

Interactive comment on “Large surface radiative forcing from surface-based ice crystal events measured in the High Arctic at Eureka” by G. Lesins et al.

G. Lesins et al.

Received and published: 17 December 2008

Response to Anonymous Referee #2

The referee had no major comments or major suggestions. We thank the referee for finding the minor corrections.

Here we address each of the referee's numbered minor suggestions.

1. The optical depth range given in the Abstract is from the lidar which operates at 532 nm. We changed ‘visible’; to ‘532 nm’. We also added the lidar wavelength in Section 2.4 that describes the lidar. We computed the corresponding optical depth at 10 microns and found less than 10 % difference from

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

the 532 nm optical depth.

2. 'Crystal' (upper case) was changed to 'crystal';.

3. We changed the wording to 'enhance the forward scattering';.

4. We have improved the wording to emphasis that dehydration is a process that occurs on a longer time scale (days to weeks) as opposed to the instantaneous forcing when ice crystals are added to an atmosphere without changing its temperature or moisture profile.

5. We have added definitions of all the symbols.

6. We clarified the wording about the duration of individual lidar profiles. The 2.5 second time is the integrating time done at the lidar measurement whereas our average optical depth is done using the 2.5 second data.

7. We clarified the wording about the 20 stream discrete ordinate method.

8. We included λ , model explicitly in defining the variables in Equation 2.

9. We have improved the wording in the last paragraph in Section 3.2 to emphasis the difference in the anisotropy behavior between wavelengths where the atmosphere is very transparent compared to wavelengths where the atmosphere is very strongly absorbing.

10. It is not clear which sentence the referee is referring to. We feel the paragraph sets the stage for the case studies section even if some repetition can be found from earlier in the paper.

11. We feel it would be best to keep the hourly human observation Table distinct from the lidar Table to avoid a massively large table. The IC categories (columns) are similar to make comparisons as easy as possible.

12. We have deleted 4 sentences that were redundant or self-evident in order to

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



shorten the caption to Table 4. We have also deleted the second paragraph in the caption to Figure 12 (which is now Figure 16) since that discussion is covered in the text in Discussion section.

13. The optical depth (shown for the 4 cases in Figures 8 to 11) is the total for the whole ice crystal layer above 100 m. It is calculated by integrating the lidar determined particle extinction vertical profile (also in Figures 8 to 11) upward from 100 m to the top of the ice crystal layer. There is no inconsistency here because the optical depth is an integrated quantity.

14. The caption to Figure 12 (which is now Figure 16) is not missing but appeared on the following page. It has been shortened.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 17691, 2008.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

