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comment**

Interactive comment on "A global satellite environmental data record derived from AMSR-E and AMSR2 microwave earth observations" *by* Jinyang Du et al.

Anonymous Referee #2

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General comments

Thank the authors for this important work! AMSR-E/2 has long been used to support global eco-hydrological studies. Various land/atmosphere states have been developed independently based on a single or multi-channels of AMSR-E/2 brightness temperature observations. This work, however, has integrated previous studies, aiming to provide an "internally consistent" environmental dataset based on AMSR-E/2. Started with some background introduction, this manuscript documents the LPDR retrieval algorithms as well as the refinements, followed by a comprehensive global evaluation and some discussions on the limitations and uncertainties of this integrated dataset.

The topic of this work definitely fits ESSD, and I recommend this manuscript being published on ESSD by considering the following comments/suggestions.

Specific comments

1. Snow (e.g., snow water equivalent) and freeze-thaw products are also common retrievals from AMSR-E/2 observations, and I am wondering why they are excluded in the current dataset. I realize it is difficult to include all the retrievals at a time but I still expect a short discussion from the authors regarding this issue.

2. The word "internal consistency", which is one of the most important motivations of this work, appears many times throughout the manuscript. However, it is still unclear to me how is this "consistency" preserved or reflected in the dataset. To me, all retrievals from one single sensor does not guarantee "consistency" as they may be obtained by using distinct retrieval algorithms. I therefore expect the authors to reorganize sections 2.1-2.2 and to more explicitly explain how these five retrievals are "internally" connected. To this end, a diagram or flowchart showing the general retrieval process and their physical connections is highly desired.

3. For soil moisture evaluation, there are representativeness issues – both horizontally and vertically. For the former, how do you upscale the point-scale soil moisture measurements into a 25km grid-scale? A map showing the spatial distributions of soil moisture stations and the corresponding AMSR-E grid-cells should also help. For the latter, as mentioned in the manuscript, most of the in-situ surface soil moisture observations are recorded at 5 cm or 0-5 cm depth, while AMSR-E retrieval only represents wetness conditions within the top 1 cm. These two issues can potentially introduce "biased" evaluation on vsm, please clarify.

4. P5, L1-5: is the "empirical calibration" kind of CDF-matching AMSR-E/2 to the climatology of MODIS fw? Meanwhile, at P5, L5: how is the threshold of fw=0.15 determined?

Technical corrections

1. P4, L10: "(Du et al. 2015)" should be "Du et al. (2015)". Also see citations at P4, L28, and P8, L26.

2. P10, L26: in "Tmn", "mn" should be subscript.

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