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Resolving key drivers of variability through an important circulation choke point in the western Mediterranean Sea; using gliders, models & satellite remote sensing

Emma Heslop (1), Eva Aguiar (1), Baptiste Mourre (1), Mélanie Juza (1), Romain Escudier (2), Joaquín Tintoré (1,3)

(1) SOCIB, Balearic Islands, Spain (eheslop@socib.es), (2) Rutgers University, New Brunswick, USA, (3) IMEDEA (UIB-CSIC), Balearic Islands, Spain

The Ibiza Channel plays an important role in the circulation of the Western Mediterranean Sea, it governs the north/south exchange of different water masses that are known to affect regional ecosystems and is influenced by variability in the different drivers that affect sub-basins to the north (N) and south (S). A complex system. In this study we use a multi-platform approach to resolve the key drivers of this variability, and gain insight into the inter-connection between the N and S of the Western Mediterranean Sea through this choke point.

The 6-year glider time series from the quasi-continuous glider endurance line monitoring of the Ibiza Channel, undertaken by SOCIB (Balearic Coastal Ocean observing and Forecasting System), is used as the base from which to identify key sub-seasonal to inter-annual patterns and shifts in water mass properties and transport volumes. The glider data indicates the following key components in the variability of the N/S flow of different water mass through the channel; regional winter mode water production, change in intermediate water mass properties, northward flows of a fresher water mass and the basin-scale circulation. To resolve the drivers of these components of variability, the strength of combining datasets from different sources, glider, modeling, altimetry and moorings, is harnessed. To the north atmospheric forcing in the Gulf of Lions is a dominant driver, while to the south the mesoscale circulation patterns of the Atlantic Jet and Alboran gyres dominate the variability but do not appear to influence the fresher inflows. Evidence of a connection between the northern and southern sub-basins is however indicated. The study highlights importance of sub-seasonal variability and the scale of rapid change possible in the Mediterranean, as well as the benefits of leveraging high resolution glider datasets within a multi-platform and modelling study.