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Evaluating key aspects of large-scale circulation for Europe in a coupled PPE

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European climate is influenced by a number of large-scale phenomena which are typically poorly represented by global climate models. A key motivation in generating a coupled perturbed parameter ensemble (PPE) for use in the latest UK climate projections (UKCP18) was to exploit the significant improvements in regional dynamics that have been demonstrated at higher vertical and horizontal resolutions.

The UKCP18 package includes a number of products, including a set of 28 global model 'realizations' comprising a 15-member PPE and a filtered sub-set of 13 CMIP5 members. These physically coherent, spatially and temporally complete scenarios of future change provide a flexible tool for exploring plausible future changes and their likely impacts.

We present an assessment of the PPE's ability to represent key aspects of the regional large-scale circulation and its implications for the realistic simulation of UK and European climate and its variability. These include the large-scale circulation climatology, frequencies of weather types determined by clustering of north Atlantic MSLP anomalies, latitude and strength of the north Atlantic jet, location and frequency of north Atlantic and European storms and the frequency of blocking events. We show that the PPE members perform at least at as well as, or better than, the filtered 13-member CMIP5 subset with respect to these circulation characteristics. This realistic behaviour offers a good basis for UK and European climate impacts studies, as well as the further development of 'storylines' approaches.