

Interactive comment on “Comparison of NLC particle sizes derived from SCIAMACHY/Envisat observations with ground-based LIDAR measurements at ALOMAR (69° N)” by C. von Savigny et al.

Anonymous Referee #1

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General Comments: This paper attacks the difficult job of comparing PMC particle sizes derived from satellite and ground based measurements. The authors are successful and have shown innovation in their approach. The differences in the observational aspects of the two instruments (SCIAMACHY and LIDAR) provide a challenge to the comparisons. The two issues that are most important are the differences in the vertical and horizontal resolutions of the instruments. In my view, the vertical resolution issue is handled properly. The horizontal resolution issue is more critical in some ways and needs more explanation in the text. I will explore this more in my detailed

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comments. Finally, assuming the validity of the assumptions used, the results show good agreement between the measurements. I also see a potential issue in the results where there appears to be a bifurcation that is not discussed in the text.

Specific comments: Abstract: A statement of the adopted width of the distribution should be given.

Introduction: I think the results from other papers should be at least quoted here. The two I think should be mentioned in addition to those summarized are:

Rusch, D.W., S.M. Bailey, G.E. Thomas, and A.W. Merkel, Seasonal Variation of PMC Particle Size from SNOE UV Measurements for the Northern 2000 and Southern 2000/2001 Seasons, *Journal of Atmospheric and Solar-Terrestrial Physics*, 70, 2008.

Bailey, M. Scott, Gary E. Thomas, David W. Rusch, Aimee W. Merkel, Chris Jeppesen, Justin N. Carstens, Cora E. Randall, William E. McClintock, and James M. Russell, III, Phase Functions of Polar Mesospheric Cloud Ice as Observed by the CIPS Instrument on the AIM Satellite, *J. Atmos. Solar-Terr. Phys.*, doi:10.1016/j.jastp.2008.09.039.

Section 3, eqn 1: Please define the variables in the equation.

Section 3, discussion of adopted distribution width: The adoption of the 24 nm width, which is significantly larger than that derived by the LIDAR measurements, needs more discussion and support. My concern is that the derivation is not as simple as described, especially since you state in Section 5 that the scattering cross section, and thus the scattered radiance, scales with the 5th power of the particle radius. This seems to indicate that the derivation of σ_{scia} is very non-linear with particle size. Please clarify.

Section 4.1: You state ‘This implies that the retrieval . . . for the descending part of the orbit.’ Would you please quantify this statement? Is the difference significant?

Section 5, 1st par: Here you state the 5th power dependence of the cross section. Please refer to my comment wrt distribution width determination.

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Section 5: The discussion of Figure 6 does not provide us with an explanation of the obvious bifurcation of the results along the SCIAMACHY axis. The vertical spread in the results is also very large. Would you comment on these issues, especially the bifurcation? Thank you.

Typing and other issues: Abstract: I would replace the 1st sentence with the following: SCIAMACHY, the Scanning Imaging Absorption spectrometer for Atmospheric CHartographY, provided measurements of limb-scattered solar radiation in the 220 to 2380 nm wavelength beginning in the summer of 2002.

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