

Impact of climate change on storm surges and wave heights on the Belgian Coastal Zone

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In the framework of the CREST project, the RBINS aims at quantifying the impacts of climate change on the Belgian Coastal Zone both for physical parameters and sediment transport. Results of eight regional climate models were analyzed and were used to force a hydrodynamic model and a wave model. Two regional climate model simulations were prepared in the framework of the CORDEX.be project, i.e. simulation from the Royal Meteorological Institute and the Catholic University of Leuven while atmospheric forcings from six other regional models were obtained for an evaluation run for the period 1980-2010, a historical run (1976-2005) and for a climate run based on the IPCC RCP 8.5 scenario for the period 2070-2100.

To interpret the estimated impacts of climate change, an analysis of the wind forcing is firstly presented. Changes in wind speed and direction between historical and RCP 8.5-time series are assessed by computing the wind density function. To estimate the changes in storm surges and wave heights, a statistical analysis has been carried out at stations located along the Belgian Coast. The bias in the model results is corrected by applying the quantile mapping method.

Results for wave heights indicate a possible increase of about 20cm for return periods of 20, 50, 100 and 200 years at Bol van Heist. Concerning the storm surges at Ostend, the expected increase varies from 20 cm for return periods of 20 years up to 40 cm for return periods of 200 years. These changes are interpreted in terms of wind changes and are in good agreement with expected changes in wind speed and direction at these locations.

Keywords: Climate change; Numerical modelling; Statistical analysis