Geophysical Research Abstracts
Vol. 14, EGU2012-13587, 2012
EGU General Assembly 2012

Climate downscaling: Local mean sea-level rise, surge and wave modelling

J. Wolf (1), J Lowe (2), and T Howard (3)

(1) National Oceanography Centre, Marine Systems Modelling, Liverpool, United Kingdom (jaw@noc.ac.uk, 44151 795 4801), (2) Met Office/Hadley Centre, University of Reading, United Kingdom, (3) Met Office/Hadley Centre, Exeter, United Kingdom

The investigation of future climate impacts at the coast requires sufficiently detailed projections for the nearshore waves and sea levels in both the present day and a future climate scenario, to provide an offshore boundary condition. Here we discuss the future changes in surge and wave climate forced by winds and pressures from a version of the Met Office Hadley Centre Climate model, for various greenhouse gas emission scenarios and for various climate model parameter choices. The local spatial variation in mean sea level is also taken into account, incorporating deviations from global mean sea level change caused by regional variations in ocean density and circulation. Some parts of the UK are still subject to glacial isostatic readjustment after the last ice age, counteracting sea level rise, although this will be overwhelmed by the projected effects of sea level rise due to global warming in the 21st century, for most future emission scenarios. Model downscaling from the global coupled atmosphere-ocean model using a regional climate model is needed to provide more realistic and detailed wind simulations over the NW European continental shelf. There is large uncertainty in projected changes in storminess for the NE Atlantic region, with different climate models providing conflicting results for the future. Results from this study show that large increases in mean sea level (even up to 5 metres) have very little effect on the dynamics of extreme surge events, the primary effect being on the speed of propagation of tide and surge (Howard et al., 2010). Increasing storminess is expected to increase surge heights but more direct effects can be attributed directly to increased mean sea level. Based on the wave model results, seasonal mean and annual maximum wave heights are generally expected to increase to the SW of the UK, reduce to the north of the UK and experience little change in the southern North Sea or eastern Irish Sea. This pattern is consistent with a southerly shift of the storm track over the UK. However, there are large uncertainties especially with the projected extreme values.

Howard T, Lowe, J.A. and Horsburgh, K. (2010). Interpreting century-scale changes in southern North Sea storm surge climate derived from coupled model simulations. Journal of Climate, 23, 6234-6247.