

***Interactive comment on “Chemical composition of ambient aerosol, ice residues and cloud droplet residues in mixed-phase clouds: single particle analysis during the Cloud and Aerosol Characterization Experiment (CLACE 6)” by M. Kamphus et al.***

**Anonymous Referee #3**

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This manuscript describes single particle measurements at the High Alpine Research station Jungfraujoch. Single particle analysis of ambient aerosol, ice residues and cloud droplet residues were carried out using two single particle mass spectrometers, SPLAT and ATOFMS. There have only been a relatively small number of measurements of atmospheric ice residues, despite the importance of the topic, so the measurements from Jungfraujoch add nicely to the sparse body of information on the subject. Also, the measurements are the first to use single particle analysis to look at

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ice residues from mixed phase clouds. In this respect the results are new and highly important. The authors should be complimented for the nice data set, especially considering the difficulty of the measurements. Like Referee #1, I think the analysis of the results needs to be improved before publication. Most of my comments are similar to comments raised by Referee #1.

1. One of my main concerns is the comparisons between the background aerosol, the ice residuals and the droplet residuals. The authors have two sections on this (3.2.4 and 3.3.4) where they contrast and compare the BG, IR, and DR data and discuss enhancements of chemical components in the IR and DR. However, in many cases the comparisons may not be valid since the majority of the background aerosol may have been collected during a different time period and for different air masses than the ice residuals or droplet residuals. The authors do point this out; but, they go on to discuss enhancements and compare BG, IR, and DR. One option would be to completely remove these comparisons and any discussion on enhancements between BG, IR and DR. Another option is to make more valid comparisons. For example only show data for background aerosol collected during cloud events, when IR and DR were recorded. Another option would be to focus on 2-3 relatively narrow time windows, and then compare BG, IR, and DR for these windows. This may be a more useful comparison. Due to the limited statistics for IR, this may not be possible, however.
2. Also the authors compare the results from SPLAT and ATOFMS. This also does not seem like a valid comparison since SPLAT was often making measurements at different times (and likely for different air masses) than ATOFMS. Should the SPLAT and ATOFMS results agree? If the authors want to compare the SPLAT and ATOFMS they should only focus on a time window where both instruments were operating.
3. Figure 4 suggests that SPLAT and ATOFMS give very different results for the background aerosol. But the authors indicate in the text that the data sets are largely in agreement. The current way the authors present their data is not consistent with this final conclusion.

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4. More discussion on “background signals/artifacts” in the ice residual experiments would be useful. For example, for the ATOFMS ice residual experiments a total of 152 ice residuals were analyzed. If 15 were from “background/artifacts”, this would be 10% of all the particles analyzed.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 9, 15375, 2009.

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