

## ***Interactive comment on “Evolution of the ESA CCI Soil Moisture Climate Data Records and their underlying merging methodology” by Alexander Gruber et al.***

### **Anonymous Referee #3**

Received and published: 22 March 2019

The manuscript by Gruber et al. 2019 (ESSD) presents a comprehensive summary of the series of ESA CCI soil moisture data records. The ESA CCI SM is a successful initiative for providing long-term satellite-based soil moisture product for climate-related applications. The current manuscript is well written and already in a good shape. In general, I recommend it for publication after minor revision. My comments are summarized below and hope the authors could take them into account.

1. In Conclusion section, the high resolution SAR data is mentioned. I agree high-resolution soil moisture is in high demand, in particular, under the context that the spatial resolution of Earth system model is getting finer and finer. The Sentinel-1 data

C1

can definitely provide data source for ESA CCI SM project. Upscaling and merging S-1 into ESA CCI SM is a promising direction, while downscaling is more questionable. Will the CCI SM team work towards improving soil moisture spatial resolution and release related CCI SM (high resolution) dataset in next version?

2. Another ‘urgent’ issue is the soil moisture under dense vegetated areas. In the manuscript, the mask applied for frozen areas are clearly stated. However, as far as I know, the highly vegetated areas are also masked out in the CCI SM. It might be better to discuss this issue and recommend future direction in the conclusion part.

3. Regarding the applications of CCI SM, the manuscript stated that the CCI SM is problematic for trend analysis. It might be misleading. Many studies have conducted trend analysis based on CCI SM. Rescaling against GLDAS-Noah indeed imposes the characteristic of model. However, the combined use of model and satellite data is not a problem, once you can guarantee it is a reliable product. It is better to revise those statements. From the user perspective, it is important to be clear the applicability of the product.

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Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2019-21>, 2019.

C2