



## **Three open problems regarding straits and channel: from local to climate insights**

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We here present three intriguing thermohaline processes that involve the role of complex interaction between geophysical fluid dynamics in marine channels and straits.

The first problem concerns both formation and dynamics of whirls within complex baroclinic currents in the Strait of Messina: nonstationary, horizontal and vertical columnar structures that are generated during the maximum currents in tidal cycle of the Strait.

The second problem investigates friction and mixing effects on bottom current crossing a marine strait: an application to the Sicily Channel (central Mediterranean Sea) and its role on the intra-basin, thermohaline circulation between the East and West sector of the Mediterranean Sea. In fact, considering the thermal storage of such basin, we envision such a dynamic as a climatologic effect.

The third problem sets some hypotheses on the complex dynamics of dense water in the Aegean Sea. In particular the entrance of dense water in the Cyclades Plateau from the Kafireas Strait (between the Islands of Euboea and Andros, Aegean Sea), which would give an important contribution to the thermohaline processes that formed (and might form) very dense waters in the Cretan sub-basin. Classical data on regarding the presence of contourites in the southern part of that Plateau suggests that strong bottom currents have important effects on the bottom layers in that plateau

We finally point out how those three, apparently local, problems are in fact of crucial interest for the understanding of dense water exchanges and mixing, in being regulated by non-geostrophic processes occurring in channels and straits.