

Interactive comment on “

Potential of high-resolution detection and retrieval of precipitation fields from X-band spaceborne Synthetic Aperture Radar over land” by F. S. Marzano et al.

Anonymous Referee #1

Received and published: 11 November 2010

General comments

My overall impression of the paper is positive: it addresses a possible use of SAR images in quantitative precipitation detection by means of different approaches showing two case studies. Moreover, the authors provide a correction for geometrical effects

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to be applied to a published retrieval algorithm, and, finally, try to address the ground resolution issue in precipitation remote sensing.

Since the use of SAR for precipitation is not yet very widespread, I would appreciate a little bit more detailed discussion on the expected role of SAR estimates in the more general framework of the precipitation instruments already in use (passive and active MW, ground radar). What contribution can be expected by SAR rainrate observation ?

Hundred-meters resolution rainfall maps over land are available from ground radar since decades, with good accuracy, especially if polarimetric capabilities are exploited. Could SAR retrieval be used over scarcely observed regions (i.e. where radar data are not available) ? or over complex orography, where ground radar fail ? What is the revisit time of the current SAR observation system ?

Specific comments

I will focus my specific comments on the section 4 of the paper. Here the authors address the sampling/beam filling issue, downscaling the SAR rainrate maps to the FOV of two sensors widely used for rain retrieval purposes, such as TRMM-PR and TMI.

First, I do not see the need to show real TRMM images in figure 2 of hurricane Gustav: they are not "nearly contemporary" to TSX (1:30 hour is a big difference if convective systems are concerned), and they are never really used in the paper.

section 4.1 To assess the spatial resolution degradation of rainrate maps the authors simulated rainrate maps at TRMM-PR and TRMM-TMI@37GHz resolution by downscaling TSX maps at 0.5 km: the results are compared with Weather Radar rain maps, computing RMSE, FRMSE, BIAS and correlation coefficient. I suggest to summarize the results in a table to make easier the comparison, and I also would recommend a deeper discussion of these results. It seems that TMI-like has very low correlation with reference map, but BIAS, RMSE are comparable with the TSX estimates, while

PR-like shows large RMSE and large (and positive !) BIAS. An attempt to explain such conflicting results should be pursued. Probably this analysis is too simplistic and the results too much dependent on the particular scene and on the spatial properties of the considered precipitation pattern.

section 4.2

I think that the "beam filling" effect cannot be regarded as "systematic error", since it depends on the observed precipitation pattern and does not affect the measure in a constant way with the same intensity.

I suggest to omit the sentence about raingauges: this is a rather complex issue and it is not addressed in this paper at all.

The sentence "Another effect is due to antenna pattern... because of the weighting introduced by antenna pattern" tells twice the same thing and should be reworded.

In figures 8 and 9 the sampling rainrate interval changes between top and bottom panels, and this should be clearly introduced and the reason explained. If I well understand, the red line in figs 8 and 9 marks the gaussian weighted values: probably it would be better, for clarity, to mark the unweighted mean values in the top panels, to illustrate differences. Moreover, I suggest to extend horizontal axis to the whole rainrate range, in order to fully show the broad rainrate spectrum.

technical comments

There is a mistake in the equation numbers: probably eq. 1b should be eq. 2, and the following numbers rescaled accordingly.

The name of Japan Space Agency is JAXA since october 2003.

In the caption of figure 2, the "convective cell indicated in figure 1" is mentioned. If it is referred to the hurricane, "convective cell" is not the proper name.

The differences between REA and MREA results should be discussed with more quan-

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titative detail, showing scatterplot between figs 5 top and bottom and/or computing some difference measure.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 7451, 2010.

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