



Small scale coastal processes in the Northern Adriatic Sea – Modeling as a tool

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The Venice Lagoon interacts with the main basin, the Adriatic Sea, producing interesting hydro-dynamical patterns in the proximity of its three inlets. This processes start to be investigated by cruises, satellites images, ADCP and many other instruments. Numerical modelling is our choice to add information about that processes and their evolution.

A 3D hydrodynamic finite element model has been developed at the ISMAR-CNR Institute, in Venice, to investigate the shallow water processes, typical of the littoral of the Northern Adriatic Sea.

This modelling application is focused on the study of processes aspects that hardly can come out from measurements: there are a great number of forcings acting in the coastal area as wind, tides, freshwater river outflow, turbulence produced in the inlet dynamics. Models give the opportunity to cover a wide spatial area and, in particular finite element models, permit to give information with high resolution. Different runs, switching on and off each of the drivers, have been run, to add information about the impact of each of them on the studied phenomena.

What has been investigated, in particular, is the origin and the evolution of small scale vortices near the inlets. From measurements, recirculation cells have been seen in the southern coastal area near each inlet and measurements were not completely able to explain their origin. Model runs have been performed to reproduce them and maps of vorticity have been produced, considering the influence of tidal flows and wind stress.

The impact of river runoff on coastal currents has been considered, including the main rivers of the North Adriatic.

Finally a comparison with real data measurements, surface velocity data from three HF Radar covering the coastal area in front of the Venice Lagoon, has been performed. The year chosen is 2004 because of a good spatial and temporal coverage of measured data. The comparison validates the model and permit to consider quantitatively the results of simulations done applying separately each forcing.

This work wants to stress the increased value of modelling in investigating even estuaries and coastal processes supplementing monitoring.