ON THE REVERSAL OF THE SURFACE CIRCULATION ON THE CATALAN CONTINENTAL SHELF

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The hypothesis that the general southwestward circulation on the Catalan continental shelf may reverse seasonally or rather for periods longer than the typical duration of mesoscale events has been suggested by different authors. We propose that at least two different mechanisms may cause such inversions in the current direction. The first of them is of a barotropic nature and shows as a long period wave in the low-pass filtered time series of current data obtained at the CASABLANCA oil rig and analyzed extensively by FONT *et al.* (1990). Related to this, PEPIO and PELLISE (not published) processed a two-year record of mean sea level data acquired at Cala Justell, Vandellos, just a few kilometers apart from the oil rig and found that there was significant spectral energy at the 20-day period band.

The second mechanism, which is of a baroclinc character, is the inversion of the density front on the Catalan continental slope. MASO and TINTORE (1991) and SABATES and MASO (1992) concluded on the basis of dynamic computations with a reference level of 100 dbar that the presence of light water on the slope induced a circulation to the northeast on the Catalan shelf during May/June 1983.

During the MECA 93 experiment conducted in the Blanes Canyon area, R/V Hespérides occupied a grid of 54 CTD stations between 17th and 22nd June, 1993. The characteristic spacing between adjacent stations was 5 to 7 nm. ADCP measurements were obtained both along-track and at the sampling stations. Five LCD drifters were launched at selected positions on the northeasternmost section of the cruise and were further tracked via Argos for a period of about two months. Contemporary NOAA/AVHRR and ERS-1/SAR imagery covering the study area and neighbouring zones were processed off-line.

ADCP measurements show that the currents on the shelf were to the northeast above the pycnocline and southwestward at deeper layers (figure 1). The salinity distribution indicates the presence of light water bodies on the continental slope. The agreement between the dynamic height distribution computed with reference to the pycnocline level and the surface current field derived from the ADCP measurements suggests that the dynamics of the mixed layer was essentially geostrophic (see figure 2). It should be noted that the wind conditions were extremely mild during the cruise. The analyzed AVHRR images evidence that the inversion of the density front, linked to the southwestard advection of water from the Gulf of Lions, probably affected a large stretch of the Catalan shelf. This is coherent with the northeastward trajectory of the LCD buoys between Barcelona and Blanes whenever they drifted on the shelf.

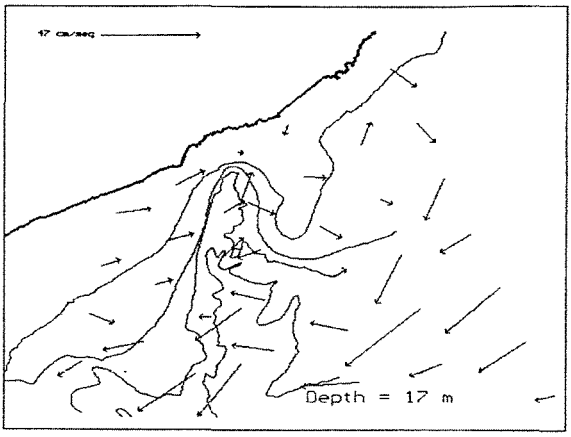

Figure 1. MECA 93 experiment. ADCP velocities at 17 m depth.

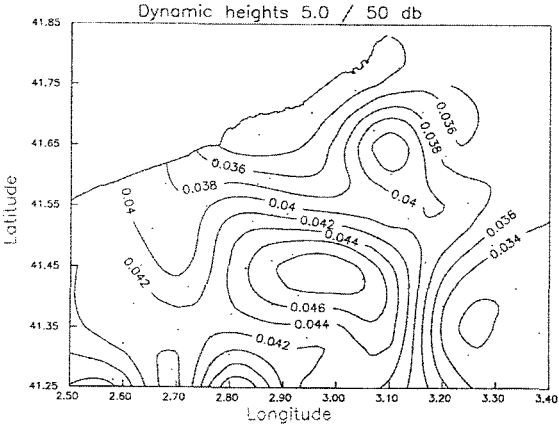

Fig. 2. MECA 93 experiment. Dynamic heights at 5 dbar computed with a 50 dbar reference level.

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