

Interactive comment on “Statistical analysis of error propagation from radar rainfall to hydrological models” by D. H. Zhu et al.

Anonymous Referee #2

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Manuscript title: Statistical analysis of error propagation from radar rainfall to hydrological models
Authors: D. H. Zhu, D. Z. Peng, and I. D. Cluckie

Review: The authors present an interesting study on the propagation of radar rainfall error into hydrological models. Readers of HESS would benefit from this paper. However, there are several issues that the authors need to address before the paper is accepted for publication (see below).

In page 10282, the authors mentioned that the radar rainfall: ' ... is the best possible estimate of rainfall at the ground in the UK and can be regarded to be the error-free data.' However, this is not accurate. There are a lot of errors in radar rainfall estimations and there are quite a few references about this in the literature. I am not sure why the

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authors made this assumption. Please explain and justify this assumption.

Page 10286, It is not clear why the true rainfall was assumed to be the original radar rainfall. Clearly radar rainfall is uncertain (see above comment) and this assumption is not justified. Please explain. German et al. (2009) developed an approach to generate radar rainfall ensembles by looking at the covariance between radar rainfall and raingauge measurements. In your approach, you are perturbing the radar rainfall fields with a simple bias and random error. Can you use something more realistic such as the approach proposed by German et al (2009) or Ciach et al (2007)?

My recommendation is this: 1- Develop a model for radar errors 2- Perturb the radar rainfall fields using a realistic radar error model 3- Generate ensembles. 4- Use these radar rainfall ensembles in your hydrological models to look at the propagation of this radar rainfall uncertainty in hydrological modelling. 5- Discuss in more detail your results.

Minor comments:

Page 10298. Fig.1. In the upper part of the catchment (upstream from Weir Wood tbr) seems to be a small catchment area that was not included as part of the catchment. why? Page 10299. Figs 2 and 3 are difficult to follow. Please use solid thin lines with different colours to show the results from the different models. Page 10300. Validation is only shown for 4 months (Nov 2006 - Feb 2007). However, in the manuscript you are talking about 18 months for validation. Where are these results? Page 10300. - Y-axis in fig 3 is missing Page 10301 & 10302. X- and Y- Axes in figures 4 and 5 are missing and therefore difficult to follow.

References:

Ciach, G. J., Krajewski, W. F., Villarini, G., 2007. Product-Error-Driven Uncertainty Model for Probabilistic Quantitative Precipitation Estimation with NEXRAD Data. Journal of Hydrometeorology, 8, 1325-1347.

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Germann, U., Berenguer, M., Sempere-Torres, D., Zappa, M., 2009. REAL - Ensemble radar precipitation estimation for hydrology in a mountainous region. *Quarterly Journal of the Royal Meteorological Society*, 135, 445-456.

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