Coastal (sub)Mesoscale Eddies in the Gulf of Lion

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Introduction

Millot [1982] was pioneer in observing an anticyclonic circulation in the western part of the Gulf of Lion (GoL), following upwelling phenomena and an offshore drift of surface water.

We use the technique developed by Doglioli et al. [2007], based on wavelet analysis of horizontal slices of relative vorticity to identify and follow the eddy structure and to measure its area.

Numerical modeling

We used the SYMPHONIE numerical model [Marsaleix et al, 2008]. Starting from a regional model (Northwestern Mediterranean, 3-km resolution), we implemented a nested high resolution shelf-scale model (Gulf of Lion, 1-km resolution) and we tested the spatial grid resolution and a new horizontal diffusion scheme.

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Conclusions:
The sensitivity study on model resolution and horizontal diffusion allows us to find the best model setup to reproduce (sub) mesoscale eddies in the GoL. With this model setup, from the numerical results, we propose a hypothesis for the generation process of this simulated anticyclonic eddy. The cruise LATEX08 confirmed the presence of an anticyclonic eddy.

Perspectives:
Simulations will be run for a long period (2001-2008) to obtain annual variability and statistics on coastal eddies. Combined with the data from the next cruises (LATEX09 and LATEX2010), we will quantify the role of these (sub) mesoscale eddies on the shelf-offshore exchanges in the GoL.

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The Cruise LATEX08 (September 1-6, 2008) was launched in order to confirm and to identify eddies in the western side of the GoL.

The buoys accomplished a complete circle in around 5 days with a displacement velocity of ~ 30 cm/s. The eddy radius is in the range: 20-30 km.

Nencioli et al. [2008] showed that we can determine the eddy center position by using transect ADCP data.

Estimated positions of the center of the anticyclonic eddy at 16 m depth (red *) for Transect 1 (left) and for Transect 3 (right). The colored areas are divided into a 30x30 grid. Tangential components of the black vectors are computed for each point within the grid. The center of the eddy is defined as the point for which the mean absolute value of tangential velocity is maximal. Isopleths indicate values of equal mean tangential velocity.

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