



Disentangling the generation mechanisms of strong and long-lived anticyclonic mesoscale eddies in the Balearic Sea

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Several intense and long-lived anticyclonic mesoscale eddies have been observed in the Balearic Sea over the last 20 years, with three particularly remarkable events in 1998, 2010 and 2017. We investigate the generation mechanisms of the 2010 event using satellite observations and a high-resolution circulation model. A detailed energetics analysis reveals that the energy was transferred from the mean flow into the eddy field through mixed barotropic and baroclinic instabilities. The temporal evolution of the eddy shows that its own presence reinforces the density gradients, converting itself in a strong and long-lived structure. Our first results suggest that the generation of this eddy is linked to the smaller anticyclonic eddies formed upstream close to Cap de Creus under the influence of northwesterly winds. Then, its intensification and persistence in time is likely related to the anomalous presence of Atlantic waters of recent origin in the Balearic Sea, which is responsible for significant density gradients. The presence of these structures blocks the general circulation of the Balearic Sea, modifying the ocean currents and regional water mass properties. These changes strongly affect heat, salt and nutrients distributions in the area. Therefore, their monitoring and understanding are essential for climate and primary production studies.