SKILL ASSESSMENT OF WIND MODELS FOR THE ADRIATIC USING WIND AND WAVE OBSERVATIONS

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Wind plays a dominant role in coastal ocean processes, determining the sea state, generating storm surge and driving mixing and transport of dissolved, suspended or floating material. The performance of oceanographic models is therefore strongly dependent on the performance of the underlying wind model, but how should the skill of the wind model be judged? Four wind models with differing spatial resolution, physics and boundary conditions are evaluated in the Adriatic Sea over a two-month period in spring 2001: a global hydrostatic model ECMWF T511 (40 km resolution), a regional hydrostatic model LAMBO (15 km), and two local area non-hydrostatic models: LAMI (7 km) and COAMPS$^{TM}$ (4 km). These wind models are used to drive a 2 km resolution wave model (SWAN) of the entire Adriatic, and both wind and wave results are compared to observations at an oceanographic platform located 16 km off the coast of Venice. Waves are also compared at buoy locations near Ancona and Ortona. The results show that the higher-resolution local area models LAMI and COAMPS have a much better amplitude response than the coarser ECMWF: there is a 3-4 fold reduction of the winds underestimation at the platform (from 36% to 8-11%). The wave response is also much improved with LAMI and COAMPS with a two fold reduction in the underestimation of wave heights at the platform. The local area models also produce wind fields with more realistic looking small-scale spatial structure during strong wind events. The correlation between observed and modeled wind and waves, however, is highest for the relatively smooth ECMWF wind fields. It
is argued that this is not an appropriate measure of model performance, because phase errors in the small-scale structure of the higher-resolution models degrade the correlation. Although there is still considerable room for improvement, existing local area wind models offer significant advantages over coarser resolution models for driving oceanographic simulations in the Adriatic Sea.