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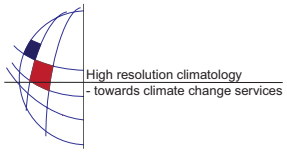

Evaluating meteo marine climatic model inputs for the investigation of coastal hydrodynamics

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One of the major aspects discussed in the recent works on climate change is how to provide information from the global scale to the local one. In fact the influence of sea level rise and changes in the meteorological conditions due to climate change in strategic areas like the coastal zone is at the base of the well known mitigation and risk assessment plans. The investigation of the coastal zone hydrodynamics, from a modeling point of view, has been the field for the connection between hydraulic models and ocean models and, in terms of process studies, finite element models have demonstrated their suitability in the reproduction of complex coastal morphology and in the capability to reproduce different spatial scale hydrodynamic processes. In this work the connection between two different model families, the climate models and the hydrodynamic models usually implemented for process studies, is tested. Together, they can be the most suitable tool for the investigation of climate change on coastal systems.

A finite element model, SHYFEM (Shallow water Hydrodynamic Finite Element Model), is implemented on the Adriatic Sea, to investigate the effect of wind forcing datasets produced by different downscaling from global climate models in terms of surge and its coastal effects. The wind datasets are produced by the regional climate model COSMO-CLM (CIRA), and by EBU-POM model (Belgrade University), both downscaling from ECHAM4. As a first step the downscaled wind datasets, that have different spatial resolutions, has been analyzed for the period 1960-1990 to compare what is their capability to reproduce the measured wind statistics in the coastal zone in front of the Venice Lagoon. The particularity of the Adriatic Sea meteo climate is connected with the influence of the orography in the strengthening of winds like Bora, from North-East. The increase in spatial resolution permits the more resolved wind dataset to better reproduce meteorology and to provide a more realistic forcing for hydrodynamic simulations. After this analysis, effects on water level variations, under different wind forcing, has been analyzed to define what is the local effect on sea level changes in the coastal area of the North Adriatic. Surge statistics produced from different climate model forcings for the IPCC A1B scenario have been studied to provide local information on climate change effects on coastal hydrodynamics due to meteorological effect.

This typology of application has been considered a suitable tool for coastal management and can be considered a study field that will increase its importance in the more general investigation on scale interaction processes as the effects of global scale climate phenomena on local areas.