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Estimation of point precipitation statistics from RCM output

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For climate change impact assessment on local/urban hydrological processes, there is a need for new approaches to estimate the expected changes in the precipitation pattern on local (single gauge) scales. To date, such estimation generally involves some processing of precipitation output from a (global or regional) climate model. A main obstacle, however, is the mismatch in resolution between the RCM grid (typically $\tilde{5}$0x50 km) and the point scale of a single gauge. This gap makes time series from a grid box, representing spatially averaged precipitation, fundamentally different from a point series in all important aspects (e.g. wet/dry fractions, event structure and not least extremes). A related issue concerns the fact that precipitation is generated by two main, and fundamentally different, mechanisms: the passage of large-scale, frontal systems and the generation of small-scale, local convection. In this study, we explore the possibility to use various indicators of the weather situation calculated in the RCM, mainly precipitation components (large-scale/convective) and cloud cover variables, to stochastically simulate realisations of precipitation time series in an arbitrary point inside a grid box. The main focus is the reproduction of point precipitation extremes as represented by Intensity-Duration-Frequency curves. The stochastic scheme has been calibrated to reproduce observed IDF curves in Stockholm City for present climate with reasonable accuracy. Application of the calibrated scheme to future periods indicate a future increase in point precipitation extremes.