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

Anonymous Referee #1

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The authors proposed and analyzed a linearized observation operator in a soil moisture and temperature data assimilation scheme, linking remote sensing data to modeled data. Because I am no expert in data assimilation, I will only comment on the more general topics of the manuscript.

The topic of using remote sensing information for data assimilation in numerical weather prediction is very interesting but I think it is too technical to fit into the scope of SOIL. The manuscript is generally very well written. However, in the introduction a clear statement of the research question or hypothesis is missing, as well as a literature overview and information about the advances and / or differences presented in this manuscript compared to the cited Dharssi et al., 2012. This is essential! The authors stated that soil moisture is highly model specific (506:27), but I do not see, that this is

a consequence of the previous statement, that the information of soil moisture values can be found in the relative values and not in the absolute values. At the end of the introduction, the authors give some examples for indirect measurements that could be propagated from the surface into deeper soil levels, but only give a reference for the fourth example (d). It is necessary to add references for (a) to (c).

At the end of section 3.2 it is stated, that the coupling between SSM and root zone soil moisture is unknown, but increases when increasing the soil hydraulic conductivity. I find this not very surprising, but the question is: is there any evidence from comparison with in situ measurements that this leads to more realistic soil moisture values in deeper soil layers or is this just a technical experiment? Are the used Ks-values comparable to measured ones or is Ks just a calibration parameter?

In general, the manuscript lacks a clear rationale and structure and has more the character of a technical report. I do not give an overall recommendation for the whole manuscript, because I did not comment on the technical aspects, but for the introduction and the structure of the manuscript, I think major revisions are required.

Interactive comment on SOIL Discuss., 2, 505, 2015.