

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

### **Anonymous Referee #1**

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This paper describes a study on error propagation from radar rainfall to three hydrological models. The topic is relevant to the journal remit and should be of interest to the hydrological community. However, the following issues should be addressed or clarified before it could be accepted for publication.

Major issues: P6 L19 ‘...and can be regarded to be the error-free data.’ Weather radar data could have significant errors. Your study is about radar data error propagation. If you assume the radar data are error free, explain how this assumption will affect your study results. P7 L20 ‘Consequently, all the model errors are assumed to be free’, again, this assumption is quite wrong. Again, explain how this assumption will affect your study results. P6 L25, ‘Due to the data availability of radar rainfall, the period from

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July 2006 to December 2007(18 months in total) was selected for radar-based rainfall error propagation analysis.’ However, P9 L15 ‘This process were performed for a 6 months period (from September 2003 to February 2004), using the first 2 months as a warm-up period, and the remaining 4 months were used to evaluate model outputs.’ You mentioned the availability of 18 month data. Why only 6 months here? P11 L1, It is not clear the simulated flow in Eq(4) and (5) are in the calibration data or validation data. Please clarify. P11 L1, Eq(4) expression is not correct (what is the average of the sum of the absolute error?). The numerator should  $\sum(|Q_o - Q_s|)/n$ . Ditto, the same problem also occurs with Eq(5) P11 L6, the error model is problematic: the bias PHI should be additive, not multiplicative. For example, if there is no bias, Phi would be zero, Rp would zero, which is not realistic because there are still random errors. In addition, the random error should be a function of a random number with a certain probabilistic distribution. However, Eq(6) uses a fixed positive number to represent the random error, which is not correct. Also, if bias is to be considered, Eq(4) is incorrect in representing the random noise because the bias should be removed in the calculation. Please clarify those points. P11 L11 The Gaussian distribution is used as the random noise. Since Eq(4) is about absolute error, not variance, how is the variance (or SD) in the Gaussian distribution derived?

Minor issues (mainly grammatical errors or typos): P2 L22 ‘There is a wide range of studies have focused on using weather radars for quantitative ...’ P5 L7, ‘to define and quantitative the...’ -> ‘to define and quantify the’ P5 L25 ‘potential evapotranspiration is around 729mm and 663mm,-> ‘potential evapotranspiration are around 729mm and 663mm,’ P6 L15 ‘Therefore, this high-resolution radar composite rainfall estimates incorporates...’-> ‘Therefore, the high-resolution radar composite rainfall estimates incorporate...’

P7L7 PRTF should use the publically available paper at: ‘Derivation of unit hydrograph using a transfer function approach’, Yang, Z., and D. Han, Water Resources Research, 42, W01501, DOI:10.1029/2005WR004227 , (2006)

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