EVOLUTION OF THE WESTERN MEDITERRANEAN THERMOHALINE ANOMALY AS OBSERVED NEARBY BALEARIC ISLANDS (2005-2009)

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Abstract
The complex thermohaline structure observed in the Western Mediterranean after the severe winter of 2004-05 is still present in the summer of 2009 at the Balearic Islands. The processes that caused the anomaly are now well identified, as well as the different newly formed water masses. The evolution of the anomaly during the period involves a progressive homogenization of the deep waters masking the layered structure. The final product is a warmer and saltier water type that apparently has incorporated deep waters formed in subsequent winters but not from other intense cascading episodes. On the other hand, Levantine Intermediate waters observed at the north of the Balearic Channels does not present robust trends since mid-90`s.
Keywords: Western Mediterranean, Balear Sea, Deep Waters

The Mediterranean Sea has been immersed in a process of warming and salt-increase at least since the mid 20th century. Anthropogenic global warming and damming of the major rivers have been postulated as the causes of the process. The severe winter of 2004-05 caused the highest heat-loss at the area of deep water formation in the western Mediterranean, triggering the production of immense amounts of cold dense waters that quickly spread along the whole basin creating a complex structure [1]. The new structure was satisfactorily explained as a combination of cascading of very cold and quite fresh waters along the shelf-slope plus the production of saline and warm deep waters at the open ocean.

The trace of the anomaly is clearly visible as a sting-like signature on the TS diagram (Fig 1). Three source waters contribute to it, the coldest mode corresponds to the cascading and the high-saline warm mode of the curve corresponds to the open ocean convection. Both lay below the older deep waters at the end of the straight TS line [2]. The detailed monitoring has shown that the anomaly is extended along the whole basin [3] and persists up to now. The characteristics have evolved towards an homogenization of the layered structure ending with a DW modal water much warmer and saltier than before, with a little contribution of extra cascading waters and intermittent incorporation of open water convection waters, as in winter 2006.

On the other hand, Levantine Intermediate Water properties have been monitored since 1996 at the north of the Balearic Channels. This water mass shows strong interannual variability but not a clear trend during that period, therefore it is not apparently a strong effect caused by the Eastern Mediterranean Transient, at this location.

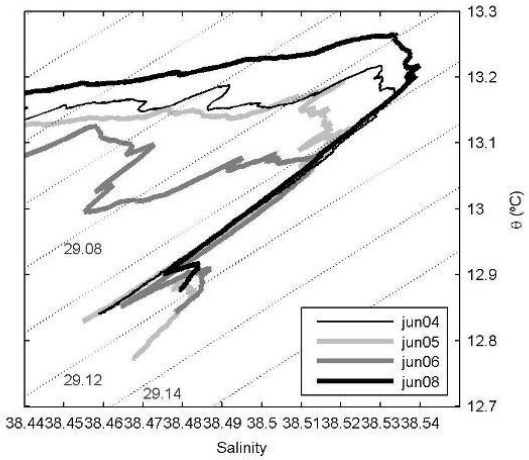

Fig. 1. T/S diagrams at 40 10.00 N and 04 34.96 E (NE Menorca Island).

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