Anonymous Referee #3

This discussion paper presents a comprehensive data set of the microphysical properties of ice particles from three aircraft campaigns and for a wide temperature range from -1.0 to -81.5°C. Although it is limited to pristine ice particles only, it gives novel and useful data on the temperature dependence of ice particle microphysics. I recommend the publication of the paper in ACP after following points have been addressed by the authors:

1) *The authors state that presented data set represents only 10% of all atmospheric ice particles and that the remaining 90% are not pristine. It would be very helpful if the authors would give some information of those particles as well, i.e., what are the main microphysical features and how do these correlate with the observations in the pristine cases (e.g., basic habit, crystal distortions like hollowness)?*

We thank the referee for mentioning this point. The numbers the referee refers to above were obtained from studies of Arctic clouds by Korolev et al. (1999) as stated in Section 3.2. In this study, a total of 341,093, 846,534, and 122,871 particles from TWP-ICE, SPARTICUS, and ISDAC, respectively, were analyzed. Among these particles, 0.58% (0.61%; 0.22%) of crystals were columns (plates; bullet rosettes) whose dimensions could be measured without ambiguity for TWP-ICE, whereas they were 0.79% (0.18%; 0.67%) and 2.18% (0.28%; 0.62%) for SPARTICUS and ISDAC, respectively. These fractions of crystals whose dimensions were measured have been included in section 3.2 together with total numbers of particles obtained from each flight in Tables 4-6. Some habit information from TWP-ICE can be found on Um and McFarquhar (2009). A future study will examine the non-pristine crystals, discussing the correlations of their microphysical characteristics with those of the pristine crystals presented here. It is beyond the scope of this study to further discuss it here.

2) *Ice particle growth speed is dependent on temperature, as stated by the authors, but also on the supersaturation with respect to ice saturated conditions. This should be noted*

in the paper. Did the authors try to correlate their observations also with the saturation conditions?

We also attempted to correlate features of ice crystals with humidity measurements. However, we found that the quality of humidity measurements were not good enough to quantify the relationship between crystal growth and humidity. There was no humidity measurement during TWP-ICE. We have been waiting for the reprocessed humidity data from ISDAC and SPARTICUS, but have not received the data yet. Following the referee's suggestion, we have added following sentence at the end of Section 5. "Although the influence of humidity on the growth of ice crystals was not included in this study because of the unavailability of good quality humidity measurements, future studies should examine such effects with other data sets".

3) *With the CPI imaging method only larger particles above a certain size threshold can be investigated. What are the size limits used in the study? What particle fraction of the total size distribution has been investigated? If available it would be very informative to give these fractions (or, if possible, the size distribution) for the different campaigns and temperature regimes.*

A CPI can measure particles larger than ~10 μm. For this analysis particles larger than ~20 μm were analyzed. A CPI can measure particles up to ~2000 μm and, thus, particle size measurements using other cloud probes are required for complete particle size distributions. Although we agree with the referee's suggestion that showing particle size distributions from different field campaigns and temperature regimes would be informative, it is beyond scope of this study. The corresponding size threshold of CPI has been added in Section 3.1.