

1 Reply to Jianzhi Dong, 03 Mar 2021

We thank Jianzhi Dong for his positive view on the ISMN and the manuscript. Our suggestions to improve the manuscript are given in blue font.

Here is my review for “The International Soil Moisture Network: serving Earth system science for over a decade” by Wouter Dorigo et al. This manuscript provides a comprehensive review of ISMN. ISMN is an important dataset for a range of research topics, and this manuscript is an excellent tutorial of the dataset. Therefore, I would suggest accepting the manuscript after some minor revisions:

1. Figure 2: It is kind of difficult to quickly figure out which part of the world is still having active sensors. Therefore, I would suggest the author to visualizing the information on a global map.

The aim of this plot is to show the period of measurement of the individual networks, therefore we would like to keep the bar plot format. However, we agree that it would be informative for the user to see at a single glance which stations are active and which are not. Therefore, we propose to add a map (either in the main text or supplement, showing the stations stratified into networks that are updated in near-real-time, networks that are updated regularly (up till once per year), networks that are being updated irregularly, and networks that are no longer actively producing data (see revised figure below)..

2. Section 2.2: It is unclear if the sampling volume differences of different sensors are considered in ISMN.

The ISMN does not harmonise for differences in the sampling volume between sensors. To state this more clearly we propose to add the following clarification following line 126: *”Note, that even if all measurements are harmonised in terms of units, differences in sampling volumes related to the sensor design and installation are not accounted for.”*

3. Figure 6: Please clarify if the calculated representativeness error includes the multiplicative and additive biases due to scale mismatch.

The errors computed with the triple collocation analysis are a combination of random measurement errors and random errors related to differences in scale. Systematic errors related to scale differences, i.e., multiplicative and additive biases, are being removed by scaling the land surface model and Earth observation datasets to the in situ data prior to performing the triple collocation analysis. To clarify this, we propose to add the following sentence after line 257: *”Systematic differences between the datasets, i.e., multiplicative and additive biases, are being removed by scaling the land surface model and Earth observation datasets to the in situ data prior to the triple collocation analysis.”*

4. Line 325: a reference is missing

We will add the missing reference: "Bayat, B., Camacho, F., Nickeson, J., Cosh, M., Bolten, J., Vereecken, H., and Montzka, C.: Toward operational validation systems for globalsatellite-based terrestrial essential climate variables, *International Journal of Applied Earth Observation and Geoinformation*, 95, 102–240, <https://doi.org/10.1016/j.jag.2020.102240>, 2021."

5. Section 5.1.2: Dong et al., 2020 shows that, when sampled across a range of (sparse) sites representativeness error is random in nature. Therefore, when averaging across multiple sites, sparse sites can still accurately capture the *relative* accuracy of different soil moisture products.

We propose to add the following sentence at the end of this section: "Even though differences in spatial representativeness between ground and satellite measurements impact the evaluation metrics, single stations are still a valuable source for assessing the relative skill of soil moisture products with a similar footprint (Dong et al., 2020)".

6. Line 510: Please also include Active and Passive Distributed Temperature Sensing (DTS) works here, which is also aimed to measure soil moisture with high spatial resolutions at low costs and perform soil moisture scaling analysis.

Our intention of this section is not to be complete but to provide an example. This is also why we start line 510 with "For instance". In the preceding paragraph we already mention that a "rich variety of low-cost sensors based on different measurement principles has been developed". Hence, we propose not to go into more depth here.

