A copula-based approach for downscaling rainfall fields

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Proper precipitation forcing is paramount to hydrological modelling. However, the available observations often do not meet the scale requirements of the model. To mitigate this, many authors have attempted to use downscaling techniques. These techniques often assume that the field at a scale smaller than the observed pixels follows a scaled distribution of the coarse scale field. If this assumption is incorrect, the estimated reliability of the model output is likely to be wrong as well. In this presentation we show that although this assumption is correct if the entire field is considered, it is not valid for the distribution of the rainfall field within a single pixel. It is found that the scaling behaviour is a function of the intensity of the rainfall field. In order to model the subpixel variability, a copula-based methodology was developed which outperforms the classical approaches.