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Hydrology and Earth System Sciences Discussions

Interactive comment on "Assessment of the indirect calibration of a rainfall-runoff model for ungauged catchments in Flanders" *by* N. De Vleeschouwer and V. R. N. Pauwels

Anonymous Referee #2

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This paper applies an indirect calibration strategy for 6 catchments in Flanders. The main objective is to illustrate how model parameters can be estimated in ungauged conditions. The Authors present the case of "spatial gauging divergence", where catchment discharge is estimated based on available discharge from a donor catchment, and "temporal gauging divergence", where forcing data and discharge data are non-concomitant.

Overall I am very positive about this paper. The analysis is well constructed in terms of hypotheses, objectives and methodology. I also think that although there is previous research on this subject, and this work applies many of the concepts expressed

by Pouwels and Lannoy (WRR, 2011), this paper appears to be quite solid, and will represent an important reference on the subject. However there are some issues that require careful attention.

1. The case of "spatial gauging divergence" has been largely researched, with previous work from many Authors, including Bardossy, Andreassian, Bloeschl, etc. There is not much reference to previous work on this. As a result, it is difficult to estimate the contribution of this paper on this particular aspect.

2. The case of "temporal gauging divercence" received much less attention in the literature, and I think the most interesting part of the paper is in its contribution to this topic. I may suggest the paper of Vogel and Sankarasubramanian (WRR, 2003), which may be included in the reference list.

3. I find the exposition of optimization algorithms not appropriate for the introduction section, and not a distinctive characteristics of direct calibration approaches. As I said, the intro should expand on something else.

4. The equations seem to be correct. I found some strangeness about the units. For example, paragraph 3, precipitation, discharge and other fluxes should have units (L/T). There is also inconsistence between the fluxes in the model equations (L), and those in Equations 10, 11, 12, 13, . . ., which are in (L3/T). This should be corrected.

5. I think a weakness of the paper is to estimate model performance only based on aggregate metrics, while it would be useful to analyse model performance also in terms of signatures aimed at characterizing specific aspects of the hydrograph. For example, how good are different calibration approaches in capturing recessions, time to peak, etc., why some aspects (e.g. timing) are poorly represented, and what can be done to improve them?

6. Knowing the Authors' passion for artificial experiments, I wonder if an artificial experiment on temporal divergence would make sense in this paper. The PDM model

could be used to generate discharge time series, which would then be used for indirect calibration.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 103, 2013.