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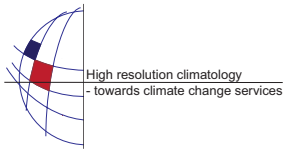

Downscaling Precipitation Extremes: Correction of Analog Models through PDF Predictions

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A new method for predicting the upper tail of the precipitation distribution, based on empirical-statistical downscaling, is explored. The proposed downscaling method involves a re-calibration of the results from an analog model to ensure that the results have a realistic statistical distribution. A comparison between new results and those from a traditional analog model, suggests that the new method predicts higher probabilities for heavy precipitation events in the future, except for the most extreme percentiles for which sampling fluctuations give rise to high uncertainties.

The proposed method is applied to the 24-hr precipitation from Oslo, Norway, and validated through a comparison between modelled and observed percentiles. It is shown that the method yields a good approximate description of both the statistical distribution of the wet-day precipitation amount and the chronology of precipitation events. Substantial random statistical fluctuations in the few observations that make up the extreme upper tail implies that modelling of these is extreme difficult, however.

An additional analysis is carried comparing the use of extended EOFs as input, instead of ordinary empirical orthogonal functions (EOFs). The results were in general similar, however, extended EOFs give greater persistence for 1-day lags.

Predictions of the probability distribution function for the Oslo precipitation indicate that future precipitation amount associated with the upper percentiles increase faster than for the lower percentiles. An extrapolation scheme is proposed for describing the trends associated with the most extreme percentiles, assuming an upper physical bound where the trend is defined as zero, a gradual variation in the trend magnitude, and a function with a simple shape.