Hydrology and Earth System Sciences Discussions

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Interactive comment on "Uncertainty in river discharge observations: a quantitative analysis" *by* G. Di Baldassarre and A. Montanari

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We thankfully acknowledge the Reviewer, Hessel Winsemius, for providing very useful comments that will enable us to improve the quality of our study.

The first point raised by the Reviewer deals with the analytical formulation we used to describe the rating curve. Specifically, the Reviewer proposed the use of the power function (Herschy, 1978; Pappenberger et al. 2006), commonly used in hydrometry. Our study used a polynomial function as this is the equation commonly utilised in this test site. Nevertheless, we do agree with the Reviewer. It would be interesting to include additional numerical experiments by using the standard power function. We are currently performing the proposed additional analysis. The results will be discussed in the revised manuscript. In particular, we will compare interpolation and extrapolation

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errors obtained with a polynomial function to the ones obtained with a power function. It is worthwhile to note that a similar comparison, power versus polynomial relationships to construct rating curves, was performed in a completely different context by Yu (2000). Hence, we believe that this additional analysis will definitely improve the value of our study.

The second Reviewer's comment is about the "independence of the errors" assumption. The Reviewer is right: "there may be a great deal of correlation in time in the errors, made in each time step" and "this may cause a previously made error to be compensated for in the near future". Nevertheless, we believe that, in order to obtain a conservative quantification of the uncertainty of the river discharge data, one does need to assume that the errors are independent. The revised manuscript will make this point clearer. Also, the Reviewer raised another interesting point: some errors may be negligible if discharge over time is accumulated. This is definitely right. The uncertainty of flood volume is lower than the uncertainty of river flow. Nevertheless our study focuses on the uncertainty of river discharge data. We will discuss this point in the revised manuscript (see below).

Summarising, we totally agree with the Reviewer: there is still "work to be done". Specifically, according to his suggestions, the revised manuscript will include: 1) additional numerical experiments aimed at evaluating interpolation and extrapolation errors obtained by using a power function as rating curve; 2) a completely new discussion section describing all the assumptions made and the effects of these assumptions on the results; 3) an indication of how the results of our study can be used by hydrological modellers.

Finally, we would like to thank the Reviewer for his minor comments that will be addressed in the revised manuscript. They will definitely improve the quality of the presentation of our study.

ADDITIONAL REFERENCES

Herschy RW, 1978. Accuracy in Hydrometry, R.W. Herschy (Ed.), 353-397, Wiley, New York (NY).

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Yu, B., 2000, A systematic over-estimation of flows. Journal of Hydrology, 233, 258-262.

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