HIGH RESOLUTION OF ATMOSPHERIC FORECASTING MODEL FOR REGIONAL ENVIRONMENTAL STUDIES. BASIC PROCESSES AND APPLICATION TO COASTAL FLOWS.

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Prediction of water quality in the nearshore zone is becoming a stressing factor for economic development in coastal areas with high concentration of human activity. The wind entrainment is considered as a major factor for pollutant and contaminant dispersion at the sea surface, including oils spills, floating particles and objects, waste and pollutants and jelly fish.

The new operational forecasting model AROME developed by MeteoFrance is herein analysed by comparison to former ALADIN and NCAR-MM5 models concerning wind forcing of coastal flows in North Western Mediterranean Sea.
Indeed, operational atmospheric models are nowadays made available with high resolutions, both in space and time, usable for coastal oceanic model forcing. A comparison between different wind forcings is presented Fig 1.

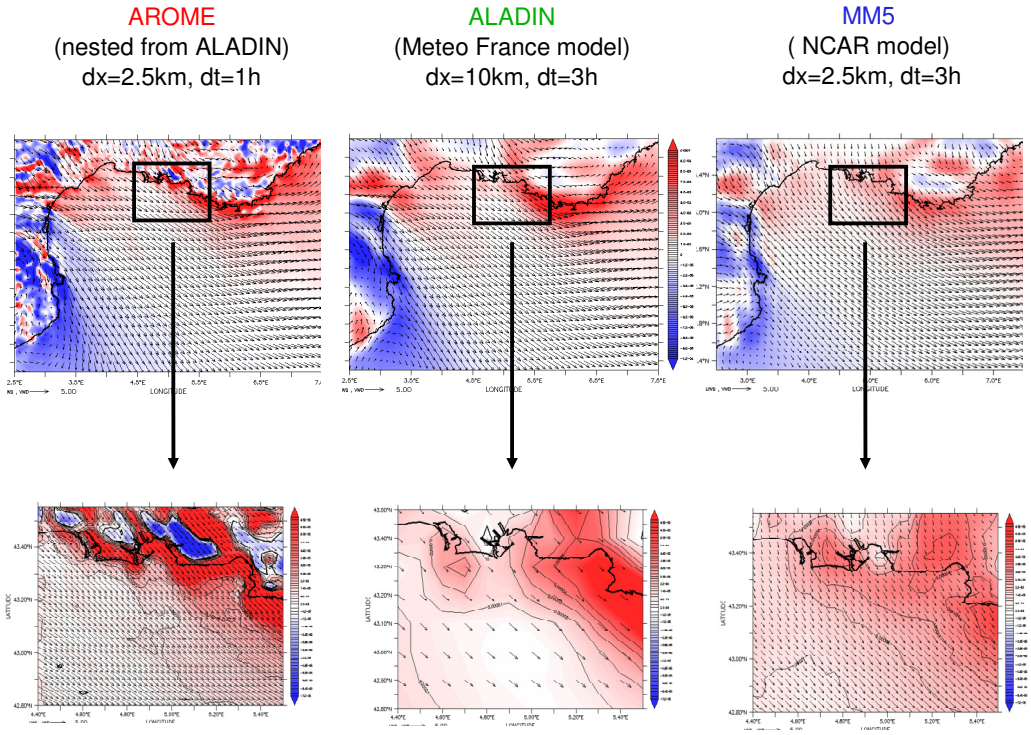

Fig 1 : Comparison of different model resolutions on the wind forcing in coastal areas :
Curl of averaged wind during june – august 2008.

Localized coastal effects with several hours duration like thermal coastal breezes, jets in valleys and anabatic and catabatic winds in complex orographic situation are clearly observed with a possible impact of nearshore circulation and mixing and local upwellings. Moreover, gusts and wind turns are able to significantly influence the inertial motion, internal waves and vertical mixing at the sea surface.

Process oriented investigations at the sea surface in the coastal Northwestern mediterranean sea are presented to illustrate the impact of small atmospheric scales on oceanic coherent structures responsible of retention or dispersion of nutrients or contaminants. They are shown to be a critical point to improve prediction of inertial motion, internal waves, confined upwellings, filaments and eddies the size of the local internal Rossby radius, i.e. the order of dozens of kilometres, especially in presence of thermocline or in the stratified region of fresh water influence.

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