SIMULATED LAGRANGIAN MOTION IN THE TYRRHENIAN SEA

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We present the results of a set of numerical experiments aimed at simulating typical seasonal patterns of Lagrangian motion in the Tyrrhenian Sea. A sub-basin of the Western Mediterranean, the Tyrrhenian Sea, is enclosed by very densely populated regions. The knowledge of its Lagrangian circulation is, therefore, valuable for its possible ecological significance. The main exchanges between the Tyrrhenian and the surrounding basins occur in the North through the relatively narrow and shallow Corsica Channel and in the South through the wide opening between Sardinia and Sicily, which is dominated by recirculations of incoming and outgoing flow. Rather than by a net and stable stream flux, the circulation of the basin is dominated by a system of sub-basin scale gyres, characterized by typical length scales of the order of 150-200 km; the baroclinic Rossby radius of deformation in this area is 10-12 km. Its dynamics, and in particular the dynamics of the cyclonic gyre just East of Bonifacio Straits, have been the focus of the TEMPO experiment carried out in 1989, collecting a wide range of *in situ* and remotely measured meteorological and oceanographical parameters (see TEMPO Group, 1991).

Significant seasonal variability of this gyre circulation pattern has been shown by the results of several hydrographic surveys. In order to shed some light on the fraction of the Tyrrhenian dynamics induced by wind forcing, the surface circulation of the basin recently has been investigated by means of a simple barotropic model (ARTALE *et al.*, 1994). The model solves the barotropic equation for the vorticity conservation in the Stommel form (i.e. where dissipation is represented by a bottom friction term).

The circulation is forced by wind stress in the interior of the basin and by water mass exchange between the Tyrrhenian Sea and adjacent basins north and south of it. The four typical cases considered, one for each season of the year, are characterized by climatological mean wind stress patterns and water mass in-/outflows at the boundaries. Correspondingly, four steady-state streamfunction fields are obtained, displaying strong seasonal variations, in which three main gyres can be discerned. In the seasonal steady-state output velocity fields, simulated Lagrangian surface drifters are deployed. The Lagrangian velocity field is the combination of two factors: the mean flow, which is represented by the model output velocity field; and the turbulent part of the velocity, determined by a random flight model, which assumes it to behave as a Markovian process in time. The parameters characterizing the turbulent part of the motion are drawn from drifter data gathered in the framework of the TEMPO experiment (RUPOLO *et al.*, 1994), using techniques of parametrical estimation introduced very recently (GRIFFA *et al.*, 1994).

The resulting simulated seasonal Lagrangian patterns are presented and discussed, as well as compared with available Lagrangian data for the area.

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