

Reply to Anonymous Referee #3

The topic of the paper is very important and the results useful in the development of new satellite rainfall retrievals. The paper is overall well written, giving a clear explanation of the work done.

Thank you for the positive comments.

However, I would like to see an application to a database consisting of real data (e.g. TRMM-TMI brightness temperatures vs co-located TRMM- PR rain) or simulated from cloud-resolving model (cloud-radiation database). In this way, it would be possible to understand the algorithm performance under real conditions. In particular, the impact on your approach of the following crucial assumptions could be considered: 1) Actual brightness temperature covariance matrix, 2) Effect on non-linearities in the brightness temperature - rain relationships.

Application to real data (in this case actual TMI brightness temperatures co-located with PR-derived rain rates) is the subject of the following two papers, just accepted in JTech:

Petty, G.W., and K. Li, 2013: Improved passive microwave retrievals of rain rate over land and ocean. 1. Algorithm description. In press, *J. Atmos. Ocean. Tech.*

Petty, G.W., and K. Li, 2013: Improved passive microwave retrievals of rain rate over land and ocean. 2. Validation and intercomparison. In press, *J. Atmos. Ocean. Tech.*