



## Regional climate ensemble simulations for Ireland

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To predict regional climate changes it is not sufficient to rely on one regional climate model realisation for future climate. It is crucial to determine the uncertainty in regional climate projections to estimate, which predicted changes are robust features. Since a regional climate model (RCM) is strongly constrained by the lateral boundary conditions, the uncertainty from different RCM formulations is minor compared to the uncertainty from global climate change projections, which include uncertainties from the emission development in the future as well as from different general circulation model (GCM) realisations. To address these uncertainties in climate predictions for Ireland in a very high resolution of 14 km, two different GCM's are used to drive the Rossby Centre Atmosphere model version 3 (RCA3) on a model domain including Ireland, the UK and parts of the North Atlantic. There are two control simulations for the time period 1961-2000, one using ECHAM4/OPYC3 and the other one using ECHAM5/OM1 as driving GCM's. In addition ERA-40 data are used to drive RCA3 for the same time period to determine biases stemming from the RCM formulation. For the future climate an ECHAM4/OPYC3 B2 scenario simulation as well as ECHAM5/OM1 simulations assuming the A2, the A1B and the B1 emission scenarios are used to drive RCA3 for the time period 2021-2060. Even though ECHAM5/OM1 has been developed from ECHAM4/OPYC3, which could suggest relatively small differences, there are considerable differences both for present day and for future climate. Different large scale circulations and different vertical temperature and humidity profiles are leading to in some seasons very pronounced differences in the dynamically downscaled precipitation over Ireland. Near surface temperature and wind speed are also affected but to a lesser extent.