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Influence of the spatio-temporal resolution of atmospheric forcings on coastal dynamics in Gulf of Lions

C. Langlais (1,2), B. Barnier (1), J.M. Molines (1), P. Fraunié (2), D. Jacob (3), S. Kotlarski (3)

(1) LEGI, Université J.Fourier, Grenoble, France, (2) LSEET-LEPI, Université du Sud Toulon Var, La Garde, France, (3) Max Planck Institute for Meteorology, Hamburg, Germany (clothilde.langlais@lseet.univ-tln.fr)

Driving Ocean general circulation models requires an accurate representation of the fluxes at the air-sea interface. This places a rigorous demand on atmospheric forcing data sets : accuracy, long periods, and coverage of large areas. In a shelf area like the Gulf of Lions, because of the high spatio-temporal variability of the coastal processes, the resolution of the data sets becomes an important requirement. In the Gulf, the complex shelf circulation is mainly influenced by the wind stress curl : wind forcing is shown to drive the high frequency variability, acting at time scales of few days on the upwelling/downwelling system, when low frequency seasonal variability dominates the coastal hydrology.

In the case of regional and coastal modeling, the question of using atmospheric forcing data obtained by a downscaling of global reanalysis is widely open. The paper compares two sets of atmospheric forcings in the area of the Gulf of Lions during a ten year period (1990 - 2000): one provided every 6 hours by ECMWF reanalysis, with a $1^{\circ}125$ resolution (ERA 40 outputs) and hourly outputs provided by the REMO dynamically downscaled re-analysis with a 18km resolution. REMO data have been obtained by a downscaling of ECMWF data (ERA15 re-analysis followed by operational ECMWF analysis). We compare the low frequency signal of the two data sets and investigate the variability gained with the REMO resolution. Finally the paper analyses the impact of the high resolution REMO forcing on the shelf circulation, using a ten years long run of the OPA model with a $1/64^{\circ}$ ($\sim$ 1 km) in the Gulf of Lions.