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Hydrology and Earth System Sciences Discussions

Interactive comment on "Inter-comparison of two land-surface schemes applied on different scales and their feedbacks while coupled with a regional climate model" *by* F. Zabel et al.

Anonymous Referee #1

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Summary: This paper attempts to compare 2 land surface schemes, coupled with an RCM. This is a very important topic, as LSMs or LSSs are in need of constant evaluation/inter-comparison. However, after reading the paper, it is clear that there are major fundamental issues with the methodology used by the authors.

Major comments: 1. The NOAH LSM/LSS is an integral part of MM5, as stated by the authors themselves. Hence, when taking MM5 output and using this to drive PROMET, the authors are invariably "mixing" two LSMs. This is a fundamental problem with this paper (which aims to compare the two LSMs). In order to compare two LSMs/LSSs,

they simply cannot be mixed. The right method would have been to "hard-code" the PROMET code within MM5, and by-pass NOAH all-together. This would then have enabled a true comparisons betwen PROMET and NOAH as LSMs, which as i understand, is the aim of the paper, as implied by the title. Additionally, Figure 1 is VERY misleading to the reader, as it seems to imply that MM5 and NOAH are separate, when in fact, NOAH LSM is part of MM5, hence "NOAH" needs to be inside the "MM5 box", and not outside and related to MM5 by an arrow. If this is done as i have suggested, it is then clear that NOAH is being mixed with PROMET.

2. In order to compare two LSMs, and make any useful conclusions, the output MUST be compared against observations, and this paper does not use any observations. The authors point out differences between the two LSMs, but this does not really provide valuable information. Sure enough, PROMET uses higher resolution input land-use data-sets and DEM etc, and hence provides more local detail. But this does NOT mean that PROMET is better than NOAH.

3. The authors then proceed to take PROMET fluxes back into MM5 which is using NOAH, via some scaling software. I do not see the logical reason behind this. They are mixing two fundamentally different LSMs again. What does does the output from this process really mean? Especially when the results are NOT related to any observations.

4. The authors either need to "hard-code" PROMET into MM5, and bypass NOAH (which i suspect is not possible), or fundamentally change the aims, title, and structure of the paper, to better reflect what is actually being carried out by the authors. The paper in its current form, is NOT making a fair comparison between two LSMs. It is simply taking met output from an RCM, and using that to drive a hydrological model (PROMET). This is fine in its own right, as long as the authors do not claim to be comparing two LSMs. I suggest that the authors do NOT take PROMET surface flux output back into MM5, as this is then using NOAH. What is the logic here?

Minor comments:

There are several typos etc which need fixing, provided the comments above are addressed. Here are some examples, i did not try to find each and every typo: 1. abstract, line 4, replace "in sufficient" with "at sufficient". 2. page 7093, line 18, replace " modelling area" with "domain". 3. page 7093, line 19, replace "of each model grid" with "at each model grid". 4. page 7093, What is PILPS, what does it stand for? 5. page 7094, line 22, replace "RCMs become" with "RCMs have become". 6. Equations are NOT referred to in the text, eg, Eq 1. 7. page 7101, line 21, replace "in (Mauser ..) " with "in Mauser and Bach (2009)". There are MANY instances where this mistake has been done. Please read carefully. 8. I stopped looking for such minor errors after a while, as the authors need to address the more important fundamental issues. 9. color bar scaling on graphs in very small and almost impossible to see clearly. Graphs need much bigger font.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 7091, 2011.