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Natural Hazards and Earth System Sciences Discussions



# *Interactive comment on* "Effects of sample size on estimation of rainfall extremes at high temperatures" *by* Berry Boessenkool et al.

**Anonymous Referee #1**

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Journal: NHESS Title: Effects of sample size on estimation of rainfall extremes at high temperatures Author(s): B. Boessenkool et al. MS No.: nhess-2016-183 MS Type: Research article

General comments:

This paper examines the effect of sample size on the extreme precipitation-temperature relationship, often referred to as the precipitation scaling. Extreme precipitation generally increases with temperature but in some regions of the world, a reversal in the scaling is observed at higher temperatures. This reversal is generally attributed to the lack of moisture availability. Here, authors show that this reversal may also arise from a simple statistical artifact. Indeed, precipitation events at higher temperature are generally convective in nature and very localized in space (and thus often missed by the



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Discussion paper

observing network), resulting in smaller sample sizes compared to large-scale precipitation at lower temperatures. Authors suggest that the use of parametric quantiles (instead of empirical quantiles) to estimate precipitation extremes at higher temperatures may overcome this statistical limitation. The paper is of interest.

However, my main concern is the use of the weighted average of distributions in quantile estimation. I don't see why quantile should be estimated from an average of distributions that have, as authors acknowledge, inherent structural differences. Moreover, differences in quantile estimates were found for different software packages. It seems that the main conclusions of the paper rely heavily on the choice of distributions, the choice of software packages and the choice of method to estimate distribution parameters.

Figure 8 (right panel): The spread in parametric quantile across stations at temperature >20°C is surprising. Empirical quantile on the left panel suggest that the scaling is relatively homogeneous across stations at both low and high temperatures. The high spread in parametric quantile at T>20°C seems suspicious and unrealistic (~200 mm/hour!).

Technical corrections:

Figure 3: I would show only the 99 or 99.9 percentiles for clarity. Authors do not provide any explanation for the behavior of the weighted distributions for a truncation proportion around 0.1. Also, "other" distributions should also be removed from the figure as they make the plot very busy and are not commented in the text.

I think authors should replace the term "quantile" by "percentile" throughout the text. For instance, 99.9 quantile should read 99.9 percentile.

Section 2 Empirical quantile estimation. Line 29: super-CC should be defined

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