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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "Mind-the-gap Part II: Improving quantitative estimates of cloud and rain water path in oceanic warm rain using spaceborne radars" *by* Alessandro Battaglia et al.

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The authors would like to thank very much the reviewer for his useful feedback. The paper has been modified accordingly (see link in Reply to Reviewer 1). Reviewer 2 Specific comments: The authors should study the sensitivity of the Cloud Liquid Water Path (C-LWP) retrieval performance with respect to the cloud microphysics scheme used in simulation of the radar observations. Specifically, the simulated cloud water and rain variables are not completely independent and implicit statistical relationships (embedded in the cloud-observation simulation database) are exploited by the retrieval procedure to "separate" cloud water from rain. While the simulations used in



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the manuscript are realistic, it is conceivable that these implicit statistical relationships are not exactly the same as in nature. The additional study of different microphysics scheme would enable cross validation experiments and facilitate insight on the impact of the joint cloud water-rain distributions on the retrievals of the C-LWP. We agree with the reviewer that the implicit relationship between C-LWP and R-LWP in the training database can indeed introduce additional uncertainties to the retrieval. Following a similar remarks from Rev1 on rain microphysics we have now introduced a sensitivity analysis in Sect.3.2.2 to show the effect of selecting different DSD parametrizations. A new figure (11) has been introduced. Studying the effect of different combinations of rain/cloud partitioning seems more appropriate in a full retrieval study where the integral constraints should be used in combination with the full reflectivity information and is beyond the scope of this work. This has been noted in the conclusions.

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