



Addressing climate model uncertainty in stochastic downscaling applications for hydrology

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Downscaling techniques are widely used to convert the outputs from gridded numerical climate models to the temporal and spatial scales required for hydrological applications. Increasingly, however, it is being recognized that projections of future climate can differ widely between climate models. It is therefore necessary to account for climate model uncertainty in any downscaling exercise. Here we suggest that a hierarchical statistical model, implemented in a Bayesian framework, provides a logically coherent and interpretable way to think about climate model uncertainty in general, which can be applied to downscaling studies in particular. The ideas are illustrated by considering the generation of future daily rainfall sequences at a single location in the UK, based on the outputs of four different climate models under the SRES A2 emissions scenario. The technique could in principle be used in conjunction with any appropriate stochastic downscaling method; in our application, the downscaling is based on Generalised Linear Models for daily rainfall.