped in the layer between 120 and 140 m (layer 1D), 400-550 m (layer 2D), 750-900 m (layer 3D) for mooring D and between 26 to 36 m (layer 1L), 117-133 m (layer 2L) for mooring L. The study shows that the effects of the surface forcings are evident in the thermohaline structure of the sea also at great depths. Upper layer salinity displays a well defined annual cycle characterised by minima around 34.65 from April to June and maxima up to 34.85 from September to November; temperature at the same level has the summer maxima up to -1.4 °C on mid March and remains near the freezing point (-1.92°C) for a long period, from July to mid November. The currents data analysis reveals a well defined barotropic structure due to the general circulation of the Ross Sea and characterized

by a high mesoscale variability. The kinetic energy series present a characteristic seasonal trend and strong interaction between the upper layer data and the atmosferic forcings which, due to the presence of the polynya, affect the sea also during winter. The current deep layer data, even strongly influenced by the bottom topography, seems to be also dependent by thermohaline forcings showing a clear annual cycle with maximum energy during the dense water formation season between July and September and minimum at the end of summer melting period (December-January). The comparison between L and D current time series show a more complex vertical structure of coastal velocities respect to open-sea profile, evidencing a more intense dynamic of coastal processes.