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Extreme storm surge and wave events in the Mediterranean Sea under climate change scenarios

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This work aims at obtaining regional projections of storm surges and wave climate in the Mediterranean Sea and the adjacent NE Atlantic area. The projections are obtained from a regional barotropic ocean model and a wave model run for the 21st century under different climate change scenarios. The forcing consists of high frequency (6h) atmospheric pressure and 10 meter wind fields obtained as the output of the ARPEGE climate model, a global atmospheric model with variable-resolution (50 km over the Mediterranean). In addition to the runs carried out for the period 2000-2100 forced by greenhouse gases (GHG) concentrations following the A2, A1B and B1 SRES scenarios, two more runs have been carried out for the period 1960-2000. One was forced by observed GHG concentrations (the control run). The second is a dynamical downscaling of ERA-40 re-analysis fields. The domain of the oceanic barotropic model HAMSOM extends from 30ºN to 47ºN and from 12ºW to 35ºE, which covers the Mediterranean Sea and the NE Atlantic adjacent sector with a spatial resolution of 1/4ºx1/6º. The wave model WAM has been implemented to cover only the Western Mediterranean with a 1/6º spatial resolution. The hourly outputs will be used to characterize the extreme events in both storm surges and waves and to explore the changes in the magnitude and frequency of such extreme events under climate change scenarios. Very preliminary results suggest that under all the considered scenarios the number of storms and their intensity will decrease by the end of the 21st century due to the weakening of winds and cyclone activity over the Western Mediterranean.