

Comment on **essd-2022-80**

Anonymous Referee #1

Referee comment on "SGD-SM 2.0: an improved seamless global daily soil moisture long-term dataset from 2002 to 2022" by Qiang Zhang et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-80-RC1>, 2022

This paper develops SGD-SM 2.0 framework for reconstruction of seamless global daily soil moisture dataset from 2002 to 2022, based on the development of the LSTM-CNN method. The method fuses the global daily precipitation products and is able to consider sudden extreme weather condition. Generally, the topic is interesting, the method makes sense and the results are supportive. Some minor comments before positive publication are as follows.

- Please provide the parameters and descriptions of AMSR-E, AMSR2, and WindSat to demonstrate the rationality of using three heterogeneous sensors.
- The original SM data acquired from AMSR-E, AMSR2, and WindSat sensors were used to generate the seamless soil moisture dataset. As we know, although the frequency band of both AMSR-E/2 and WindSat have the same frequency band to retrieve the soil moisture, the GHz of WindSat sensor is different from that of AMSR-E/2. Is there a big difference in accuracy between 2011.10.5 to 2012.07.02 (i.e., using WindSat) and other periods (i.e., using AMSR-E/2)?
- Section 4.3 only exhibits the dynamic change of the SGD-SM 2.0 dataset. Perhaps, the advantages of version 2.0 can be demonstrated by introducing version 1.0 as the reference in this section. Moreover, this revised description is different from Section 5.2 (the time series in the precipitation area).
- Please provide the website for collection of in-situ data, if the data are public.
- Why the partial CNN and mask updating were used to reconstruct the missing regions?
- What is the relation between the two sub figures in Fig. 1?
- Please consider including more up-to-date references on gap filling, such as [Remote sensing image gap filling based on spatial-spectral random forests. *Science of Remote Sensing*, 2022, 5: 100048].
- Check the caption of Fig. 6.