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Ireland's Changing Wind Resource: An Atlas of Future Irish Wind Climatology

P. Lynch (1), R. McGrath (2), **P. Nolan** (1,2), T. Semmler (2), S. Wang (2)

(1) Meteorology and Climate Centre, University College Dublin, Ireland (peter.lynch@ucd.ie), (2) Community Climate Change Consortium for Ireland (C4I), Met Eireann, Dublin, Ireland (manager@c4i.ie)

Greenhouse gas emissions are having a significant effect on the Earth's climate. Changes in the wind climatology of Ireland are expected. Since wind power will be a key renewable energy resource, it is vital to model the impact of climate change on future wind patterns over Ireland. A web-based Atlas of the wind climatology of Ireland for future decades is under preparation.

In the C4I Project, we are using a Regional Climate Model (RCM), the Rossby Centre Regional Atmospheric Model, to simulate the wind climatology of Ireland at high spatial resolution. The horizontal resolution is 0.12˚ (approximately 12 km) over Ireland, with 40 levels in the vertical.

The RCM has been validated by performing a 40-year simulation of the Irish climate (1961-2000), driven at the lateral boundaries by ECMWF ERA-40 global re-analysis data, and comparing the output to observational data. UKCIP data, Irish weather station data, ERA-40 data and HOAPS satellite data have been used for the validation. Results confirm that the model is able to simulate wind patterns over Ireland with a high level of accuracy.

Projections for the future Irish climate were generated by downscaling the Max Planck Institute GCM data using the RCM. Both ECHAM4 and ECHAM5 data were used, and results for both will be presented. Simulations were run for a reference period 1961-2000 and future period 2021-2060. Results for the downscaled simulations show an overall increase in mean wind speeds for the future winter months and a decrease during the summer months. The most extreme increases in the mean cube wind speed arise during February with increases of about 12% in the north of the country. The

overall mean cube wind speed increases by approximately 1.0% over most of the country.

To address the issue of model uncertainty, the C4I team has commenced *ensemble forecast runs* with the RCM. A preliminary report of this work will be presented.

A web-based *Atlas of future Irish Wind Climatology* will be produced from the simulations.