Volume flux measurements in the Bosphorus using an acoustic doppler current profiler

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The exchange of waters between the Black and the Mediterranean Seas takes place through the Strait of Bosphorus. The inflow to the Black Sea through the lower layer has been found to occur essentially on a continuous basis through the year (LATIF *et al.*, 1991), and based on long-term salinity data the volume fluxes have been determined as 612 km^3/yr for the upper layer and 310 km^3/yr for the lower layer (UNLUATA *et al*, 1990). Direct measurements of the flows in the two layers have been carried out utilising an acoustic doppler current profiler (ADCP). The series of measurements, which commenced in April 1991, have indicated that the volume flux in each layer varies in a wide range, both seasonally and in response to the prevailing meteorological conditions at the time of the measurements. High values of the outflow from the Black Sea, corresponding to about 700 km^3/yr, were observed in April and August, while the maximum values of the inflow to the Black Sea, corresponding to about 350 km^3/yr, were observed in October. The lowest discharge values in either layer were between 50-100 km^3/yr. The surface flow velocities in the northern entrance of the Strait are typically about 20-50 cm/s (Fig. 1). The velocities increase towards the south, due to the shallowing of the interface. Particularly high velocities, of about 150-200 cm/s, exist in the consriction region in the southern part of the channel.

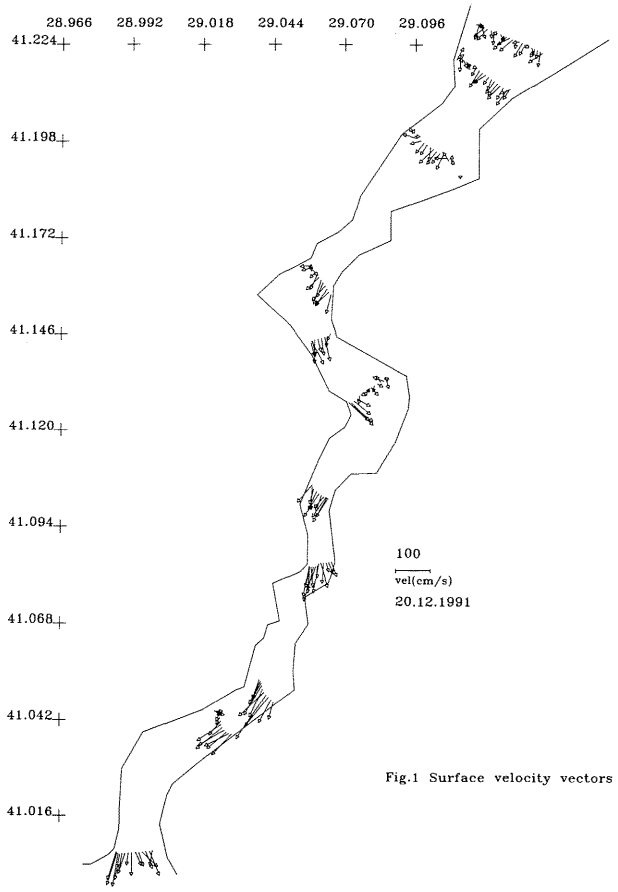

Fig.1 Surface velocity vectors

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Winter Surface Circulation Variability in the Balearic Basin

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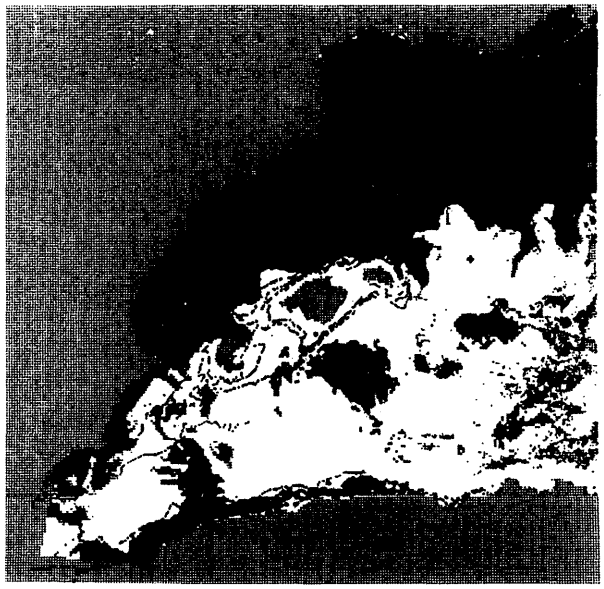

Fig. 1.- sea surface temperature of the Balearic and surrounding basins on 3 February 1990 derived from AVHRR NOAA

During the EEC MAST1 program, the EUROMODEL project has been investigating the processes and forcing mechanisms that drive the circulation in the different regions of the Western Mediterranean. Special attention has been devoted to seasonal variability, the scale of the main driving processes.

The Balearic basin is an area where two different regimes interact: the thermohaline driven circulation of the Liguro-Provençal basin and the large-scale eddy dominated Algerian basin. A series of AVHRR-NOAA images for the autumn-winter period during 1981-1990 has allowed the study of several aspects of the structure and circulation of its upper layer. This study is part of PRIMO, the International Research Programme in the Western Mediterranean.

During the stratified season warm waters occupy the surface mixed layer with a northern boundary delimited by the action of the strong winds in the Gulf of Lyon. This boundary extends to the east, and depicts the most intense surface thermal front observed in the Mediterranean. The progressive erosion of the thermocline allows the observation of the current that follows the continental slope from the north to the Gulf of Valencia. This is the final section of the Liguro-Provençe-Catalan current, the flow that characterises the circulation of the northwestern Mediterranean.

Near the Balearic islands, the irruption through the sills of recent MAW, transported by anticyclonic eddies from the Algerian current, creates the Balearic front and contributes to its mesoscale variability. The latter appears to be much more intense than previously described. Figure 1, a typical winter image, shows this front being continued to the east by the well known North-Balearic front, the feature that usually delimits the northern extension of recent Modified Atlantic Water.

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