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A stochastic bias correction approach for precipitation

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Abstract

Extreme precipitation is a major hazard, which can cause serious implications to the environment and economy. In order to assess the potential impacts of future changes in extreme precipitation, high resolution projections of precipitation variability are necessary. Regional Climate Models (RCMs) are often used to dynamically downscale precipitation to grid scale level however, these simulations are systematically biased and should not be directly applied. Furthermore, because RCMs produces grid box averages, they are unable to explain precipitation variability at point scales, which is often used as input for climate impact models. To address this, bias correction is often used. Here, we introduce a new concept that includes bias correction and downscaling to point scales by explicitly including stochastic noise to model point scale precipitation variability. This new concept is demonstrated using data from the United Kingdom, and also employs the mixture distribution model (Vrac et. al., 2007) to model both the bulk and extreme tails of the precipitation, and the vector generalised linear model (VGLM) to include modelled precipitation from the RCM as predictor. Results from this study will be assessed against those from commonly used statistical downscaling models of a probabilistic nature, using suitable validation measures, with particular attention to extreme precipitation events.