



Probabilistic projections of change in UK extreme rainfall using the PRUDENCE regional climate models

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There is now a broad scientific consensus that global climate is changing in ways that are likely to have a profound impact on human society and the natural environment over the coming decades. Frequent extreme weather events and record wet spells, such as the autumn/winter 2000/01 UK floods and summer 2002 European (Elbe) flooding, have created public concern that such events are increasing, possibly due to global warming. Climate model integrations predict increases in the frequency and intensity of heavy rainfall worldwide, but large uncertainties surround the likely regional distribution of change and impacts on spatial-temporal rainfall patterns.

Here, we produce probabilistic climate change scenarios for future predictions of change in UK extreme rainfall patterns using results from six regional climate models (RCMs) from the PRUDENCE set of experiments. The selection of models encompasses two different driving Global Climate Models and four different RCMs, thus maximizing the uncertainty range of response. The analysis was performed using a statistical technique, Regional Frequency Analysis, and annual maxima of 1- and 10-day rainfall totals. The Generalized Extreme Value (GEV) distribution was fitted using the method of L-moments to define extremes with given return periods. In this paper, we estimate the rainfall amounts associated with 5- and 25-year return periods for the RCM control integration, 1961-90, and compare these to estimates using observations. We then estimate the size of future change in extreme rainfall for the SRES A2 2071-2100 scenario, the uncertainty in the estimates and the role of RCM and GCM selection in that uncertainty. A method is then developed to use results from multiple models to produce probabilistic estimates of change in extremes. This will

be presented and the results for different UK regions discussed.