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Hydrology and Earth System Sciences Discussions

Interactive comment on "Gauging the ungauged basin: how many discharge measurements are needed?" *by* J. Seibert and K. Beven

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Comment on the paper by Seibert and Beven

by

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Dear colleagues,

We have read your interesting paper entitled 'Gauging the ungauged basin: how many discharge measurements are needed?' and we wish to discuss here your results in

light of our past work on this topic. We have two main comments:

1. Literature review

In your introduction, you mention that 'there is almost no guidance in the hydrological modelling literature about the worth of measurements in model identification, except for vague suggestions'. We believe that although one cannot say that the literature is full of references, there are several recent works which have tackled this issue:

. In Rojas Serna et al. (2006), we have used at a large worldwide set of 1111 catchments, and looked for a strategy allowing to calibrate the parameters of a hydrological model using a few streamflow measurements, which are combined with a priori knowledge of the parameters. Results show this approach to be much more efficient than classical regionalization studies, as soon as about thirty measurements can be made, at random, during a period of three to five years.

. In Perrin et al. (2007), we have assessed the sensitivity of continuous hydrological models to the quantity of information used during model calibration when it is randomly sampled in the observed hydrograph (i.e., using non continuous calibration periods). A few references therein also deal with the issue of model sensitivity to the information available for calibration.

2. Interpretation of results

Although we agree with most of your analysis, some of your conclusions may deserve more caution, for two reasons:

. You used a quite homogeneous catchment and in that context and you should be aware that this homogeneity might lead to relatively optimistic conclusions on the number of point flow measurements required. Indeed, Perrin et al. (2007) used two daily rainfall-runoff models and a set of 12 US basins. Some of these basins were dry, and showed a much higher data requirement to reach stable and robust parameter values. And out of the two models used, Perrin et al. (2007) showed that the more parsimo-

nious model required fewer calibration data.

. It is a very good idea to look whether high flows are more informative than low flows. We did also identify a higher informative value of high flows (Rojas-Serna, 2005). But you should mention that the figures that you present in Fig. 6 and 7 represent the upper limit of what can be reached: in an operational perspective, the decision on whether to send a gaging crew on a given day will not be based on the knowledge of the discharge, but on an estimate of it, and this can only reduce the efficiency of the method. Last, you should also discuss the potential impact of the objective function you have used (i.e. would a calibration on the RMSE of log-transformed flows change your conclusion?).

References

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