Geophysical Research Abstracts
Vol. 15, EGU2013-8844, 2013
EGU General Assembly 2013

The response of North Atlantic cyclones to climate change in the CMIP5 climate models

Len Shaffrey, Giuseppe Zappa, and Ben Harvey
National Centre for Atmospheric Science, University of Reading, Reading, United Kingdom (l.c.shaffrey@reading.ac.uk)

Intense extratropical cyclones are one of the major weather risks in the mid-latitudes. High winds and extreme precipitation from extratropical cyclones can result in windstorm damage, flooding and coastal storm surge. Understanding the impacts of climate change on extratropical cyclones is critical to assessing future weather risk.

In this talk the ability of the CMIP5 (Fifth Coupled Climate Model Intercomparison Project) climate models to represent North Atlantic cyclones and their response to climate change will be presented. Objective cyclone tracks and eulerian variance measures are calculated from 17 CMIP5 climate models and evaluated using the ERA-Interim reanalysis. The North Atlantic stormtrack in the CMIP5 models tends to be too zonal, with too many storms over the Northwestern Europe and too few storms over Scandinavia. The spatial biases in the CMIP5 models, however, are slightly reduced in comparison with the previous CMIP3 climate models. The CMIP5 models also tend to under-represent the observed strength of North Atlantic cyclones (and Northern Hemisphere cyclones in general). There is some indication that higher resolution climate models have smaller wintertime biases in both the spatial distribution and the strength of extratropical cyclones.

The response of North Atlantic cyclones in the CMIP5 models to climate change has also been assessed in the RCP4.5 and RCP8.5 scenarios. The number of winter storms decreases over Scandinavia and the Mediterranean, consistent with changes in the large-scale baroclinicity of the atmosphere. There is a slight increase in the number of winter storms over Northwestern Europe. Generally, only small changes in the intense winds associated with North Atlantic cyclones in the CMIP5 models are found, although there is an increase in intense precipitation rates. The impact of climate model biases on the CMIP5 projections of North Atlantic cyclones will also be discussed.