The Simulation of the Month to Month Variability of the Western Mediterranean Circulation

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Using the GHER 3D non linear primitive equation model (e.g. BECKERS, 1991), the month to month variability of the general circulation in the Western Mediterranean Sea is established. It will be shown that the main physical features are well represented (the deep water formation is shown as an example on figure 1), but that the choice of initial conditions is crucial as well as the boundary conditions.

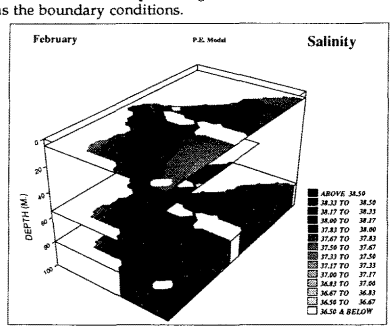

Fig. 1.- 3D view of the deep water formation in the Gulf of Lions. Salinity field in February.

In a first simulation, Levitus climatological data set was forced by the monthly mean May atmospheric data. The results showed herafter were obtained after 3 years of simulation. With these initial conditions and forcings, only a weak month to month variability was detected.

For a second simulation, the BNDO data interpolated by the inverse method are used as initial conditions. Thus a variational inverse model (e.g. BRASSEUR 1991) is developed to create appropriate initial conditions using the BNDO data set. The interpolated fields (e.g. on figure 2) - exploited as initial conditions - lead to a better simulation of the general circulation, and a crude data assimilation scheme is implemented to improve the general pattern. This data assimilation scheme simply uses the surface values computed by the inverse model to calculate an additional surface flux with a tendancy to restore the surface values computed by the direct model to those computed by the inverse model. It will be shows that now the Algerian current is improved, the Liguro-Provencal current well established. In the Balearic Island region, the simulations do not create a coherent current system indicating either bad grid-resolution, initial conditions or a high mesoscale variablity. Indeed, the variational inverse method gave significantly better results by using seasonal averages than monthly averages in this region, suggesting thus an important seasonal signal and high mesoscale variablity.

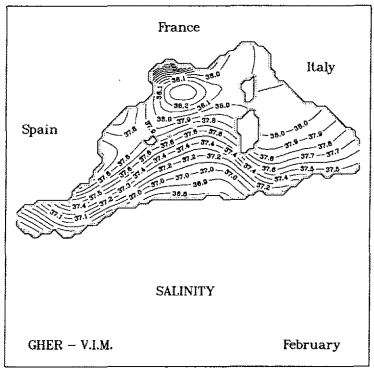

Fig. 2: Surface salinity field in February reconstructed by the variational inverse model from the BNDO data set.

In the near future, more sophisticated data assimilation schemes will be tested, in order to use a high resolution model with accurate data.

REFERENCES

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

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