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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Scavenging of black carbon in mixed phase clouds at the high alpine site Jungfraujoch" *by* J. Cozic et al.

Anonymous Referee #2

Received and published: 12 January 2007

This manuscript looks at the scavenging of black carbon in mixed phase clouds at the high alpine site in Jungfraujoch. The data adds to the growing body of results on soot-cloud interactions. In contrast to referee #1, I do not find the paper "boring". The authors of this manuscript could consider putting the section on "Black Carbon Measurements" into an Appendix to reduce the length and readability, but this is a minor point.

The new aspect in this paper compared to the others is that measurements were carried out in liquid and mixed-phase clouds. The paper presents interesting results, and I recommend it for publication once the authors have addressed adequately the following questions.

Comments:

Most of the data are displayed with box charts. However, the statistics associated with the plots are not discussed. What do the boxes represent? Please describe completely the graphs and indicate what each symbol represents.

Overall, I would like to see much more discuss on the statistics, and I would like the authors to backup there conclusions with a statistical analysis or discussion. Specific points are listed below.

Section 3.4.1: The authors suggest that Fscav,bc increases with increasing LWC. I would agree that the data suggests this trend for T>-5 C, but I do not think the authors can make this conclusion for T<-5 C. The authors should perform a full statistical analysis to support their conclusion. My feeling is that the uncertainty is too great to make this conclusion. The authors indicate that the observed dependence is also weaker at lower temperatures, but I think even this is too strong of a statement. Maybe I do not understand the uncertainty in the data, but the authors should provide a statistical analysis to support this conclusion.

Section 3.4.2: For Figure 6a, can the authors say with certainty there is a trend with BC concentrations? Except for maybe the first data point, there doesn't appear to be much of a trend. Please include a discussion on the statistics.

Section 3.4.3. line 8: "At higher temperatures, T>0 C, a reverse trend is observed." This appears to be based on one data point, which has a rather large uncertainty. Statistically, can the authors say with certainty there is a reverse trend?

Section 3.4.4, line 10: "According to equations 7 and 8, 16% of the BC mass concentration is found in the ice residuals whereas only 2% of the aerosol mass is found in the small ice crystals." Please state the uncertainties (i.e. error bars) of these numbers?

Section 3.4.3: The authors state that the observed trend is explained with the Wegener-Bergeron-Findeisen process. This statement is too strong. Could other factors such

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as updraft velocities also explain the results? The authors should state that the trend could possibly be due to the Wegener-Bergeron-Findeisen process, but other factors could also explain the trend (unless the authors can prove that this statement is false).

Page 11881 line 6: "The scavenged number fraction is defined as the fraction of the total number of particles (particle diameter D $>$ 100 nm) that are incorporated into cloud droplets and ice crystals." Why was D $>$ 100 nm chosen?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 11877, 2006.

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Interactive Comment