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Interactive comment on "A plateau scale soil moisture and soil temperature observatory for quantifying uncertainties in coarse resolution satellite products" *by* Z. Su et al.

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In the recent years several global remotely sensed soil moisture data sets derived from active and passive microwave instruments have become available. It is extremely important that independent validation studies are performed over different climatic regions and environmental conditions to characterize the spatiotemporal error of these satellite data. So far, most validation studies have been conducted in temperate climate zones. Therefore this study, which uses in-situ measurements collected over three sites of the Tibetan Plateau, is a very welcome addition to the growing body of literature on this topic. However, there are some methodological problems related to the use of the

satellite data that I would like to report. I only refer here to the ASCAT surface soil moisture product which has been developed by the Vienna University of Technology (TU Wien) in cooperation with EUMETSAT.

1. The authors use the ASCAT Level 2 surface soil moisture product disseminated by EUMETSAT in near-real-time (130 min after sensing). Because of operational constraints, updating of this product is not straight forward. Therefore, in terms of product accuracy, it lacks behind the off-line soil moisture products produced by TU Wien in the framework of the H-SAF (Satellite Application Facility in Support to Operational Hydrology) and related research projects. For this particular validation study, which is carried out over quite difficult terrain, I would like to recommend using the most recent data version as e.g. used by Brocca et al. (2010).

2. The ASCAT surface soil moisture data are provided in degree of saturation (0-1). Multiplying the degree of saturation by the porosity (if expressed in m3m-3) gives a direct estimate of the volumetric soil moisture content. Global maps of soil hydrologic properties are unfortunately often not very accurate, which is our main reason for distributing the ASCAT soil moisture data in degree of saturation instead of volumetric soil moisture (which is the quantity usually preferred by the other satellite teams). The disadvantage of this approach is that the users of the data are responsible for correctly converting the ASCAT degree of saturation into volumetric soil moisture data. In the case of the Naqu test site, the ASCAT data converted by the authors using a soil database of FAO (2003) take on values between 0.5 and 0.8 m3m-3 which is physically not possible. So please note that this not an error of the ASCAT data but must be due to some error in the FAO database or in the conversion. Overall, I would recommend that the authors employ conversion methods as e.g. used by Pellarin et al. (2006) or Brocca et al. (2010).

3. Any soil moisture measurement technique that relies on the large dielectric contrast between a dry and wet soil cannot provide soil moisture estimates when the soil is frozen. So neither active or passive microwave measurements, nor the ECH20 probes

used by the authors in their in-situ networks, can be used during the winter period. It is therefore physically wrong to conclude that ASCAT and AMSR-E under- or overestimate the measurements of the ECH20 probes in winter. As noted by the authors, there are frozen soil flags in the satellite data. In the case of ASCAT this is however only a probability flag which shall be replaced if more accurate information about the freeze/thaw status is available.

References

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