

# ***Interactive comment on “Evaluation of ORCHIDEE-MICT simulated soil moisture over China and impacts of different atmospheric forcing data” by Zun Yin et al.***

**Anonymous Referee #2**

Received and published: 23 April 2018

## **OVERVIEW**

The manuscript analyses the capability of different atmospheric forcing datasets in reproducing soil moisture over China through ORCHIDEE-MICT model. Specifically, four atmospheric forcing datasets (GSWP3, PGF, CRU-NCEP, WFDEI) are considered and the corresponding modelled soil moisture data are compared with satellite soil moisture datasets (GLEAM and ESA-CCI) to assess their accuracy. A sensitivity analysis for trying to understand the meteorological variables influencing soil moisture variability

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between datasets is finally carried out.

## GENERAL COMMENTS

The manuscript is well written and clear. The topic is interesting for the readership of HESS as the simulation of soil moisture at continental scale is important to understand the role of this important hydrological variable in governing the land-atmosphere interactions. Therefore, I believe the paper deserves to be published. However, some aspects should be improved, in my opinion, before the publication. I listed below the general comments (in order of appearance in the text) with also their importance.

1) MAJOR: The abstract contains some details that cannot be understood by reading the abstract only (it should be avoided). For instance, median R and RMSE are reported at page 1 - line 9 without mentioning with respect to which dataset they are computed. The reference to SB and LSC metrics is given but the reader is not able to understand what these metrics represent. Why are they used? Similarly for the discrepancies metric. I suggest mentioning in the abstract the results in general terms, without referring to metrics not known to the reader.

2) MINOR: Acronyms and symbols should be specified the first time they appear in the text, please check.

3) MAJOR: The selection of the reference datasets for soil moisture simulations might be questionable. Please try to fix the problem.

a. GLEAM contains several datasets included in the atmospheric forcing datasets. It

is not only ERA-Interim but also GPCC through MSWEP product. Therefore, I expect a large agreement between GLEAM and modelled soil moisture, but it does not mean the soil moisture simulations are accurate, they are simply consistent with GLEAM soil moisture (as I expected). The corresponding results should be clarified and put in perspective.

b. Even though it is a satellite-based dataset (therefore, its accuracy might be not good enough), the use of ESA CCI soil moisture dataset is in my opinion good. However, why only 3 years? I agree with authors that ESA CCI soil moisture product is more accurate after 2007, but for modelling assessment, I would prefer to see a long-term comparison (1980-2017). It is highly needed and to me much more appropriate than using GLEAM.

4) MODERATE: Too many figures, also by considering the Appendix, have been presented in the paper. I would prefer a lower number of more focused figures that would help the reader to understand clearly the main results the authors want to convey. Please try to reduce the length of the paper, mainly the results section.

5) MODERATE: The sensitivity analysis linking soil moisture and meteorological variables seems to me not robust enough for being published on HESS. I might be wrong, but also the authors acknowledge this problem. I suggest removing or, at least, strongly reducing.

## **SPECIFIC COMMENTS**

Page 5, line 3: How is it assessed the quality of ISMN stations? Please clarify.

Page 5, line 17: I would not say “only” 203 stations.

Page 7, line 19: Soil depths are not different in the four datasets. If I am right, please

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remove.

Page 10, line 16: “an traditional” should be “a traditional”.

Page 10, line 20: Why the magnitude of soil moisture is systematically underestimated? Please try to find an explanation.

Page 12, lines 2-3: Again, why changes of precipitation regimes are not enough to predict changes in soil moisture? Please comment.

## RECOMMENDATION

On this basis, I found the topic of the paper relevant and interesting. Therefore, I suggest a moderate revision before the publication in Hydrology and Earth System Sciences.

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