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High-Resolution Regional Climate Model Projections for Ireland

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The method of Regional Climate Modelling (RCM) was employed to assess the impacts of a warming climate on the 21st-century climate of Ireland. The RCM simulations were run at high spatial resolution (18 & 4km), thus allowing a better evaluation of the local effects of climate change. To address the issue of uncertainty, a multi-model ensemble approach was employed. Through the ensemble approach, the uncertainty in the projections can be partially quantified, thus providing a measure of confidence in the predictions. Simulations were run for a reference period 1975–2005 and future period 2020–2100. Differences between the two periods provide a measure of climate change.

The COSMO-CLM and WRF RCMs were used to downscale the following CMIP5 global datasets; CNRM-CM5, EC-EARTH, HadGEM2-ES, MIROC5 and MPI-ESM-LR. To account for the uncertainty in future emissions, all four RCP (2.6, 4.5, 6.0 and 8.5) scenarios were used to simulate the future climate.

Preliminary results for mid-century indicate an increase of 1–1.6°C in mean annual temperatures, with the largest increases seen in the east. Warming is enhanced for the extremes (i.e. hot or cold days). Averaged over the whole country, the number of frost days is projected to decrease by over 50%. The projections indicate an average increase in the length of the growing season of over 35 days per year. Results show significant projected decreases in mean spring and summer precipitation amounts by mid-century. The projected decreases are largest for summer, with “likely” reductions ranging from 0% to 20%. The frequencies of heavy precipitation events show notable increases (approximately 20%) during the winter and autumn months. The number of extended dry periods is projected to increase substantially during autumn and summer.

Finally, an overview will be presented on current work to produce sharper estimates of expected climate change in Ireland by downscaling CMIP6 datasets using both RCMs and the coupled atmosphere-ocean-wave model, COAWST.