



## **An Estimation of Water, Salt and Heat Transports in the Tyrrhenian Sea using an Inverse Box Model**

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The Tyrrhenian sea has been object, until today, of relatively few studies, most of them addressed to specific and limited portion of the basin. Poor is the number of surveys covering almost synoptically the different portion of the basin. During May -June 2004 a basin-wide hydrographic cruise partially reduced this deficiency and provided a comprehensive update of the hydrographic conditions of the whole basin. Seven hydrographic transects performed across the basin permitted also to estimate the absolute geostrophic flow by means of a linear inverse box model, imposing conservation of some water properties in closed volumes of water. Current meter data sets were used for subsurface flux estimates to verify the consistency of current intensity calculated by hydrography.

The model result provides a mean circulation of the Tyrrhenian Sea during spring 2004 along with simultaneous evaluation of water fluxes and associated uncertainties through the hydrographic sections. The picture coming out from the model evidences that, besides an overall cyclonic circulation, many regional structures are present, producing an almost complex circulation pattern.

The surface current field shows that a strong Atlantic Water stream enters the Tyrrhenian from the south and splits in two branches: one flows northward, the other flows eastward. These veins are associated to several small scale structures.

The Levantine Intermediate Water (LIW) enters the Tyrrhenian in the eastern area of the Sardinia Sicily Passage (SSP) and recirculates cyclonically in the central part of the basin. A quota of the LIW leaves the Tyrrhenian through the Corsica Channel

flowing toward the Ligurian Sea, but a significant amount exits the basin southward along the Sardinian slope. Below the LIW, the Tyrrhenian Deep Water shows the same pathway inside the basin.

In the central area of the SSP a water mass enters the basin at intermediate level. It can be associated to an old LIW that returns to the Tyrrhenian Sea after having recirculated in the western basin. At the bottom the Western Mediterranean Deep Water enters the basin through the SSP, where a deep recirculation can be observed.