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Wind and Waves assessment in the Adriatic Sea in a severe Climate Change Scenario

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In the present contribution we summarise the preliminary results of an assessment of the projected meteo-marine climate of the Adriatic Sea, an elongated semi-enclosed basin of the Eastern Mediterranean Sea, under a RCP 8.5 climate change scenario. First we explored the quality (and the improvements with respect to previous state of the art) of the wind fields provided by a high-resolution implementation of the Regional Climate Model (RCM) COSMO-CLM under control (1971-2000) and future scenario (2071-2100) conditions. These fields were then used as a forcing for two SWAN wave model runs referred to the same period aiming at investigating the possible upcoming modifications of the wave climate, with a special focus on the implications for coastal systems.
COSMO-CLM appears capable of capturing not only the climatological wind intensity features, but also the peculiar directional distribution of the events reproducing the bimodal dominance of Bora (a cold, generally dry northeasterly wind) and Sirocco (a wet and humid wind blowing from southeast across the main axis of the basin), as well as the typical jet patterns of the former blowing from orographic gaps. This is indeed a major achievement of this implementation, whilst up to now many climatological models typically tended to poorly reproduce strong spatial gradients and directional modes. Projected wind climate exhibits a tendency to a moderate overall energy decrease throughout the Adriatic basin, in accordance with previous studies, but with a directional redistribution that can locally lead to an increase of sea state severity at the regional scale. Indeed, the depicted increase of the relative energy content of Sirocco sea states compared to Bora can increase the average rate of wave energy impacting the northern coasts of the Adriatic Sea, with relevant implications for coastal vulnerability to erosion and flooding.