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Hydrology and Earth System Sciences Discussions

Interactive comment on "Spatial and temporal variability of biophysical variables in Southwestern France from airborne L-band radiometry" *by* E. Zakharova et al.

Anonymous Referee #1

Received and published: 3 April 2012

General comments:

This is an interesting paper to analyze the results of CAROLS air-borne L-band microwave campaign with in-situ and other source of measurements. Both soil moisture and vegetation optical depth (VOD) retrieved at L-band have gain increasing interests in hydrological and biogeochemical communities, esp. after the launch of SMOS satellite. The paper well addressed the differences between CAROLS and other source of measurements, and potentially could be a good contribution in the corresponding fields. However, there are also some major weaknesses in this paper as suggested below. In sum, I recommend major revisions for this paper.

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First of all, there is a lack of rational and logic in the introduction, esp. the first paragraph of the intro contains quite a few redundancies. The 2nd, 3rd and 4th paragraph in the introduction took lots of efforts in emulating the past work and campaigns, but it is better for the authors to synthesize the historical research and give your insights on the existing problems in different soil moisture retrievals from different bands (e.g. C, L), as well as from active or passive sensors. I am eager to know what we learned from all these campaigns: this would also provide a better context for your work. I also recommend you to have a separate paragraph for VOD. There are various definitions for VOD (Owe et al., IEEE-TGRS, 2001; Njoku and Chan, RSE, 2006; Shi et al., RSE, 2008; Jones et al.,IEEE-JSTAR 2009), and it is always good to clarify this at the beginning.

Second, I feel the current results in your paper reflect a major defect in CAROLS campaign design. If spatial heterogeneity plays such an important role in validating soil moisture, more ground points should be deployed in the same station such that more spatial heterogeneity could be captured. I feel we could learn more from this CAROLS campaign, and if not, we should identify the existing problems and provide directions/suggestions for future campaigns. This kind of discussion could make your unique contribution among all these validation works.

Third, from my personal experiences, the VOD retrieved from AMSR-E has a time lag after LAI, with longest lags in wood-dominated land-cover, and shortest lags in grassland. VOD is related to canopy water content and theoretically should lag behind the LAI. In other words, use LAI as a predictor of VOD may not be true in most cases except low leaf biomass plants, i.e. grass. So it is worthy attention in your analysis and result interpretation. Finally, I realize that language also requires improvement. The authors used many commas in an inappropriate way.

Specific comments:

Page 897, line 25: rewrite the sentence.

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Page 900, line 18: does “the along track spatial resolution” mean swath width?

Page 900, line 24: “. . .,only” -> “only covered the Toulouse-. . .”

Page 901, line 1-3: rewrite this sentence

Page 901, line 5: a.s.l. -> you should define these acronyms in your first use.

Page 901, line 23: delete “As,”

Page 902, line 8: add reference for “assumed to be close to zero”

Page 903, line 17: Could you provide some references for your cluster method?

I am also wondering whether these noises could also be a big problem for SMOS data? How general is your filtering approach for passive L-band data?

Page 904, line 9: “,also” <- not the right English

Page 905, line 21-25: rewrite the sentence.

Page 907, line 2-3: not sure what you mean by “with anther . . .by remote sensing”

Page 907, line 24: “,only”

Page 908, line 14: what kind of correlation did you use? Pearson, Kendall or Spearman? Please clarify it.

Page 909, section 3.2 Not sure why you did not compare ISBA LAI simulation with MODIS LAI. Based on your results, I am not sure how well ISBA captures the LAI temporal evolution. I recommend to add MODIS LAI analysis in this section.

Page 910, line 11-12: rewrite the sentence.

Page 911, line 6: it is hard to tell that Fig 7 show a similar spatial pattern between CAROLS VOD and ISBA LAI (say Fig 7A and Fig 7C have very different spatial patterns).

Page 912, line 25-26: rewrite the sentence.

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Page 913, line 9-12: rewrite the sentence.

Page 913, line 16: -> “it is difficult to represent litters in L-MEB”

Page 913, line 19: -> “and also vary within a given vegetation type”

Page 913, line 20: -> “The same kind of problem may exist in the ISBA simulation”

Page 913, line 25: “,also”

Page 914, line 4.2: this is not a complete sub-title

Page 915, line 3-4: too many commas

Page 923, Table 1: clarify what correlation you used.

Page 930, Fig 5: recommend to add MODIS LAI

Page 931, 932: “Along flight interannual variability of ” -> “Flight transect of”

Page 935: Please spell out all the acronyms.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 895, 2012.