

## Responses to Reviewer 2

First of all, we would like to thank the reviewer for the useful elaborated comments and suggestions which help to improve the new version of the manuscript.

General remarks:

1. According to the reviewer's suggestion, the title of the paper has been changed as follows:  
Particle surface area dependence of mineral dust in the immersion freezing mode: Investigations with freely suspended drops in an acoustic levitator and a vertical wind tunnel.
2. Due to the reviewer's comments, remarks about effects of charge on freezing have been removed.
3. The authors fully agree with the reviewer that the calculation of the specific surface area includes some errors due to the BET method which was used for illite NX and IMt1. The surface density of active sites has been selected to compare the results obtained with the same particle sample but with different methods. In a paper which will be submitted soon immersion freezing of illite NX of several techniques from the INUIT research group and others will be described. It includes discussions about the weakness of BET surface area, therefore, this issue has not been included in the present manuscript. The suggestion to use  $n_s$  in cloud models has been removed. All about parameterizations based on illite NX data will be included in the forthcoming paper (Hiranuma et al., ACPD, will be submitted end of August 2014).
4. Regarding Figures 10 and 11 vs. Figures 14 and 15, the reviewer is right that there is actually provided twice the same, one  $f_{ice}$  itself, the other  $\ln(1-f_{ice})$ . Therefore, Figures 10 and 11 have been omitted in the revised manuscript to reduce the number of figures.

Specific comments:

Section 2.2, line 10: We have include references of previous measurements in the revised paper.

Section 3.1.3, Fig. 12: We agree with the reviewer's comment that Figure 12 should be omitted as it does not have any added value and have remove it from the revised manuscript.

Section 3.2.1, line 22: According to the reviewer's remark, the somewhat vague formulation of the sentence has been changed into "...that the nucleation probability is the same for all drops of a population."

Section 4, line 14: The reviewer is right, the mentioned sentence does not make sense and have been removed from the revised paper.

Section 4, line 25: The mentioned issue is discussed in the revised paper.