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Interactive comment on "A fine-resolution soil moisture dataset for China in 2002–2018" *by* Xiangjin Meng et al.

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Our National Satellite Meteorological Center is responsible for the production of FY satellite passive microwave soil moisture products. Thank you for producing this set of high-resolution and long-term soil moisture products in China. By comparing with some product data and site data, the accuracy of this product has been significantly improved in some local areas. For soil moisture products, although satellite soil moisture remote sensing inversion has made great progress, we need to let users understand the specific limitations of current satellite products. I hope the author can emphasize these. It is very important to study soil moisture changes for weather forecasting and agricultural production. In particular, high-resolution soil moisture product data is key parameter for evapotranspiration and water conservation studies on small and medium-scale wa-

tersheds. There are currently three main methods to obtain soil moisture product data at the regional scale in China. The first is through thermal infrared and visible light remote sensing data, namely the Drought Index (TVDI). Although this product has a high resolution and can show changes in soil moisture on a small scale, it is not very comparable in different regions, which is mainly due to the limited penetration of thermal infrared. The second is radar (Active microwave) remote sensing. Active microwave has some advantages, but it is greatly affected by roughness. The third is passive microwave soil moisture retrieval product. Generally speaking, the accuracy of passive microwave retrieval of soil moisture is higher than that of active microwave, which is currently recognized as the best method for inversion of soil moisture in large regions. Now the mature passive microwave products in China mainly include AMSR-E, AMSR2, SMOS, FY, etc. Different frequency settings of microwave sensor and different incident angles will result in large differences in the inverted soil moisture information. The L-band has a stronger penetrating power and represents a deeper soil moisture depth. The frequency and incident angle of AMSR-E and AMSR2 sensors are basically the same, their similarity soil moisture information is the highest, which keep them have a relatively high consistency. Although the frequency setting of FY is basically similar to AMSR-E and AMSR2, the incident angle is slightly different. In addition, the low frequency band of FY passive microwave sensor is not very stable, and the inversion error is relatively large especially in high vegetation coverage regions. SMOS mainly uses the L-band with different incident angles to invert soil moisture. Because the frequency and observation angle are very different from the previous three, the inverted soil moisture is quite different from the previous three instruments, which represents a deeper depth of soil moisture information. In addition, the soil moisture algorithms developed by different sensors are different, and different algorithms obtain some parameters, especially the vegetation coverage regions, which will cause differences in soil moisture products. For microwave sensors mounted on polar-orbiting satellites, the soil moisture products retrieved are all instantaneous products, and the satellite passes twice a day. Therefore, the transit time of different satellites is inconsistent,

and the weather conditions are also inconsistent, resulting in inconsistent soil moisture products. Therefore, it is more difficult to produce a long-term soil moisture product with high precision with high spatiotemporal resolution, and we should consider consistency of time, observation angle and observation depth. Although this study considered theses, it did not elaborate. The author is recommended to emphasize the following three points. 1. What are the differences in the characteristics of sensors mounted on different satellites, including frequency and incident angle. 2. What are the advantages and disadvantages of different sensor soil moisture products, the depth of soil moisture that they represent, and how to calibrate the depth information of different sensor. 3. In the discussion part of this paper, add an explanation of the limitations of this data set. In general, this data set selects the relatively stable passive microwave soil moisture data products, and uses thermal infrared and visible light data to further downscale and make further corrections. This has greatly improved the resolution of passive microwave products in China and provided key parameters for many studies, especially agricultural drought monitoring and analysis.

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