Hydrol. Earth Syst. Sci. Discuss., 8, C4203–C4204, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C4203/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Comparison of hydrological model structures based on recession and low flow simulations" *by* M. Staudinger et al.

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Received and published: 26 September 2011

We appreciate the reviewer's comments and especially the list of where clarifications are needed. We briefly reply here to the major comments and suggest where we will include more extensive clarifications in the revised manuscript. All minor editorial comments will be addressed within the revision.

The reviewer criticized that snow modules were not included into the FUSE concept, and that there is one choice only of the snow algorithm. Snow is in fact important in the modeled catchment but to make the study manageable we decided to focus on the impact of methods used to represent groundwater storage and release behavior. This is similar to the approach that had also been used in the original FUSE model (Clark et

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al, 2008). The hydrological model does not impact the snow model results (the output from the snow model is used as input to the hydrological model), so uncertainty in the snow model can be considered as uncertainty in model input. As the parameters still might interact with other routines we suggest to amend the discussion by a section on processes that were not included in FUSE like snow processes and other than the reservoir concepts used in the study.

In the study region, snow cover is permanent during the winter season, i.e. in general there are no mid-winter melt periods and the seasonality with a spring snowmelt period is strong and stable. Hence, winter recessions will be due to groundwater drainage only. During the study period there were only 'cold winters'. Winter was hence defined as the time from October 15, when precipitation generally begins to fall as snow in this area, to June 15, which is usually towards the end of the snowmelt period. We will clarify this in the manuscript.

There are many different ways of selecting recession limbs of hydrographs. In principle consecutive days of decreasing streamflow are selected. Rainfall was not particularly considered. For the recession analysis in this paper we followed the method of Brusaert and Nieber modified by a flexible time step by Palmroth et al. as cited on page 6844 lines 10-15. As we directly followed the methods described in accessible literature, we do not think that more details are necessary. The alternative, i.e. to repeat the equations from Palmroth(2011) may be for the editor to decide.

FUSE has not been applied widely yet, but as some time has passed since we wrote the introduction, it is certainly good to update and complement the introduction with relevant studies using FUSE and other approaches (see also other reviewers' requests for an extended review). This will be done in the revised version.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 6833, 2011.