ANALYSIS OF A ROBUST SIMULATION OF THE GENERAL CIRCULATION IN THE WESTERN MEDITERRANEAN

Jean-Marie BECKERS[1], Jacques C.J. NIHOUL[1], Joaquin TINTORE[2] and Alberto ALVAREZ[2]

[1] GHER, University of Liège, B5 Sart-Tilman, 4000 Belgium
[2] Universitat des les Illes Balears, Dept. de Fisica, 07071 Palma, Spain

The general circulation pattern of the Western Mediterranean is simulated using a primitive equation model (BECKERS, 1991) with daily mean atmospheric data, in the scope of the EU program EUROMODEL. In order to achieve a robust view of the circulation, assimilation of hydrological data is incorporated in the model by a simple relaxation mechanism towards monthly mean temperature and salinity fields computed by an inverse model (BRASSEUR, 1991) applied to the Western Mediterranean (BRASSEUR *et al.*, 1993).

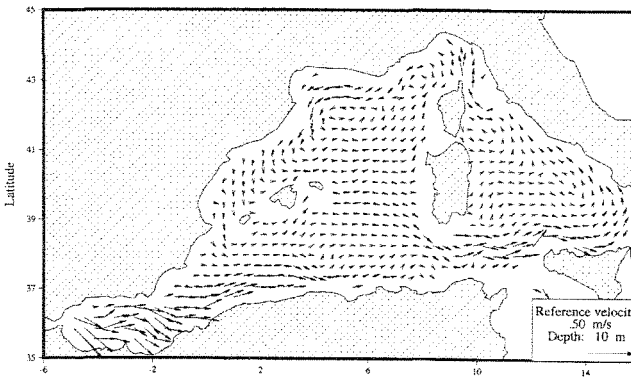

Fig. 1: Surface currents computed by the model at the end of February.

The simulation is then carried on in perpetual year conditions and the output of the simulations shows a general agreement with observational evidence : a Liguro-Provençal currents which is intensified during the winter, an Algerian current detached from the African coast during summer but closer to the coast in winter, general cyclonic circulation in the central basin and the Tyrrhenian Sea, deep water formation in the Gulf of Lions, signature of Levantine Intermediate waters, etc., are present in the model outputs (fig.1 & 2).

On the basis of these results, a diagnose of the operators in the mathematical model is performed in order to quantify the relative importance of wind forcing, thermohaline pressure gradients, diffusion and advection in the momentum equations. The evolution of these relative forcings is analysed in six different regions of the western Mediterranean and discussed in the light of seasonal variability of atmospheric forcings.

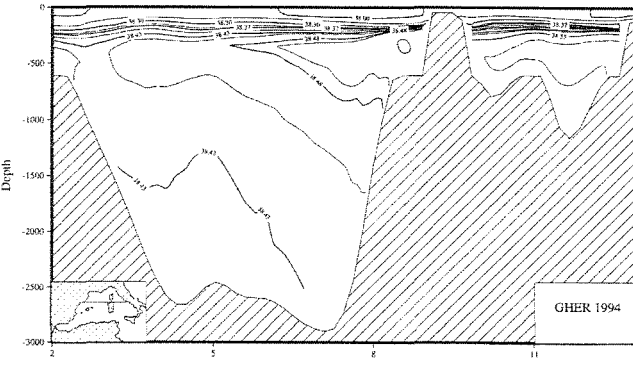

Fig. 2: Vertical section showing the northward flow of Levantine Intermediate Waters along the western coast of Sardinia.

Finally, the monthly mean sea surface heights are computed, as well as the variance in each month, which provides information about the mesoscale activity in the different basins.

REFERENCES

BECKERS J.M., 1991. Application of a 3D model to the Western Mediterranean. *Journal of Marine Systems*, 1, pp.315-332.

BRASSEUR P., 1991. A Variational Inverse Method for the Reconstruction of General Circulation Fields in the Northern Bering Sea, *Journal of Geophysical Research*, Vol. 96, No C3, pp. 4891-4907.

BRASSEUR P., BRANKART J.M., BECKERS J.M., 1993. Seasonal variability of the general circulation fields in the Western Mediterranean Sea : Inventory of climatological fields, Progress Report, Liège University.