"The importance of sampling multi-decadal variability when assessing impacts of extreme precipitation"

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Robust estimates of the magnitude and return period of local precipitation extremes are essential for assessing levels of vulnerability to climate variability and climate change. Using a statistical analysis of a three-member ensemble climate projection experiment to account for the full spectrum of climate variability, I will demonstrate that annual to multi-decadal natural variability can influence significantly the extent to which clear climate change signals can be identified. For example, in this ensemble projection the ability to quantify extreme precipitation changes at the grid-box level to a reasonable accuracy is largely limited to regions in northern Europe.

These findings imply that a detailed knowledge of the effects of variability on all time-scales on the statistics of a climate parameter of interest is required before making confident statements about changes in the parameter. In the context of the example presented, this means that it may be many decades before a clear climate change signal in extreme precipitation is seen. This does not meant that current understanding of vulnerability to extreme precipitation, which is often based on data records which do not sample multi-decadal variability well (or at all), can be used to inform decisions over these coming decades. For this one needs observations,or reconstructions, of the climate at the centennial time-scale such as provided by the 20th Century Reanalysis. Finally, I will discuss plans for how this historical reanalysis could be used with the Hadley Centre regional climate modelling system PRECIS to provide the ability to develop such centennial-scale high resolution climate reconstructions for any region of the globe.