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Wind-wave-current interactions in the North West Mediterranean

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The Catalan Coast is a micro-tidal environment, governed by density driven coastal currents. The coastal current is strongly polarised in the along shelf direction, with maximum speeds exceeding 50cm/s. The mean speed is of the order 10cm/s but with a standard deviation of the same order of magnitude, is therefore highly variable. The position and strength of the coastal current can be affected by local winds and wave-current interaction. Freshwater input at the coast is generated by sporadic land-based flash flooding. River outflow can be highly variable and dominates the tracer distribution in the nearshore zone.

A multi-disciplinary coupled model approach is needed to capture the physical processes occurring at the Catalan Coast. We combine the meteorological weather research and forecasting model (WRF), with the hydrodynamic model (POLCOMS) coupled to the spectral wave model (WAM). WRF-POLCOMS-WAM has been implemented in this region to examine specifically:
-The position of the shelf current
-The position of the freshwater plume
These two features of the Catalan inner-shelf will be examined, with emphasis on their response to local winds, and wave-current coupling.

During periods of high freshwater input the region becomes strongly stratified in the form of a coastally trapped river plume. The extent of this plume is also found to be governed by local wind conditions. The position of the coastal current is affected by coupling the hydrodynamics to the wave model, while (due to the large water depth) there is little effect of the current on the waves away from the very nearshore.