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Aspects of the mean winter and summer circulation of the Tyrrhenian Sea.

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The Princeton Ocean Model is used to characterize the mean winter and summer circulation of the Tyrrhenian Sea (TS), at very high spatial resolution (about 4 km). Simulations are initialized with MEDAR-MEDATLAS climatological temperature and salinity for the two seasons, and forced at the surface by the corresponding ECMWF wind stresses until quasi-steady states are reached. At the open boundaries (Sardinia, Sicily and Corsica strait) net barotropic transports are specified, while temperature and salinity are relaxed to climatology.

The mean circulation patterns predicted by the model, both for surface and intermediate waters, are in excellent agreement with those inferred from the available in-situ and satellite observations. The model reproduces the main characteristics of the surface winter circulation (the overall cyclonic circulation, the northern current along the Italian coast, the cyclonic gyres off the Bonifacio Strait and to the South-East of Sardinia, etc.), revealing additional details in the structure of the main patterns, together with the presence of a rich mesoscale activity in the central part of the basin. Some eddies are controlled by the complex topography. The summer simulation shows the expected inversion of the surface circulation in the central TS, where reversal of the wind stress curl takes place, with the formation of a wide anticyclonic cell. However, the cell is not decoupled from the circulation in the lower part of the basin, but is fed by an intense baroclinic current entering from the Sardinia Strait, that, instead of proceeding further inside the TS as in winter, sharply deviates towards North-West to follow a strong thermal front that develops between Sardinia and Sicily.