

Review of the manuscript egusphere-2023-1597 Evaluation of root-zone soil moisture products over the Huai river basin by Liu et al.

SUMMARY

I believe that the Authors prepared a comprehensive rebuttal to the comments of the Reviewers and the manuscript has been improved accordingly. Still, I found some issues that merit in my opinion further attention. These issues are described in detail below followed by more specific edits. As soon as the Authors could also improve these parts, I think the manuscript should reach a good quality for possible publication.

MAJOR ISSUES

Irrigation: at L141 it is stated that the main cover types in the HRB are rainfed croplands, followed by irrigated croplands. Later (L143) it is stated that 76% of the cultivated area is irrigated. Finally (L148) it is underlined that heavy irrigation in the HRB can explain the extra water available for evaporation. Based on these statements, I'm still confused by the role of irrigation and its effect on the present intercomparison. I understand that ground soil moisture observations are in rainfed areas. Thus, some LSM that do not consider irrigation can be compared accordingly. However, recently the use of remote sensing products to estimate irrigation has been widely promoted. So, a comparison of the ground measurements to remote sensing products or soil moisture products based on the assimilation of remote sensing into LSM is in my opinion misleading as soon as the area is irrigated and the remote sensing data capture to some extent this signal. I encourage the Authors to further clarify.

Temporal resolution: soil moisture observations are collected at 8:00 am (L154). So, the aggregation to daily average soil moisture products is not consistent (L351 - 352). It would have been better to address the temporal mismatch by, e.g., selecting the consistent hour of the soil moisture products when possible or resampling the ground soil moisture time series. Please at least clarify this issue in the methods and during the discussion.

Homogenous area. The bold statement in the rebuttal (e.g., response to comment 2 of Reviewer #1) about having a homogenous area is arguable also in the light of the data and analysis presented and discussed. E.g., fig 3 shows with gray shaded area the standard deviation of the soil moisture observation which is not negligible in my opinion. Fig 9 e fig 10 shows strong variability of soil properties. Fig S2 and S3 show strong variability of the performance when point-to-grid comparison is performed. In Section 5.5 it is discussed that (L669) results can be interpreted considering the high spatial variability resulting from different characteristics of the underlying surface and meteorological forcing. I encourage the Authors to further clarify. Please also consider moving the results (figure S2) and the discussion (section 5.5) into the results section.

MINOR ISSUES

L18-19. The manuscript does not test the capability of soil moisture products to support drought monitoring and flood forecasting. Thus, the statement "and shows the potential for drought monitoring and flood forecast" is not supported. I would remove it.

L24-27. The sentence is not clear. Please check English grammar.

L165. Average coverage is 38%. Do you mean that for 38% of the area you have at least 1 station per cell? Please clarify.

L332 – 333. Since you have added the section 3.3, I think you can now remove the sentence starting with “The time series...metrics”.

Figures. Some figures (fig. 4-5-6-10-11) are cut in the lower part and labels are not always visible. Please provide new figures.

Fig.10: Please be more precise in the caption legend. what do you mean by “different stations”?, all?

L547. The fact that soil properties are time invariant depends on the spatial and temporal scale of the study. I agree that porosity is considered time-invariant in these LSM but I would consider other examples, e.g., texture.

L748. The 5th statement is not supported by the present study, i.e., you do not have results that support the fact that HWSD will contribute to improve the simulation. It is a hypothesis that should be tested but is also out of scope of the present study. Please reformulate.