Atmos. Chem. Phys. Discuss., 3, S1358–S1359, 2003
www.atmos-chem-phys.org/acpd/3/S1358/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol-cirrus interactions: A number based phenomenon at all?" *by* M. Seifert et al.

Anonymous Referee #2

Received and published: 20 August 2003

This paper deal with the very important problem of the key role that aerosol particle may play on cirrus cloud life cycle. The authors analysed in details residual and interstitial aerosol measurements performed at midlatitudes during the INCA project. The work is presented with a very clear and detailed approach, and results and discussions are very new and interesting. My overall impression is that this paper should be a significant contribution to current research on aerosol cirrus interactions, and a very good valorisation of INCA measurements. Nevertheless, some hypotheses have to be clarified before publication. To my opinion, the strong hypothesis concerning the interpretation of the CVI data (i.e. one cloud particle leaves one, and only one residual particle) is not enough justified for this study and, to my understood, is sometimes in contradiction with further hypotheses and conclusions in the paper.

Not enough justified: The hypothesis is based on a previous study, Seifert (2002),

Full Screen / Esc
Print Version
Interactive Discussion
Discussion Paper

where residual particle concentrations are compared with ice particle concentrations derived from FSSP-300. Fig.2 illustrates this result in the previous paper. The correlation between the two estimated concentrations is clear for a number of residual particles above 1 per cm-3. For lower concentration, the relation between the two estimated concentrations is not established. Another point is that data are relatively dispersed. For example, for a number concentration of 1 residual aerosol per cm3 measured from CVI, FSSP-300 counts between .2, and 2 ice crystals per cm3. Is it possible that the over or under estimation of cloud particles is lied to physical processes and bias the conclusions?

In contradiction with some further hypothesis: First, in paragraph 3.5 it is state that the scavenging of ambient aerosol particles by ice crystal has a very small impact on the number of interstitial aerosols. I agree. But, in these conditions, one crystal leaves several aerosols. The impact on the crystal number concentration may be not negligible. Second, an interesting explanation of the result is that crystal evaporation may produce new aerosols (end of paragraph 4 and paragraph 5). Is it possible that, when crystal evaporate in CVI probe, aerosols are produced with a similar process? Then in this case the crystal concentration is probably overestimated by the interpretation of CVI data.

Finally: To dodge the issue, why FSSP-300 measurements have not been directly used to derive ice crystal concentrations?

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 3625, 2003.