"Developing an improved soil moisture dataset by blending passive and active microwave satellite-based retrievals"

Liu et al. present a method for blending two independent satellite-based global soil moisture products being the ASCAT product from the TU-Wien and the AMSR-E product from VUA-NASA. The combination of active and passive microwave soil moisture products into a single is a topic of special interest to future mission such as SMAP and Aquarius. Therefore, I recommend this manuscript for publication after a careful revision. Nevertheless, there are some issues related to the structure of the paper, applied method and validation that need some further clarification.

General comments:

Introduction
From reading the introduction it does not become clear to me what is to be expected. I would suggest to write a few sentences on the followed approach. Moreover, I think also that the research problem is not placed in the proper scientific context. Njoku et al. (TGRS 2002) and Piles et al. (TGRS 2009) have for example also worked combining passive and active microwave using a statistical approach.

Method
The description of the method is not very clear. The first sentence states that the method consists of two steps rescaling and merging. Then in section 3.1 the rescaling through the CDF matching technique is described, which later comes back in the description of the merging. I would suggest first to describe the merging and then the go into detail about rescaling.

Conclusions
In the conclusions I find that the authors are discussing their results and present even some discussion on the refinement of the applied method. The authors should make a clear distinction between the discussion and conclusion, which also mean that some of the discussion points need further investigation. For example, the uncertainty due to the inherent characteristics of the Noah soil moisture could easily be investigated by using the soil moisture from a different LSM.

Specific comments:

p.6701L5: "are sensitive to water on the earth surface". I don't think you mean here open water. So I would suggest changing the text into something as "soil water".

p.6701L25-28: "Both passive and active microwave techniques have inherent advantages and disadvantages. Higher accuracy of passive microwave soil moisture is expected over regions with low vegetation density, as the effects of vegetation attenuation are less (Jackson and Schmugge, 1995; Njoku and Entekhabi, 1996)."

These two sentences confuse me.

If a higher accuracy of passive microwave soil moisture is expected over regions with low vegetation because the attenuation by vegetation is less then one would also expect a higher accuracy under more dense vegetation.

Further, in the first sentence the authors write that "both passive and active microwave techniques have advantages and disadvantages". A lot of text is devoted to explaining the advantages of passive microwaves, but are there also advantages of active microwaves.

p.6702L1-15: In this part of the text and throughout the complete manuscript the terms low, sparse and moderate vegetation are used. Could the authors give some definition as to which vegetation cover is considered low, sparse and moderate?

P6704L7-9: "After removing the effect of vegetation growth and senescence." I am not aware that the change detection algorithm used for developing ASCAT product truly corrects for the effect of vegetation. If the authors refer for this to the seasonal variant backscatter-incidence relationship, this should not be considered as a vegetation correction. Please revise the text or provide a better description.

P6705L17-25: Could the authors please provide some more information on the different soil moisture networks, such as type of instrumentation, accuracy, number of station within the network, climate?

P6706L11: I think the term "absolute" is a bit unfortunate here because both the AMSR-E and ASCAT products are rescaled. Perhaps it is better to use "physical and relative units".

P6707L04: Do you mean soil texture?

P6707L07: Why do you create daily averaged and not use 3 hourly Noah soil moisture product?

P6707L21-23: Why do you use eight linear equations? I am afraid that when using such relative coarse discretization you may get some ambiguous results at the points where the Noah and Satellite CDF's cross each other.

P6708L14: It is not clear to me what "this" is and why it needs examining? Moreover I do not think there is a detailed analysis presented.

P6709L10-13: The text here in combination with Table 1 is very confusing. Are the three situations in the text the same as the three cases in the table? What happened to the Italian soil moisture network? Were the soil moisture products compared to a single in-situ measurements or an average? And if an average of multiple measurements were used what was the variation among the measurements?

P6711L01: "Thus we can use the error of passive …". How would you determine that error?