

***Interactive comment on “Constraining frequency-magnitude-area relationships for precipitation and flood discharges using radar-derived precipitation estimates: example applications in the Upper and Lower Colorado River Basins, USA” by C. A. Orem and J. D. Pelletier***

**Anonymous Referee #2**

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The paper presents an interesting methodology for the incorporation of recurrence intervals into the determination of Flood Envelope Curves using NEXRAD data. The subject is of interest for the HESS readership and the methodology is in principle sound. However, a number of points prevents publication in my opinion.

The authors make a strong case in the introduction about the need to incorporate

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recurrence intervals to the FEC methodology. However, they do not indicate that to some extent, this has already been done. The work by Castellarin et al. (2005, 2007, 2009), which is mentioned in point 5.2 should be included in the introduction to show the real state of the art. As it is now, the only papers that are mentioned in the intro are more than 10 yrs old and it looks like nobody has done anything on the subject since then. Section 5.2 should be moved to the intro as it also does not belong in the discussion (too general and without any quantitative support). This may require some rewording and a clearer statement about the novelty of the current application.

The methodology has a number of assumptions and simplifications that are not always thoroughly justified or tested. Since the final model results are not really suitable for a validation, more emphasis should be put into the individual components of the methodology to convince the reader of the validity of the results.

Regarding the last point, the selection of runoff coefficients needs a lot more justification. Figure 3 does not do a good job in convincing readers of a sensible methodology. The determination of the wet, dry and intermediate antecedent conditions runoff coefficients does not agree with the data very much, and may question the assumption that such simple separation is meaningful. For example, half of the dry data of Vivoni et al.(2007) is better described by the intermediate curve, and the same goes for half of the intermediate data that falls close to the wet curve. There is also no mention of the antecedent conditions of the Rosenberg et al. 2013 data. I would also argue that the Rosenberg data does not show any dependence of the runoff coefficient with contributing area. This poor agreement with the data is reflected by the low correlation coefficient, particularly for the dry antecedent conditions (0.04). The authors should justify the validity of the runoff coefficients, and also perform a sensitivity analysis. This is particularly important since the uncertainty analysis of 3.4 does not include parameter uncertainty.

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