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Seasonal variability of the surface circulation in the Channel of Sicily

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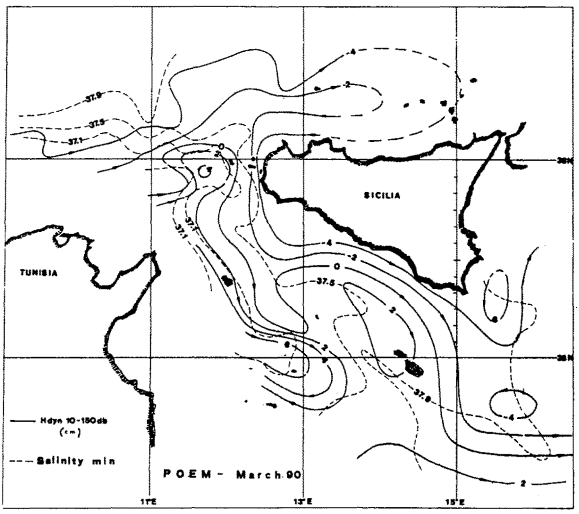
The seasonal variability of the surface marine currents in the Channel of Sicily is discussed on the basis of hydrological and surface current data collected by the Institute of Meteorology and Oceanography in the framework of the POEM project.



The surface flow patterns which resulted from the surveys of September 1987 and March 1990 are considered as they represent the typical summer and winter situations, and because the fair meteorological conditions which prevailed during the surveys allowed a good set of observations on the whole area. The patterns, as resulted from the analysis of the hydrological data, are supported by both the direct current measurement recorded on board R.V. Bannock while at station, and by the NOAA satellite imagery. They show a NW to SE meandering path with well defined cyclonic and anticyclonic gyres on its sides.

In summer time a frontal system having Atlantic Water (AW) in the south part of the channel and higher salinity water on the Sicily continental shelf, is seen. It is oriented NW - SE with meanders of 100 nautical miles wave lenght and 20-40 nm amplitude. Velocities close to 40 cm/s resulted by both direct and indirect methods. A few cyclonic gyres about 20 nm in diameter are well seen down to 50 meters. The results match fairly well with the thermal front shown by the imagery of the NOAA satellite during the same period.

In winter the mixed layer formed over the Sicily continental shelf is missing, and the area is characterized by a cyclonic flow along the Sicilian coasts as far as the Ionian sea. The AW is easyly recognized through the subsurface salinity minimum distribution which follows the geostrophic flow in the south part of the channel and turns toward the African coast (Fig. 1).

Moreover the two sets of observations point out that between Tunisia and Sicily the AW keeps always the same salinity values (37.0-37.1). In summer, the AW flows out of the channel around Malta Island and reaches the western Ionian basin. In winter the AW layer is shifted toward the African coasts and leaves the channel far south.