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

Overview:
The paper presents an analysis of the case studies of two convective mesoscale systems from satellite born remote sensing. The main focus of this work is on the estimation of the ice water content, extinction coefficient and effective radius of ice particles from the CloudSat/CALIPSO and/or METEOSAT-9/SEVIRI observations. The estimation of the IWC and Reff in this study has been performed for the 35000ft altitude, which is a frequent flight level for commercial aviation. The results of this paper may be of great importance for estimating the potential hazardous effects of high IWC on commercial aircrafts, which may cause engine power loss events (flameout, rolloff, etc) and Pitot tube clogging. Currently, there have been few studies collecting in-situ measurements at such altitude levels. The microphysical properties of the regions at the tops of convective storms remain poorly characterized. This paper brings another bit of information about the microphysical properties of high IWC regions.

One of the main problems of this paper is that the estimations of IWC were performed based on the retrieval algorithms, which may not be directly applied to the cloud regions near the cloud tops of the convective storms. Most of the existing IWC-Z relationships were obtained for ice clouds where IWC and Z were mainly contributed by relatively large ice particles (D>~100um). However, the existing in-situ observations suggest that the high IWC cloud regions are mainly composed by small ice particles for which the IWC-Z relationship may be estimated with large errors, when existing relationships are applied. The authors acknowledge the existence of this problem and potentially large errors in the IWC estimates obtained in this paper. This problem will remain until new collocated in-situ and remote sensing measurements in the tops of convective storms can be obtained. Other than that, I did not find any significant issues with the presented material, other than the minor editorial comments listed below. Given the great importance of the information about the IWC, Reff, horizontal extension of high IWC cloud regions for the safety of the flight operation of commercial aviation this manuscript undoubtedly should be accepted for publication in the ACP.

Recommendation: accept with minor revision

Comments and suggestions:
1. Page 22554/555:
Several hypotheses may explain these differences:
i. Accurate in situ measurements of particle effective radius are not available in MCS clusters. Such data may improve the comparisons of the retrieved R_{eff} within the IWC–Z relationships.
This is not a hypothesis, this is a matter of fact. I suggest rewording this text.

2. Page 22555: Publication presenting FSSP measurements in ice clouds should be referenced with caution. Recent studies suggest that the FSSP inlet tube is a subject of

shattering which may result in a significant overestimation of ice particle concentration in ice clouds (up to 100 times).

3. Page 22549: Larger R_{eff} (27 μm) are observed in the fresh cloud (part B) whereas smaller effective radius (22 μm) are found in part A likely due to sublimation processes efficient near the cloud top.

The statement about sublimation sounds too speculative. Not sure if it adds anything to the subject of the paper.

4. Page 22554: These instruments have specially designed tips and electronics that may now provide much more accurate in situ measurements (see for instance, Korolev et al., 2011).

There is a more recent work published in JTECH (2013, V30, p.690) regarding this subject.