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Hydrology and Earth System Sciences Discussions

Interactive comment on "On the importance of appropriate rain-gauge catch correction for hydrological modelling at mid to high latitudes" *by* S. Stisen et al.

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This is an interesting study on the importance of corrections of precipitation measurements for hydrological modelling. Often this issue i not addressed in any detail but the assumption is, that these measurement errors are implicitly correted in the calibration of a hydrological model. Therefore, it is then assumed that rough corrections are enouh or that corrections are not needed at all. This study demonstrates, that these often-used approaches might not be appropriate and that we should spend more efforts in better correcting measurement erros. The recommendation, which follows from this study, namely that national weather services should provide (also) corrected precipita-

tion data, seems important. Below I list a number of comments which I hope will help to further improve this valuable study. Some of the comments would require additional computations. While I am aware that such a request is seldomly appreciated, I feel that these additional test would be highly valuable to make this study even more useful.

Methods :

1) Please describe the corretion methods better. On pages 3611/12 it remains, for instance, unclear where the snow fraction parameter alpha comes from, what the reference height for wind speed is, and how and over which time the different variables are aggregated (daily, hourly, only during rainfall ? Weighted for rainfall amounts ? ....). Please also clarify on which data the empirical factors are based.

2) While the simplifications on page 3613 sound reasonable, I would like to see some more motivations/justifications on these different simplifying decisions. I am sure you spend a lot of thinking about these decisions, but as this part reads now it sounds a bit ad hoc.

Modeling

3) Much could be discussed about whether the SHE model actually can, or should, be calibrated and whether the 'reduced SHE model' with a limited number of free parameters and spatially uniform parameter values of large regions actually is more physically-based than more conceptual models would be. This means also that the parameters might not be that 'physicl' after all and the unrealistic root depth could also be an effect of compensating other structural model errors.

As interesting as such a discussion could be, I don't think it is needed here in its full length, but I would recommend to mention these issues at least and to refer to previous discussions on these issues (e.g. the classic Refsgaard-Beven discussion). Please also discuss how your results potentially might be affected by the type of model you were using. Would you expect the results to be similar or different (in which aspects) if

you had been using a more conceptual or lumped model approach ?

4) The focus in the modelling is much on subsurface processes. One could argue that above-surface processes are more directly related to the way precipitation data has been corrected. I would expect that interception parameters would also be found to be related to the correction method, if they had been calibrated. Keeping the subsurface parameters fixed and calibrating parameters related to the vegetation, thus, would be a valuable additional test.

5) The NSE values are quite low for a number of catchments (Fig 8). Especially when one considers that the model has been calibrated NSE values below 0.5 seem to indicate some problems with the data. Could you comment on this ? Would it be reasonable to exclude catchments, where the calibrated modl gives low NSE values from the further analyses ?

Analyses

6) There is a minor difference in the total amounts of precipitation in the two correction methods and this is used to explain the differences in model performance and parameter values. However, I would think that the better temporal distribution is at least as important, if not much mor. I would therefore like to suggest another test which might be provide useful information on this issue. To focus on the temporal aspects you could scale the constant correction in a way so that the total precip amount corresponds to the 'dynamical' corrected one on (1) an annual basis or (2) long-term mean monthly (seasonal) values. Using these two constant, but scaled corrected precip series you could distinguish between the effects of the general differences in precip (water balance effects) and the effects of the temporal distribution.

Further comments:

Title: as there is a large focus on solid precipitation I recommend to change rain-gauge to precipitation-gauge (also in the text the terms rain and precipitation should be used

more consequently)

Instead of the term 'dynamic correction factors' something like 'time-variant correction factors' would be better, not sure what is meant by dynamic (more than variable). Also the term 'dynamic precipitation' in figure 3 is a bit vague, please always be clear that you refer to the correction method.

Avoid variable names like CF, which might be understood as C times F

As it is now, both results and discussion is mixed in the results section. I would recommend to separate the two clearly into two sections.

The issue of precipitation correction obviously has been addressed for a long time (although not so much more recently), and it might be appropriate to refer some more of this work such as the detailed studies by Boris Sevruk.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 3607, 2012.