**Hydrology and
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Comment

# *Interactive comment on* "Remotely sensed latent heat fluxes for improving model predictions of soil moisture: a case study" *by* J. M. Schuurmans et al.

**J. M. Schuurmans et al.**

hanneke.schuurmans@dhv.com

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Anonymous Referee #1 RC: This is an interesting paper, which main contribution to me seems to be that satellite ET estimates can be used to diagnose model calibration or structural errors. As such the title is a bit of a misnomer. AC: The referee has a good point in the fact that we are not able to proof our statement of the current title 'improving soil moisture'. We therefore want to change the title into: 'Remotely sensed latent heat fluxes for model error diagnose'.

Main comments: 1. Re the "improving" in the title. This paper focuses on validation and does not in fact improve the model used, rather points out (one?) source of error. Not a problem, butpls rephrase accordingly, also throughout the text. AC: we will rephrase the 'improving'

2. Re "soil moisture" In the title. I found rather little discussion as to whether soil moisture estimates are indeed improved. I would certainly have liked to see that sort of analysis/discussion – can it be added? AC: As stated above we suggest a new title. In the paper we will tell that we focused on soil moisture and discuss why it is difficult to prove that soil moisture estimates improved.

3. I struggled to cross-reference the location acronyms to their characteristics and results. Can you use more insightful site references than 'SZ', 'GD' etc? E.g. with a brief reference to soil or land cover (whichever is most relevant for the interpretation) AC: We will do our best to give better references to the sites in the text and in figure captions. Changing the names in the figures themselves will not be done because too much text in the Figures will make it unreadable.

4. The ET bias correction applied seems very large to me and suggests either of the two estimates is way of the mark. This needs a fair bit more discussion. AC: The referee is right that the bias correction is very large. We think this is due to the fact that the method used in the model underestimates ETact and the remotely sensed ETact overestimates. We will discuss this better in the paper.

Specific comments/suggestions: - Page 6179 / Line 2) "This paper investigates" – papers are inanimate, rephrase AC: in English papers can be personal. But we rephrased it. - 4) delete "aim to" AC: done - 6181 / 7) define "operational" and also "physically-based" (in latter case: as opposed to what?). Same in line 26. AC: will be explained - 24) gifts -> application AC: changed - 28) Better to introduce term "MetaSWAP" in methods? AC: we will tell something more about this model - 6182 / 2) "a" specify – was it the same model? AC: changed - 11-18) could be removed I think AC: we prefer

to keep this paper outline - 22-23) "on laps cover sand" ?? correct sentence pls. AC: should bo onlaps, which is correct. - 6183 / 18-20) "Only..zone" Cryptic sentences, pls explain. Also Equation not Eq AC: we will change this sentence.

- 6185 / 2) Pls specify bands used and source of ASTER and MODIS data (there are many MODIS data sets). Also pls comment on the method and sources of error/uncertainty, these are important for interpretation. AC: In this paper we want to point out the potential of a product that is ready to use in practice but which of course has its shortcomings. The referee has a good point in the fact that we should discuss the sources of error/uncertainty of SEBAL. The more technical background of SEBAL and the bands of ASTER and MODIS used are not within the scope of our paper. - 3-4) Check figure numbers. Also, pls explain how ETpot was calculated. AC: we will do this

- 6186 / 13) "both left and right side" what does this mean? Both measurements of the replicate? Rephrase. AC: rephrased

- 6188 / 9) Introduce ETpot,s , what do subscript s and m stand for? AC: is better explained

- 11) can -> may. Also, pls elaborate, not clear to me why this is the case.

- 16) 2.5-2.74 mm - that seems a pretty massive bias correction to me! Presumably with such a large difference you should be able to assess which is more credible? This definitely needs more discussion. AC: referee is right, we will add more discussion.

- 21) "estimate" not determine. Also, on what basis do you defend this approach? AC: we will change this

- 9) 100 cm seems extraordinary shallow. Pls discuss – may be a source of model error? AC: we will discuss this - 14) There would seem to be some circularity in your approach; you use the same data for validation? Pls discuss. AC: We will discuss this - 6190 / 2) Note that assuming random error probably leads to a conservative (high) estimate of error; there is likely to be a structural component as well. AC: we will

discuss this

- 6191 / 10 (or thereabouts)) around here you should also be able to comment on the degree to which your soil moisture estimates improved compared to the site observations? (noting that the measurement scale discrepancy) AC: we will discuss this

- 6192 / 5) That does not surprise me at all given the seemingly unrealistic rooting depth of 1 m for forest vegetation. AC: Changing the rooting depth however is not a solution in this case. We will discuss this better in the paper.

- 15-26) much too verbose and speculative. I don't think you need to invoke hydraulic lift to explain this, even though it may happen too. Deep water uptake can happen without any hydraulic lift! AC: We think in this section there is room for speculations so we would like to keep these suggestions.

- 6193 / 8-9) "The..model" It seems to me you have only discussed one structural error? Which other ones? AC: the other one is an error in the groundwater flux which is due to the geohydrological parameterization. We will make it more specific in the text.

- 17) proof -> prove AC: oops. Changed

- 18) "this appeared not enough : : :" You state this but did you try? Haven't seen it.. AC: Yes we tried this. Unfortunately we can not put all the work we've done in this paper as it would become to large.

- 6194 / 1-4) Good point. Would extend to "..model calibration or structural error" AC: thank you, good suggestion.

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