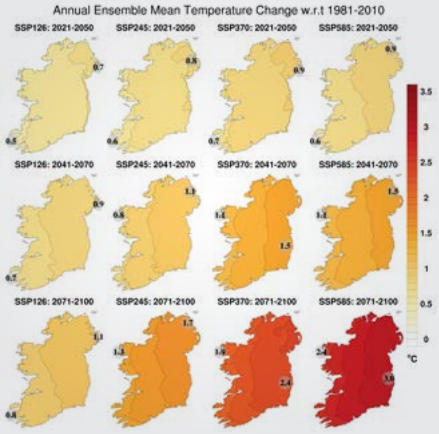


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# Updated High-resolution Climate Projections for Ireland

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## Identifying pressures

Climate change poses a significant risk to Ireland's economy, society and environment, and therefore it is imperative that planners and policymakers are adequately informed about future climate change so that appropriate mitigation and adaptation measures can be implemented. The main objective of this project was to evaluate the effects of climate change on the future climate of Ireland using high-resolution regional climate modelling. Previous regional climate projection research for Ireland shows large uncertainty for certain climate projections such as precipitation. Since extreme events such as flooding and droughts are likely to be a critical issue for Ireland, it is important to address this research gap. The project simulated the future climate (up to the year 2100) at high resolution (4 km grid spacing) using the most up-to-date regional climate models, Coupled Model Intercomparison Project Phase 6 (CMIP6) Earth system models and new shared socioeconomic pathway and representative concentration pathway (SSP-RCP) (SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5) emission scenarios. The scenario-based projections are supplemented with global warming threshold scenario projections for temperature and precipitation.

## Informing policy

This research will inform national policy and further the understanding of the impacts of climate change in Ireland at a local scale. Below are examples of climate projections that are of particular interest to policymakers:

- Near-surface temperature is projected to increase by 0.5–0.7°C for SSP1-2.6 (2021–2050) and 2.4–3.0°C for SSP5-8.5 (2071–2100), with the largest increases in the east.
- Warming is enhanced for the extremes, resulting in substantial projected increases in heatwaves and decreases in frost and ice days.
- The future autumn and winter months are projected to be wetter (increases of up to 10% for SSP5-8.5, 2071–2100), while summer is projected to be drier (decreases of 8% for SSP5-8.5, 2071–2100).
- The precipitation climate is projected to become more variable, with substantial projected increases in both dry periods and heavy rainfall events.
- Snowfall is projected to decrease by between 31% (SSP1-2.6, 2021–2050) and 84% (SSP5-8.5, 2071–2100).
- The projections indicate an average increase in the length of the growing and grazing seasons, soil temperature, crop heat units and growing degree days for a range of crops.
- The energy content of the 120 m wind is projected to decrease for all seasons, with the largest decreases noted for the summer months (reductions of 23% for SSP5-8.5, 2071–2100).
- Photovoltaic power is projected to decrease for all seasons, with decreases enhanced for the winter and summer months.
- The projections show that over the coming decades there will be a substantial reduction in the requirement for heating in Ireland.

## Developing solutions

This research provides Ireland with a data resource to explore its future climate and enables the assessment of the scale of impacts across sectors, at regional and local levels. This report provides an outline of the regional climate modelling undertaken to assess the impacts of climate change in Ireland, based on a number of future scenarios, and highlights the key findings. The project has also provided a large database that can be interrogated for various meteorological parameters, which is essential for detailed analysis across a diverse range of sectoral concerns.

The national climate projections of the current report are in broad agreement with previous research, which adds a measure of confidence to the projections. The research improves on previous research by simulating the future climate at a higher spatial resolution (4 km) using the most up-to-date regional climate models to downscale an ensemble of CMIP6 global datasets under the new SSP-RCP emission scenarios. The increased ensemble size of projections allows for a more accurate quantification of climate change uncertainty. Furthermore, the current report provides projections for additional climate variables and derived metrics that are critically important to biodiversity and to key Irish sectors, including agriculture, health, energy and transport.

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