

## Multiplatform study of a long lasting anticyclonic eddy in the Algerian basin.

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The Algerian Basin is often stage of formation of long-life mesoscale eddies, which may impact the circulation of the entire Western Mediterranean Sea. These structures are able to store and transport water masses and consequently physical and biological properties all around the basin. This highlights the relevance of a further study of these features and their influence within the basin.

In this work we use a multiplatform approach combining altimetry data, a detection and tracking algorithm and in situ observations to provide a complete description of a case study long-life eddy. In fact, the analysis of the in situ data only could bring to an incorrect description of the eddy evolution in time; on the other side satellite data see the surface only.

We detected a 17 months long anticyclonic eddy through a hybrid (physical and geometrical) method (Halo et al. 2014, Chelton et al. 2007, 2011, Pessini et al. 2018) applied to Sea Level Anomaly Data. This eddy was also sampled by two different oceanographic cruises in fall 2004 and late spring 2005, which provided information of the water masses characteristics along the water column.

The observation of potential temperature, salinity, density and dissolved oxygen concentration highlighted the eddy to have captured Atlantic Water during its formation along the Algerian Current. Furthermore, the variability of the radius, kinetic energy and vorticity suggests to divide the eddy lifetime into three different periods: the formation phase, a period of high variability and a third lower energetic phase. The position of the eddy confirms the hypothesis of an interaction with the North Balearic Front and a consequent change of the eddy physical properties. The decomposition of the kinetic energy into the mean and the fluctuating parts of the flow allowed to describe the interaction between the eddy and the mean circulation.

Finally, the combination of in situ data with the detection and tracking method has revealed fundamental for the correct interpretation of the eddy related processes.