Geophysical Research Abstracts, Vol. 7, 02616, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02616

Coastal dynamics in Gulf of Lions : interactions between the North Mediterranean current and the shelf circulation during the years 1990-2000.

C. Langlais (1,2), B. Barnier (1), J.M. Molines (1), P. Fraunié (2)

(1) LEGI, Université J.Fourier, Grenoble, France, (2) LSEET-LEPI, Université du Sud Toulon Var, La Garde, France

(clothilde.langlais@lseet.univ-tln.fr)

Fluxes across ocean shelves are dominated by complex coastal dynamics. In the Mediterranean Sea, the circulation is driven by a combination of factors operating at different but often related time scales. More precisely, in the microtidal site of the Gulf of Lions, mixing and dispersion are dominated by interaction between freshwater dynamics associated to the large Rhône river discharge, coastal upwellings and the North Mediterranean shelf current (the Liguro-Provençal Current – LPC).

To know how these processes operate and interact, a regional model of the Gulf of Lions has been integrated over the 10 year period 1990-2000. The model is based on the NEMO code, with a 1/16° (∼5 km) resolution. The atmospheric forcing is provided every 6 hours by ERA40. Conditions at the limits of the regional model are handled by radiative open boundary conditions, and use data provided every 5 days by the global 1/16° model of the Mediterranean Sea of the MERCATOR project. Our analysis focuses on the mesoscale variability of the coastal circulation and fluxes across the shelf, and especially on the LPC which acts either as a barrier when flowing along the shelf break or an efficient flushing system when intruding the Gulf of Lions. In this shelf area, the forcings which drive the coastal processes act at different time scales. The wind is shown to drive the high frequency coastal dynamics variability, acting at time scales of a few hours concerning the river plume dynamics and a few days concerning the upwelling/downwelling system, while low frequency seasonal variability dominates the coastal hydrology and the LPC structure. The effects on the physical properties of the sea of these processes which scales range from a few-hours

to seasonal and year-to-year are analysed and discussed.

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