Hydrology and Earth System Sciences Discussions

Interactive comment on "The within-day behaviour of 6 minute rainfall intensity in Australia" *by* A. W. Western et al.

A. W. Western et al.

a.western@unimelb.edu.au

We thank the referee for their thoughtful comments on our paper and respond to each in turn as follows.

Referee 1: I only have some minor comments: Page 3190, line 7: I find the term "efficiency of prediction" a bit confusing, since it is not a real prediction of rainfall (no numerical weather prediction has been performed).

To improve clarity we have amended this sentence to read as follows: "Two goodness-of-fit statistics are reported: the Root Mean Square Error (RMSE) between the fitted and observed within-day distribution; and the coefficient of efficiency for the fit to the

C3293

highest rainfall intensities (average intensity of the 5 highest intensity intervals) across all days at a site."

Referee 1: Page 3191, lines 16-18: The distribution of rainfall intensity across a day can also be thought of as simply the intensity versus time, whereas in line 18 "time sequence of intensity" is already mentioned. Could this be clarified?

We have amended this sentence to read as follows: "Point-scale work has shown that, from a water quality/erosion perspective, the probability distribution of rainfall intensity within the day and the total daily volume are of primary importance, while the time sequence of intensity is of secondary value (Van Dijk and Bruijnzeel, 2004; Kandel et al., 2005) reached similar conclusions for events."

Referee 1: Page 3192. Why the well-known maximum-likelihood fitting method has not been used?

We could have used maximum-likelihood for this paper; however, we chose to use other fitting methods. We did use a variety of fitting methods and did not find a large difference between them and thus do not believe that using maximum-likelihood would have significantly changed our results.

Referee 1: Page 3194, line 17: Maybe I missed it, but could you clearly mention the definition of a valid day?

This is defined on Page 3194, line 1 (it is simply a day with a complete pluviograph record); however, our terminology is clearly confusing since two referees asked the same question. We have therefore amended the text in places where "valid day" was used to indicate that we are referring to days with complete record, all of which were analysed.

Referee 1: Page 3196, line 8: I would be appropriate to add references to earlier work about Lmoments. Hosking, J.R.M. and J.R. Wallis 1997: Regional frequency analysis: an approach based on L-moments. Cambridge University Press, Cambridge

Hosking, J.R.M. and J. R. Wallis, and E.F. Wood, 1985: Estimation of the generalized extremevalue distribution by the method of probability-weighted moments. Technometrics, 27, 251-261.

These references have been added.

Referee 1*: Page 3202, line 19: It could be mentioned that a reduction in model parameter can lead to a (considerable) reduction in uncertainty of rainfall intensities*

The following sentence has been added to address this point. "Using one less parameter should lead to less parameter uncertainty and thus a reduction in the uncertainties of the rainfall intensity."

Referee 1*: Could the authors give a short description of the Köppen climate zones?*

This information is provided by adding the following to the caption of Figure 1. "The climate class symbols have the following meanings Aw = tropical, savannah; BWh = arid, dessert, hot; BWk = arid, dessert, cold; BSh = arid, steppe, hot; BSk = arid steppe, cold; Csa = temperate, dry hot summer; Csb = temperate, dry warm summer; Cwa = temperate, dry winter, hot summer; Cfa = temperate, no dry season, hot summer; CFb = temperate, no dry season, warm summer."

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 3189, 2011.

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