

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

Reply to Reviewer # 1

We thank the reviewer for his detailed review and valuable comments. The manuscript has been modified according to the suggestions proposed by the reviewer. The remainder is devoted to the specific response item-by-item of the reviewer’s comments :

*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 Reff within the IWC–Z relationships. This is not a hypothesis, this is a matter of fact. I suggest rewording this text.*

We agree with the reviewer. The text has been reworded as the following :

(i) Accurate in situ measurements of particle effective radius are not available in MCS clusters. Such data obtained with new generation of instruments (see above) will improve the comparisons of the retrieved Reff within the IWC-Z relationships.

*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).*

The reviewer is right, past measurements carried out with former FSSP version should be affected by ice shattering effects. This caveat is considered in the revised version regarding the subsequent references. The Knollenberg’s reference (1993) has been suppressed and a comment has been added in the introduction as the following :

... Although FSSP ice particle concentrations are generally overestimated due to shattering effects (see among others Korolev and Isaac, 2005) these unusual observations could be important regarding engineering issues related to the failures of jet engines and Pitot tubes commonly used on commercial aircraft during flights through areas of high ice water content (Lawson et al., 1998, Strapp et al., 1999 and Mason et al., 2006). ...

*3. Page 22549: Larger Reff (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.*

We agree with the reviewer; the statement about sublimation has been removed.

*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.*

The reference has been updated :

Korolev, A.V., Emery, E.F., and Creelman, K.: Modification and tests of particle probe tips to mitigate effects of ice shattering, *J. Atmos. Oceanic Tech.*, 30, 690-708, doi: 10.1175/JTECH-D-12-00142.1, 2013.