Hydrology and
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Discussions

Interactive comment on "The importance of topography controlled sub-grid process heterogeneity in distributed hydrological models" *by* R. C. Nijzink et al.

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Received and published: 17 February 2016

This manuscript presents an interesting work to evaluate the potential merits of explicit representation of sub-grid process heterogeneity into a distributed hydrological model mHM. The sub-grid process heterogeneity is represented by classifying landscape into wetland, hillslope, and plateau by following the authors' previous work. Also, the calibration strategy by using expert knowledge is utilised to improve the model performance. The methodology is tested in 7 middle-size basins across Europe. The results show moderate degree of improvement by incorporating sub-grid heterogeneity and similar improvement by the new calibration method constrained by expert knowl-

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edge. Generally speaking, this is a valuable study in the hydrological modelling which provides new insights and understanding about our capacity to improve the model performance by allowing more complex description of real processes. I recommended its publication on the Hydrology and Earth System Sciences. Some detail comments are listed for reference.

1) I noticed that the improvement of mHM with semi-quantitative constraints improves a little bit when incorporating the additional sub-grid heterogeneity. The authors are often anticipated to improve the performance by comparing to the known 'best' one (not the worst one). More explanations and discussions are preferable here.

2) As the authors test two things, sub-grid heterogeneity representation and expert knowledge based calibration methodology, in this paper, the title of the paper should also reflect the two things.

3) P13303, the last sentence: on the catchment scale âĂŤ> at the catchment scale.

4) P13305 L7-10: the authors state that the distribution function for maximum unsaturated storage capacities are originally defined in the VIC-model. In my mind this is not true. I suggest the authors refer to Xinanjiang model developed by Zhao (1992, on JoH, 135: 371-381).

5) The same place with 4): For the Representative Elementary Watershed approach and its closure problem, there is quite a few new publications after Reggiani et al. (1998). I suggest the authors to cite the news as well to reflect the recent advance.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 13301, 2015.