



Linking the Tyrrhenian and Ligurian seas: current reversal and flow variability within the Corsica Channel

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The Corsica Channel, a strait between Italy and Corsica, connects the Tyrrhenian and Ligurian seas. The dynamics within the Channel has been historically explored with long term mooring observations and targeted field campaign. At present, however, little work has been done in modeling the Corsica Channel at high-resolution. In this study, we investigate with a realistic, high-resolution (~ 1.5 km) numerical setup flow reversals within the Corsica Channel.

The simulations compare well with available water mass transport estimates, with hydrographic observations in the area, and current velocity measurements showing a flow in the Corsica Channel predominantly directed northward from the Tyrrhenian to the Ligurian Sea. On top of the well-documented Corsica Channel seasonal variability, a higher-frequency variability can be found throughout the year but more frequently during the summer season. This temporal variability, highest close to the western flank of the Channel, is of the order of a few days to a week and associated with reversals of the currents. We find that this variability is ascribed to periodic intrusions of the West Corsica Current on the Eastern side of the Island. Moreover, our findings suggest the importance, of a so-far neglected, across-channel variability of the meridional velocity.

Lagrangian particles are released into the hydrodynamical simulations and show that the exchanges between the Tyrrhenian and Ligurian seas are crucial for biological processes, like the spreading of propagules or larvae. For example, we find that the red gorgonian populations in the basin are connected through a stepping-stone strategy among different colonies.