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Hydrology and Earth System Sciences Discussions

Interactive comment on "Prediction of monsoon rainfall for a mesoscale Indian catchment based on stochastical downscaling and objective circulation patterns" *by* E. Zehe et al.

E. Zehe et al.

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First we want to thank the Reviewer Dr. Harald Kunstmann for his thoughtful and constructive comments, which we addressed in detail below:

Reviewer: I am not sure, if "prediction of monsoon rainfall" as stated in the title is really what the article is about. The paper deals with downscaling of global meteorological fields (reanalyses). "Prediction" usually is seen in the sense of "forecasting" and would mean: GCM analyses (pressure levels, SST, etc.) days, weeks or months in advance are used to predict rainfall later on (short term or seasonal prediction). However, this is not captured and addressed in the article. To my opinion, the article is more about describing mesoscale or station rainfall on base of large scale features. But this is not what "prediction" (in the sense of forecasting) is about. If I am correct, you make think about a new title which fits better to the work presented. Response: We see the

point. However, we meant predictions not in the sense of forecasting but in the sense of extrapolating outside the calibration period of the model. We will change the title of the new manuscript to something less misleading

Reviewer: Albeit the references to previous papers dealing with the same methodology are given, I have the impression that readers would somehow appreciate a brief tour through the basis steps of the methodology of the stochastic rainfall simulation. To my opinion, 2.1.2 could have the same extent as 2.1.1. That would bring more transparency into the methodology. Response: We will add a more detailed description of the stochastic rainfall model in the revised manuscript.

Reviewer: What is the impact of the number of realizations (n=30, section 3.2.3) chosen for the stochastic weather generator. Did you check for convergence of moments? It might be that your results change significantly if you apply 50 or 100 realizations. It even might be that the increase of n helps in reproducing the extreme values. Response: It is true that increasing the number of realisations could help in capturing the extremes. We used 30 replicas/realisations of generated rainfall serious to compute the expectation of daily/ monthly rainfall totals. Please note that all the realisations are based on the same CP input time series (which is deterministic), within each generation each day has the same CP-specific rainfall probability and amount, as the CP does not change! We therefore think that 30 realisations give a reasonable estimate of the expectation of daily and especially monthly rainfall. Estimation variance of the mean is app 1/5 of the variance of the daily/monthly rainfall amounts. Nevertheless we will generate 100 realisations and compare the differences.

Reviewer: Figure 8: it seems that annual or seasonal rainfall is plotted instead of monthly, as the years 1963-1994 are indicated and every year has one data point (but this is not clearly visible). Axes, however, are indicated as “months”. Please correct and clarify what is plotted. Additionally, please highlight calibration period and validation period. Response: The figure will be corrected as recommended.

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Reviewer: Figure 8 & section 3.2.3: The quality/performance of the downscaling should be discussed and analysed behind the following background: monthly rainfall above/below the mean value should be reproduced/simulated also above/below this mean. For example: at Thandla, in the year 87, comparatively high precipitation was observed, but the downscaling produced very little. This raises the question: if you assume a “trivial” downscaling which simulates every month/year the mean value, is your statistical downscaling “predicting” better or worse? I therefore suggest to choose a different figure, showing the deviation of observed and “predicted” monthly/seasonal rainfall. Response: The figure will be corrected as recommended.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 1961, 2005.