ANALYSIS OF DEEP VARIATIONS RECORDED IN THE LIGURO-PROVENÇAL SUBBASIN DURING WINTER 2005-2006

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Abstract
Although historical data [1,2] identifie in the Gulf of Lions the main important site for dense water formation for the whole Western Mediterranean. Hydrological data performed during the last decade report interesting episodes of deep water convection also in the Ligurian Sea, indicating significant changes in temperature and salinity of the Western Mediterranean Deep Water [3,4].Between 2004 and 2009, six moorings were deployed along the Var submarine canyon, on a distance of about 100 km, at variable depths starting from 500 m down to 2300 m. An accurate analysis of this huge current dataset revealed a long period of strong near bottom currents not attributable to the turbidity flows, but rather imputable to processes of water sinking.

Keywords: Deep sea processes, Ligurian Sea, Deep waters

The analysis of about four years of current measurements collected off Nice (up to a distance of about 100 km from the coast) have shown an interesting mesoscale deep variability occurred on winter 2006. Hydrographic and moored data, as well as meteorological conditions have been taken into account in order to investigate thisdeep variability and correlate it to possible processes of dense water formation. In fact, it is well known that the combination of cold and dry winds, can be able to modify significantly the surface layer with a consequent buoyancy loss, leading to mixing and homogenization of the underlying water column.

Accurate spectral and Wavelet analyses of bottom long term series allowed us to distinguish between events strictly related to the canyon activity, as hyperpycnal currents, and mesoscale events representative of a wider circulation dynamic. Also, the use of a Wavelet analysis on the whole dataset offers the rare opportunity to easily compare sites affected by very different dynamics (mooring cover a vertical thickness of about 1000 m and an horizontal distance of about 100 km from the coastal area to the deep ocean). In general, all moored time series show the presence of energetic signals starting from periods ~ 10 days. These behaviors may be related to mesoscale processes which intensify during the wintry season. This is in good agreement with literature data [5] that show a slow weakening of Liguro-Provençal current during spring and summer, and an intensification afterwards in autumn and winter.
This mesoscale phenomenon presents two main fluctuation bands: one with period 10-30 days related to the Liguro-Provençal main direction (westwards), and another one with period 3-6 days related to a branch which separates from the main current and flows perpendicularly (southwards) polarizing anticlowckwise at a certain distance from the coast.

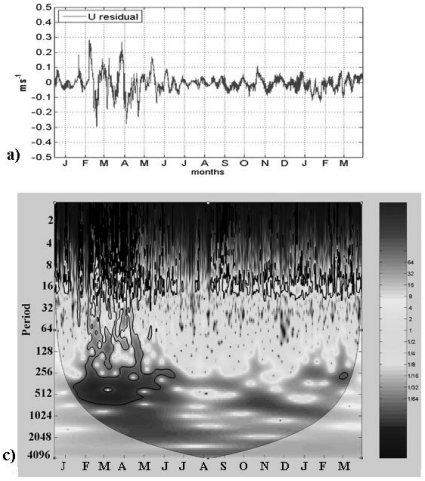

Fig. 1. Time series residual of U velocity component acquired by bottom current meter RCM8 and related wavelet analysis showing the main period of variation recorded during winter 2006.

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