

## ***Interactive comment on “Land-surface modelling in hydrological perspective” by J. Overgaard et al.***

### **Anonymous Referee #4**

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In my opinion, the multidisciplinary perspective illustrated by Overgaard et al. should be of interest for Biogeosciences journal. Therefore I support its publication after a responsible revision.

General comments: Clearly, the paper by Overgaard and co-authors is a general review of state-of-the-art of LS models. I am not an expert on LS models and Remote sensing. Therefore I can not evaluate rigorously the sections 2 and 3. In any case, I really appreciated the synthesis elaborated in sections these sections. The text appeared addressed to hydrologists and attempts to persuade this community that LS models might be an interesting tool to study the lateral and vertical water movements in catchments and advocate to couple the LSM approach with the hydrological modelling (HM). For a neophyte, this approach appeared an interesting idea, and the Introduction of the manuscript induced the reader to believe that authors will analyse in much more detail this idea. However, most of the paper is devoted to review the LS models rather than to analyse how to couple these two different approaches. In more detail, in section “4”

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the authors focused their attention on vertical water and energy fluxes and feedback at the land-atmosphere interface and stated that the distributed hydrological models treat climate and atmosphere in a simplistic way. I think that reader (i.e. a poor hydrologist) might appreciate a concrete example (with a figure perhaps). Authors cited the Overgaard's PhD. An example from this work might be useful to understand "where" and "how" the hydrological approach fails and how the LS approach might contribute to integrate the land-atmosphere feedback into the HM and therefore to improve the hydrological scenario simulations. I miss, in this section, the mention of the work by Graham and Bergstrom (2000, HESS, 4(1): 13-22). Certainly, this paper might be a very useful start point for section 4 because it is focused on the same topic and attempt to analyse the differences between hydrological and meteorological approaches and to conciliate these two "culture".

In my opinion, the "Future perspective" section does not really provide any new information, and the idea to link the two approaches is repeated with reiteration. In addition, the concept of "hydrological scales" is unclear for me: temporal scales, or spatial scales, or both?.....Furthermore, I invite the authors to be more audacious and, to suggest "how" to couple the two approaches rather than to catalogue the benefits that might provide the hypothetic synthetic approach. Does the HMs approach should incorporate the LS one or vice versa? Does the HMs should incorporate (or eliminate) some additional (or redundant) variable(s)? Which ones? Does exist some potential conflict related to the scale that might undermine the coupling between HM and LS approaches? With respect to the pioneering work by Graham and Bergstrom, how the approximation toward a hybrid hydro-atmospheric approach is evolved (for instance Graham and Bergstrom did not mention the feedback mechanisms between land-surface and atmosphere)? Does exist a real need to generate the hybrid approach?

Specific (few) comments: Pag. 1831 eq. 3: What does "ra" mean? Check potential confusion between "Tr" (in the text) and "Ta" (in the formula). Pag. 1818 (lines 10-15). This text is repeated at pag. 1837 (lines 20-24). This sentence is extremely interesting

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and in my opinion is appropriate for the Introduction, but it is essential to extend it in section 4 (see General comments). Pag. 1835 (line 9), pag. 1838 (line 21), pag. 1839 (line 2). What does “hydrological scales” mean? Pag 1835 (line 12): eliminate the title of the sub-section “4.1”? (there are not sections 4.2, 4.3 etc) Pag 1835 (line 22): What does “PBL” mean? (Planetary Boundary Layer ?).

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Interactive comment on Biogeosciences Discussions, 2, 1815, 2005.

**BGD**

2, S848–S850, 2005

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