

Dear authors,

According to my understanding, this paper tries to tackle the differences found in satellite remotely sensed L-band radiometry brightness temperature TB and TB from two models, H-TESSEL and ORCHIDEE. The radiative transfer model used for the two models is CMEM. The authors find a good correlation between the temporal evolution of the measured and modelled TB, but inconsistent spatial structures. Using a EOF method, differences between the two methods are analysed, but no main / major candidate can be found to explain these differences.

First of all, I would like to compliment the authors. The paper has significantly improved compared to an earlier version. It is well structured and, although a lot of ground is covered in the paper, I can still follow the structure and logic of the authors. Well done. The conclusion found that no major candidate can be found is an important one, and therefore it makes this an important paper for the scientific community. Recommendations in this paper need to be followed up.

I accept this paper, with minor revisions. There is one structural revisions I think needs to be made. The authors use the EOF analyses often, but they do not explain what the actual method is, what the P1 and P2 and EC coefficient are. For me, that made it extra hard to work myself through the analyses of the results. I think the paper would be significantly improved if a concise explanation of the EOF method would be included, including what the P1, P2 and EC stand for.

All my other comments are minor. Here they are:

**General/structural comments:**

I assume you write in American English, since most of the spelling is as such. Some inconsistencies that I found were:

- 1) It is 'southwest' and 'north' and 'southwestern', etc., not South-West or North. If the area is really called 'the Southwest', then it is with a capital, but that does not apply here.
- 2) Change 'normalise' to 'normalize' in all figure captions.

Some possible explanations were explored in a former paper, a lot in this paper, and some weren't and are recommended. You can understand, that for the reader, that could be a bit confusing.

Please consider making a table with an overview of Possible explanations (column 1) and outcome (column 2)

**Detailed comments:**

Page 1, Line 20: Replace 'latter' by ' the two models'.

Page 2, Line 1: In the conclusion you have a nice sentence about the importance of this research for the scientific community. I think you should put that sentence in the abstract as well.

Page 3, Line 27: 'Schlenz et al', not 'Schlenz el al'

Page 4, Line 3: but also elsewhere in the paper. Please be consistent with past or present tense. Have a think about what you would like to describe in past tense (e.g. former research, and your method) and present tense (e.g. Data). And be consistent.

Page 4, Line 21: Consider replacing by 'a methodology section follows'

Page 4, Line 23: Consider replacing by 'Second, their difference...'

Page 4, Line 23: Consider replacing by 'Third' instead of 'Finally'.

Page 5, Line 3: Consider removing 'As previously said'

Page 5, Line 12 – 21. Because of the mixed past and present tense, it is not clear of this was done in this research, or that the data has already been pre-processed like that before doing this research.

Page 5, Line 22-24: Consider moving above Line 12.

Page 5, Line 27: Consider putting the URL in as a reference.

Page 8. General comment: consider putting headings for ORCHIDEE and H-TESSEL parts.

Page 10, Line 9. It is a bit confusing why you mention 'forecast parameters' here, since you are not using forecasted data at all. Consider rephrasing this to avoid using the word 'forecast'.

Page 11, Line 12: 'Common filters': are these also in Table 3? If not, what are the common filters?

Page 11, Line 19. Explain why you already start filtering from 300 K, when RFI is higher than 1000K.

Page 11, Line 23: It does not explain why the 24 pixels surrounding it were excluded. 24 SMOS pixels cover a large area. Maybe this also confuses me, since the cell/pixel size of the SMOS or model data was not mentioned. Please mention those as well as one in the Data section.

Page 11, Line 27 and further. Consistence in past tense, please.

Page 12, Line 10-21. I would add at least 10-20 more lines on the EOF method, including P1 and P2, since it is such a vital part of the analysis.

Page 14, Line 21. Consider replacing 'is reduced' to 'has decreased'.

Page 15, Line 7-9. Something is missing here, I think the structure of the sentence is wrong.

Page 15, Line 27: 'as revealed'. Consider removing 'as'.

Page 15, Line 27: '(Fig 3 to 5)'. I only see this in Figure 5, not in 3 or 4. And for Figure 5, this is for the whole IP.

Page 15, Line 28: 'we looked at ECMWF mean first guess first departure'. Is this from H-TESSEL, or ERA-Interim, or something else. If something else, this should also be mentioned in the 'Data' section.

Page 16, Line 9: Consider replacing 'to sum up' with 'summarized'.

Page 16, Line 15-23. Past and present tense mixed.

Page 17, Line 27: What do the VC, SD and FW stand for in the underscore?

Page 19, Line 14: 'In winter, ...'. Put a comma here.

Page 19, Line 24: Over the North-Western IP, ....'. Put a comma here. And correct spelling of wind directions (see general comments above).

Page 20, Line 3. 'On the other hand, ...'. Put a comma here.

Page 20 – 22: (same comment as above in general/structural). Some possible explanations were explored in a former paper, a lot in this paper, and some weren't and are recommended. You can understand, that for the reader, that could be a bit confusing. Please consider making a table with an overview of Possible explanations (column 1) and outcome (column 2).

Page 24, Line 3: 'could also be thought of **as** a combination'?

Page 33: Table 3. What is the resolution over which the slope was calculated? I.e., Over what distance?

Page 40, Figure 5: Months are with a capital. Font size is quite small.

Page 41, Figure 6: Is the color scale in K?

Page 42, Figure 42. Consider putting in a legend at the color scale.

Page 43, Figure 8: Months are with a capital. Font size is quite small.

Page 44, Figure 9. Just put the division as  $a/b$ , not  $\frac{a}{b}$

Page 45, Figure 10: Months are with a capital. Font size is quite small. Check spelling of 'South-West' and 'North-West'