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Coastal (Sub)Mesoscale Eddies in the Gulf of Lion

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The LAgrangian Transport EXperiment (LATEX) project (2008-2011) has been initiated in order to study the role of (sub)mesoscale structures on shelf-offshore exchanges in the Gulf of Lion. The strategy will combine use of data from an inert tracer release (SF6), Lagrangian drifters, satellites and Eulerian moorings with numerical modeling.
In this work, we present a shelf-scale model of high resolution (1-km) nested in a regional-scale model (3-km). We use an upwind-type advection-diffusion scheme, in which the numerical diffusion term is adjusted by an attenuation coefficient. Sensitivity tests have been carried out, varying the model spatial resolution and the attenuation coefficient to reproduce the (sub)mesoscale structures. A wavelet technique is applied on model outputs to identify eddies and to define their area, position and tracking duration. Comparisons between the modeled eddies and those observed by satellite have allowed us to choose the best model configuration.
With this setup, single and combined effects of wind forcing, bathymetry and mesoscale circulation are investigated to propose a generation process of these simulated eddies.
Then, simulations are run for long period to obtain annual variability and statistics of the coastal eddies. These coastal (sub)mesoscale eddies potentially interact with the distal plume of the Rhône river and the Northern Current.
Numerical modeling sets the foundation to understand the eddies' dynamics and helps us set up the sampling strategy of the cruises. The in situ measurements combined with the modeling results will allow us to evaluate the eddies' potential impact on the coastal-offshore transfer of matter and energy.