

***Interactive comment on “Analysis of parameter uncertainty in hydrological modeling using GLUE method: a case study of SWAT model applied to Three Gorges Reservoir Region, China” by Z. Y. Shen et al.***

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Thank you very much for your comment of Oct 24, 2011, informing us of valuable suggestions to improve our manuscript ‘Analysis of parameter uncertainty in hydrological modeling using GLUE method: A case study of SWAT model applied to Three Gorges Reservoir Region, China’ (hess-2011-263). Our point-by-point responses are as follows.

1. Your comment: “Page, 8205, line 15-16. The statement “one way to deal with this issue is to use random variables as the input data, rather than the conventional form of fixed values” should be supported by appropriate references.”

Our respond: a reference “Yulianti, J.S., Lence, B.J., Johnson, G.V., and Takyi, A.K.: Non-point source water quality management under input information uncertainty. J. Environ. Manage., 55, 199-217, 1999.” has been added.

2. Your comment: “Page 8209, line 22-23. The Morris Qualitative Screening Method should be mentioned with appropriate references.”

Our respond: a reference “Morris, M. D. : Factorial sampling plans for preliminary computational experiments, Technometrics, 32, 161-174, 1991.” has been added.

3. Your comment: “ Page 8212, line 22-23. The “high precipitation condition” is not clearly defined.”

Our respond: In TGRA, the most amount of rainfall is observed in May (160.7 mm) and July (153.1 mm), and high precipitation is often referred to from May to September. In the revised manuscript, this period has been clearly defined.

4. Your comment: Page 8213, line 1-10. Suggest rewriting these sentences. In particular, why daily precipitation data might be invalid in TGRA? It is also not clear how many rain gauges are involved in this study.

Our respond: These sentences have been refined as follows: In the Three Gorges Reservoir area, the daily stream flow changes frequently and widely, thus the measured value might not represent the actual value of the daily flow and the discrepancy between the measured mean value and simulated mean value would be high. However, more precise simulated flow would depend on designing accurate rain-gauge networks and less measurement errors (Chang et al., 2007). In addition, rainfall data was collected at ten rainfall gauges in the watershed and nine gauges at sites at approximately 30 km outside the watershed boundary. However, the main objective of

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this study was to identify the degree of uncertainty and uncertainty parameters for prediction of stream flow and sediment in TRGA. A further study is being conducted on determining the impacts of spatial rainfall variability on NPS predictions by changing the number and location of rain stations.

5. Your comment: Page 8215, line 18-19. This finding would contradict the assumption about distributions of parameters (page 8211, line 7-9). Should the sampling strategy be updated accordingly?

Our respond: The model parameters can be divided into the conceptual group and the physical group (Gong et al., 2011). The conceptual parameters such as CN2 could be conceptualized of a non-quantifiable process and usually determined by the process of model calibration. However, presence of multiple peaks in the Nash-Sutcliffe model efficiency for CN2 and ESCO indicated that estimation of these parameters might not be feasible. Thus, instead of the process calibration, a decision regarding modeling could deal with these non-identifiable parameters by setting confidence interval on model output.

6. Your comment: Page 8215, line 24-25. Temperature in TGRA may feature a large variability. The so-called “high temperature” should be associated with a specific time period.

Our respond: The greater uncertainty of ESCO indicated that the soil evaporation probably played a greater role in the whole evaporation process in TGRA. This might be due to the rainy seasons and highest temperature are both in the summer in this region. Therefore, When there were higher ESCO values, the estimated base flow, tile drainage and surface runoff increased, then greater uncertainty in prediction in the TGRA.

Please also note the supplement to this comment:  
<http://www.hydrol-earth-syst-sci-discuss.net/8/C4636/2011/hessd-8-C4636-2011->

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