

## ***Interactive comment on “Analysis of the linearised observation operator in a soil moisture and temperature analysis scheme” by I. Dharssi et al.***

**I. Dharssi et al.**

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Referee comments are partially repeated in italics. Our reply is in plain text. A revised manuscript is added as a Supplement.

*This paper could fit in the journal SOIL, ...*

*The paper presents a sensitivity analysis of meteorological variables with respect to soil variables. The conclusions are not very surprising, and will also be model specific, .. What do we learn from this work which is helpful for the construction of our data*

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*assimilation experiments?*

The Introduction and Conclusion sections have been significantly revised to make clear the research question and novelty of this work as well as the relevance of the results.

*As it is unclear to me whether the paper contains enough novel material I suggest major revision.*

We have performed a major revision of the manuscript.

*Section 1. The literature review is not adequate. What has already been done in terms of data assimilation experiments with land surface models (e.g., soil moisture assimilation, other papers with T2M assimilation)? What is novel?*

Many additional references have been added to provide a more comprehensive literature overview of the subject.

*Section 3.1, Line 1-11. This is a highly parameterized relation in models and it is unclear to what degree the sensitivity of T2M with respect to soil moisture is realistic. I wonder therefore what is the purpose of a detailed interpretation of Figures like Figure 2?*

Additional material has been added explaining the reasons for assimilating T2M. It is worth analysing figure 2 to understand how different soil and vegetation processes affect the assimilation of T2M.

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*P515, L7: Please refer also to soil literature here. There is a large body of evidence in the soil literature, much earlier than these references in the land surface literature.*

Additional references have been added.

*P515, L10-L12: Cite standard soil physics textbooks. The variations can be much larger. Please rewrite also this sentence indicating that variations can be on the order of many orders of magnitude.*

The text has been revised to show how large the variations can be.

*Figures. The color scales in all figures are not very ideal. I would prefer gradual changes in the maps ranging between blue and red. Now we have nearly identical colors for very low values and medium high values. Please modify everywhere.*

The figures have been revised with a new colour scale that changes gradually.

Please also note the supplement to this comment:

<http://www.soil-discuss.net/2/C457/2015/soild-2-C457-2015-supplement.pdf>

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