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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Microphysical properties and high ice water content in continental and oceanic Mescoscale Convective Systems and potential implications for commercial aircraft at flight altitude" *by* J.-F. Gayet et al.

Anonymous Referee #3

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Review of "Microphysical properties and high ice water content in continental and oceanic Mesoscale Convective Systems and potential implications for commercial aircraft at flight altitude" by Gayet et al.

Recommendation: Requires minor revision before publication.

This paper analyzes convective systems properties in two convective systems over Germany and off the Brazil coast in regions where cloud-top lidar backscatter anomalies have been observed. It is shown that the backscatter anomalies correspond to

the most dense and active parts of the convective clouds with high values of particle concentration, extinction and ice water content, with differences in the microphysical properties in the isolated convective cloud top from the surrounding regions. Retrievals from spaceborne CloudSat data show that regions with high ice water content and maximum reflectivity factor of only 18 dBZ can be identified at the typical cruise altitudes of commercial aircraft. Thus, this paper makes a contribution of continuing to characterize the microphysical properties of such regions that may represent a threat to commercial aircraft.

The paper is well written and represent a comprehensive analysis of these two case studies, and as such, should be published in the refereed literature. However, there is one aspect of the paper that should be improved. The retrievals of ice water content and effective radii are based on application of existing retrieval schemes that were designed using data obtained in regions well removed from areas where large concentrations of small ice crystals are expected. As such, there are large uncertainties in the retrieved microphysical properties. Although the use of existing retrievals is necessitated by the fact that there are no in-situ measurements existing in such conditions, I think this caveat of the retrieved quantities and the corresponding large uncertainties should be better emphasized in the manuscript. These issues are mentioned in the manuscript, but can anything more quantitative be done to characterize these effects?

I should also point out that many of the papers that are referenced for the in-situ analysis (e.g., Ivanova et al. 2001; Knollenberg et al. 1993) consist of observations that are highly biased by the presence of shattered artifacts in the data. When these papers are referenced, caveats about the use of these data due to artificially high concentrations of small ice crystals should be noted.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 22535, 2013.