

Interactive comment on “Field-of-view characteristics and resolution matching for the Global Precipitation Measurement (GPM) Microwave Imager (GMI)” by Grant W. Petty and Ralf Bennartz

Grant W. Petty and Ralf Bennartz

gwpetty@wisc.edu

Received and published: 13 December 2016

This paper is well-written and describes a process for matching the resolutions of the low frequency channels on GMI. While similar processes have been applied to previous microwave radiometers (which the authors cite), this paper does provide value as the process is specific for GMI and includes more description than what is in previous papers. However, I think the paper would benefit from a more detailed discussion on the impact of this work.

See replies below

C1

I would have liked to see more discussion on the purpose and impact of resolution matching. I could find just one sentence (page 2, line 3) that mentions geophysical retrievals. But the motivation behind the resolution matching should be emphasized a bit more so the reader easily understands why this is being done. How much does resolution matching reduce error in retrieval algorithms? What has been the impact for doing this with past radiometers? Including some references here would be good.

This is a good suggestion. We have added some discussion of the motivation. Unfortunately, we're not aware of retrieval improvements having been documented by previous authors, and it's difficult to do so in this case as well, because only a complete reconstruction of the Bayesian data base – both with and without resolution-matching – would allow that question to be answered in any reasonably general way. Nevertheless, we have comment on the nature of the errors on p. 2 of the introduction, and we have added subsection 4.3, which also refers to three new figures.

Since this is specific to GMI, are there plans to incorporate this process into the GMI precipitation retrieval algorithms? It would be good to mention what is currently being done with GMI retrieval algorithms and why applying a process like you describe here for resolution matching is better than what is currently being done.

The first author has already implemented a prototype algorithm for GMI based on the methodology of Petty/Li 2013.

Has the retrieval team expressed desire to incorporate this in their algorithm? That would be good to include in the paper if they have.

There has been no formal "team" discussion, but Chris Kummerow's group at CSU requested the coefficients, so that would seem to imply interest. However, I don't think it's a citable example yet.

Finally, what is the expected error reduction on precipitation estimates using this resolution matching? I realize this may be a bit beyond the scope of this paper to run a

C2

full retrieval algorithm and error analysis, but I think it would add value to the paper if you at least provided an expected outcome of this process and how much of a positive impact resolution matching would provide to precipitation estimates from GMI.

See the new subsection 4.3, which discusses some aspects of this question. As stated earlier, it's not possible to quantify the error reduction for precipitation retrievals without actually developing and running parallel algorithms with and without resolution matching. This would be cumbersome for our own algorithm, owing to the need to produce a large database of GMI-DPR matchups.

The 23.8 GHz channel is missing from Figure 3 and Figure 7. Is there a reason for this? I see you're plotting H polarization in Figure 7 (I assume for the land/ocean contrast), but it would be good to see 23.8 as well for completeness.

We would prefer to leave that figure the way it is for the following reasons: 1) 23.8 is very close to the target frequency of 18.7 GHz, so changes in the resolution are slight and certainly less challenging (and less visible) than for any other frequency; 2) adding that frequency into the suite of plots would reduce the area available for each of the other subplots (if kept on one page) by 36%. We don't think that the information gained by adding the one channel that is already closest to the target resolution quite justifies the need to shrink the other subplots by such a large amount to accommodate it. We have added a comment to the caption explaining the omission.

Page 1, last paragraph starts with "additional blurring". What do you mean by "additional"? You haven't defined what blurring is at this point.

We have changed this to read, "The effective spatial resolution is additionally reduced..."

Page 1, line 7: "achieved in for the 10.65" change to "achieved for the 10.65"

Fixed.

Page 2, line 21-22: "which determines the both" change to "which determines both"

C3

Fixed.

Page 3, line 13: EFOV and IFOV have already been defined, no need to write the acronym out here again

Fixed.

Page 4, line 16: "images" change to "imagers"

Fixed.

Page 6, line 20: "as well was some" change to "as well as some" Page 7, line 18: "will suppressed" change to "will be suppressed"

Fixed.

Thank you for your helpful review.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-275, 2016.