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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Airborne measurements of aerosol optical properties related to early spring transport of mid-latitude sources into the Arctic" *by* R. Adam de Villiers et al.

Anonymous Referee #2

Received and published: 16 February 2010

General Comments: This paper describes spaceborne and airborne lidar measurements, in-situ measurements, and FLEXPART simulations of aerosol properties for long range transport into the Arctic. The authors provide an adequate description of the importance of Arctic aerosols. It is beneficial to the scientific community to see synergy between these measurements and models to characterize the source regions of transport to the Arctic.

I understand the use of pseudo color ratio and pseudo depolarization ratio to try to minimize the instability in weak aerosol layers. However, it is difficult to compare these results on an apples to apples basis to other measurements (e.g. Catrall et al, 2005

and CALIOP) done so here. It would be easier to understand (and compare to previous studies, as suggested by Referee 1) if the authors remain consistent by using the more traditional color ratio and depol ratio for the lidar measurements.

Specific Comments and technical corrections:

P 27794: As a reader unfamiliar with the POLARCAT campaign, I agree with the first reviewer that citing a paper in preparation is not helpful.

P 27796: There is no information given on the backscatter lidar instrument itself (e.g. instrument paper) other than the measurement parameters listed in table 1. If no such paper exists it would be worth a few paragraphs describing the lidar instrument.

P27797 line 12: Regarding "the CALIOP pseudo depolarization", I am unsure if you have calculated this quantity from the CALIOP data or mean the volume depolarization reported by CALIOP.

P 27805: The version of CALIOP products is not indicated and it is not clear that the Aerosol Layer products are used.

P 27805, line 8-9: The authors have several conditions for the CALIOP aerosol layer to be used, however no mention is made of the QA flags. Were the QA flags, FCF, or CAD scores used to verify quality, confident data? If so it should be indicated which were used and how.

P27805, line 9: It is not clear what is meant by "a 532-nm layer optical depth > 3

P27806, line 9: Focussing should be focusing.

P27807, line 3. According to P27806, line 16 there are only three main results, however this forth one is presented. Also, on P27807, line 5 the pseudo color ratio and pseudo depolarization ratio are mentioned, but there are no "pseudo" variable in Table 3 to support this.

P27809, line 23 should read "means" instead of "mean"

Figure/Table comments and corrections

Table 1: The first column should be in a date format consistent with the text.

Figure 2: The title runs into the latitude label.

Figure 3: Label the fourth profile “PBL” as in Table 1 and explain the white vertical lines. Also, the figure text is too small to be readable.

Figure 4: Changing y axis is confusing. It might also be helpful to label “I”, “II-A”, etc instead of lining up latitudes.

Figure 5: The x labels are “depolarization ratio” and “beta1064/beta532” while the caption describes these as “pseudo depolarization” and “pseudo color ratio”

Figure 6: Please define the green line.

Figure 7: What does the white line represent?

Figure 10: Why does the caption indicate June 2008 and July 2008 while the title indicates April 6 and April 7 2008?

Figure 11: Numbers are very difficult to read. The color bar indicates ns/mg while the caption indicates ms/kg.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 27791, 2009.