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Abstract content:**Water masses transformation through the Strait of Gibraltar**

The Strait of Gibraltar (SoG) is the natural connection between the Atlantic Ocean and the Mediterranean Sea, here the basic exchange involves Atlantic Waters (AWs) flowing on surface toward the Mediterranean and Mediterranean Waters (MWs) flowing below towards the Atlantic. MWs was usually considered to be composed by Levantine Intermediate Water and Western Mediterranean Deep Water, but recently some works highlighted the presence of others MWs as Tyrrhenian Dense Water and Winter Intermediate Water, this makes a total of six water masses being involved in the exchange.

In the framework of the Hydrochanges European programme, the French Mediterranean Institute of Oceanography carried out the Gibraltar International Campaign (GIC) in July 4th-6th 2012. Data were collected with a Moving Vessel Profiler (MVP) which allows a very high spatial resolution. The campaign was developed during a short period allowing us for making a quasi-synoptic description of the water masses distribution in the SoG. θ - S diagrams show a noticeable erosion of the distinctive features of the MWs as they flow from East to West, the same applies to the NACW flowing in the opposite way. Main changes in both Mediterranean and Atlantic waters occurs once passed the main sill.

A clustering method is presented to determine the affinity of each MVP sample to one of the water masses involved in the exchanged flows, proposing a functional classification to investigate their transformation along the strait. The method reveals a observable evolution of the pattern of the MWs as they flow westward mainly due to the strong mixing in the Tangier basin. The three MWs are easy to recognize east of the sill, while downstream a marked weakening of the spatial differentiation is observed.

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