



In-situ and modeling evidence of a mesoscale anticyclonic eddy in the Ligurian Sea, Northwest Mediterranean Sea

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We describe the physical and dynamical characteristics of a mesoscale anticyclonic eddy observed in the northeastern sector of the Ligurian Sea in August 2013. Previous observational and numerical evidence invite the hypothesis that this anticyclonic eddy may not be a sporadic feature but rather a recurrent structure in the region likely leading to significant implications on biogeochemistry, mixing and on heat and fresh water fluxes. To date, however, a detailed hydrographic study for this anticyclonic eddy is not available. A densely populated dataset of in situ temperature and salinity measurements obtained from three different oceanographic platforms (including gliders) were used to initialize and force a simulation with the Regional Ocean Modeling System, configured for the northeastern sector of the Ligurian Sea with a resolution of 1.9 km. In situ observations, as well as model results obtained from a strong nudging to observations, allow a 3-dimensional characterization of the eddy, as well as an estimation of the associated vertical velocities. The eddy has a ~ 16 km radius, and it is centred around 9.5°E , 43.94°N , between the northeastern edge of the Northern Current and the Italian coast. Horizontal velocities below the surface are around 0.4 m/s, while at 150m are still significantly high and close to 0.2 m/s. Vertical velocities, here estimated from model results, remain below 4 m/day till depths shallower than 150m depth. Waters enclosed in the eddy are significantly fresher than waters outside the eddy till approximately 300m, suggesting that the eddy may have formed from a instability of the Northern Current