

Interactive comment on “Freezing thresholds and cirrus cloud formation mechanisms inferred from in situ measurements of relative humidity” by W. Haag et al.

W. Haag et al.

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The referee has one concern he/she wishes to be addressed in the revised version of the manuscript, namely the assumption of the total water mixing ratio being a conserved quantity along the trajectories.

We believe that the referee is correct in his estimate of vertical mass fluxes. In fact, we have noted that the above assumption likely leads to an overestimation of cirrus lifetime and occurrence (see p.3273, Is.27-29). According to our reply to ref.2, we will present new calculations that include the effect of variations of the total water mixing ratio and approximately account for the sedimentation of large crystals. In the same way, the new calculations include the effects of small-scale dynamic features on cirrus formation.

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We do note at this point, that the key conclusions (as shown in the Figures 4 and 6) will remain as expressed in our publication. The assumption of constant water influences the calculated cirrus properties (and may thus affect the slopes of the distributions of RHI), but not the location of the cut-offs. The peak RHI values inside cloud may be shifted slightly towards higher values when strong wave activity is present. Measurements of sedimenting ice crystals in supersaturated air may affect the interpretation of the RHI values where ice nucleation first occurs, but the measurements were mostly made in cloud-forming regions where sedimentation did not occur very frequently (Kärcher and Ström, ACP, 3, 823–838, 2003).

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 3267, 2003.

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