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How can the BiOS and the mesoscale structures influence the flux of Atlantic Water in the central Mediterranean Sea?

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Altimetry data and model surface salinity products (https://doi.org/10.25423/medsea_reanalysis_phys_006_004) are used to define the pattern of Atlantic Water (AW) in the Central Mediterranean Sea (CMS) since 1993. Geostrophic fluxes are estimated through four transects, located at the main entrances of the CMS (Tunisia, Sicily Channel, Northern Ionian Sea and Cretan Passage). These fluxes highlight the influence of the Adriatic-Ionian Bimodal Oscillating System (BiOS; Gačić et al. 2010, 2011) on the water exchange between the Mediterranean sub-basins and, on the other hand, they reveal an anomalous behaviour induced by mesoscale activity on the BiOS-driven AW transport.
Sicily Channel transect intercepts the inflow of the AW in the Ionian showing decadal oscillation that are in phase with the Cretan transect and perfectly out-of-phase with the Ionian transect. Anticyclonic phases of the Northern Ionian Gyre (NIG) lead to a larger deflection of the AW in the northern Ionian (less saline waters in Northern Ionian and Adriatic seas) and, consequently, to a smaller transport of AW toward the Cretan Passage (more saline waters in the Levantine). Cyclonic phases of the NIG block the inflow of the AW in the northern Ionian (more saline waters in Northern Ionian and Adriatic seas) leading to a larger transport toward the Cretan Passage (less saline waters in the Levantine). The transport across the Cretan transect shows both decadal and interannual variability; interannual variations can be ascribed to the pronounced variations of the mesoscale activity observed at the southern entrance to the Cretan Passage (related to the instability of the coastal current) and/or east of the Sicily (interannual variability of the Messina Rise Vortex).