Atmos. Meas. Tech. Discuss., 7, C3752–C3754, 2014
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Atmospheric Measurement Techniques Discussions

Interactive comment on "A novel algorithm for detection of precipitation in tropical regions using PMW radiometers" *by* D. Casella et al.

Anonymous Referee #2

Received and published: 17 November 2014

This paper describes and validates an objective technique for deriving a rain/no-rain screening algorithm applicable to multichannel microwave brightness temperatures, irrespective of the specific sensor considered. I don't have any serious problems with their methodology; I do have longstanding philosophical reservations about the desirability of separating "screening" from "retrieval" – see additional comments below. That said, I believe this paper will be acceptable for publication if the authors can satisfactorily address the following comments:

Throughout: The use of the adjective "novel" is reasonable in the title and once or twice in the introduction. It becomes repetitive when used every time the algorithm is mentioned (note that "novel" and "new" are not quite the same thing in English). Consider giving the algorithm a name early on so that it can be referred to unambiguously

without adjectives.

Abstract, last three lines (see also p. 9257, lines 8-10): “total amount of precipitation” seems imprecise, given that this is a detection algorithm. Perhaps “total occurrence” or “total area” or “total fraction” would be better.

p. 9240, line 3: In my opinion, achieving consistency among difference radiometers is not only NOT of primary importance, it is not even a theoretically realizable goal. The available channels and channel resolutions, which differ from radiometer to radiometer, introduce fundamental variations in the degree to which the precipitation signal can be separated from background variability, and these differences may be large over certain surface types. For example, polarization information, when available, can be very effective in discriminating cold unpolarized precipitation from cold polarized water surfaces (including wet land). If polarization information isn’t available, the ability to detect precipitation will be severely degraded irrespective of the algorithm employed.

p. 9241, lines 1-2: It has been too common over the past decades, in my opinion, for algorithm developers to strive to “separate the problem of identifying precipitating areas from the problem of estimating the intensity of the rainfall.” I have never accepted that there is a valid justification for seeing these as two distinct problems to be solved separately. On the contrary, the determination of rain vs. no-rain is nothing more and nothing less than that of determining whether the rain intensity is greater than zero. If the intensity retrieval algorithm can’t do that with adequate skill on its own, then it probably isn’t doing a very good job with other rain rates either. A retrieval algorithm that needs to be protected from a wrong determination of rain/no-rain by a separate screening algorithm is clearly failing to optimally utilize the available information; otherwise it should be able do exactly as well as the best screening algorithm applied to the same channels.

p. 9242, line 5: The authors cite Petty (2013) but do not mention the two subsequent papers that actually implement and validate a TMI retrieval algorithm based on the

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conceptual framework laid out in that first paper. Some of the methods and findings of the later papers might be relevant here.

Petty, G. W., and K. Li, 2013: Improved Passive Microwave Retrievals of Rain Rate over Land and Ocean. Part I: Algorithm Description. J. Atmos. Ocean. Tech., 30, 2493-2508.

Petty, G.W., and K. Li, 2013: Improved passive microwave retrievals of rain rate over land and ocean. Part II: Validation and intercomparison. J. Atmos. Ocean. Tech., 30, 2509-2526.

p. 9255, lines 1-3: I don't understand this part. I would think that a "perfect" algorithm applied to pixels misclassified as raining by the screening algorithm would not retrieve "the mean value of precipitation rate over the full data set" but rather something more like "the mean value of precipitation rate over the full data set minus those pixels correctly classified as raining," which is presumably a much lower value. In other words, one wouldn't expect that the PDF of rain rates for misclassified pixels is the same as the climatological PDF for all pixels, because higher rain rates are less likely to be misclassified.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 9237, 2014.