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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Effects of record length and resolution on the derived distribution of annual precipitation" *by* C. I. Meier et al.

G. Blöschl (Referee)

bloeschl@hydro.tuwien.ac.at

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The derived distribution approach (DDA) that estimates the annual rainfall distribution assisted by subannual rainfall information (Eagleson, 1978) is tested for two rainfall stations. Resampling with shortened records indicates that the DDA gives a smaller variability between subsamples in terms of mean and standard deviation than the direct estimation of the moments.

The paper is very well written and the method is interesting. It should be noted, however, (and acknowledged in the paper) that the variability between samples the authors use as a proxy of uncertainty is actually a conditional probability - conditional on the applicability of the assumptions of the rainfall model. These assumptions provide struc-

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ture and therefore reduce the degrees of freedom of the estimation (similar to fitting a distribution with fewer parameters), hence the finding of the reduced uncertainty. Similar to any parameterisation, this reduction in uncertainty is real if the assumptions apply, but spurious if they don't.

The difficulty with the resampling is that it does not test the applicability of these assumptions. Maybe this is beyond the scope of the paper, but a more comprehensive test would be to use, say, only 3 years of data from each of a large number of stations and test the DDA estimates against the respective long records. This would constitute a full blind testing. I am not sure whether the same reduction in uncertainty would result from such a comprehensive testing. For example, I cannot see how long range dependence is captured in the DDA. Long range dependence is surely important in many parts of the world and makes drought and wet periods more persistent than a random sequence. There is a substantial literature on this which is relevant to the paper.

So, overall, based on the evidence shown in the paper I would be hesitant to conclude "that the DDA, in combination with high resolution gauging, provides more accurate and less uncertain estimates of long-term precipitation statistics such as interannual variability and quantiles of annual precipitation with high return periods even for records as short as 5 years." (p. 12988). I do not think this has been demonstrated in the paper and I can't see why this would be possible, given that long term climate processes (involving, eg., ocean dynamics) are quite different from shorter term processes. A more subtle statement acknowledging the assumptions would therefore be more appropriate. Alternatively, the authors may choose to provide a full blind testing on a large number of stations.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 12987, 2015.