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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Airborne observations of a subvisible midlevel Arctic ice cloud: microphysical and radiative characterization" *by* A. Lampert et al.

Anonymous Referee #3

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Comments about the paper: “Airborne Observations of a Subvisible Midlevel Arctic Ice Cloud: Microphysical and Radiative Characterization” by A. Lampert, A. Ehrlich, A. Dörnbrack, O. Jourdan, J.-F.Gayet, G. Mioche, V. Shcherbakov, C. Ritter, and M. Wendisch.

The paper describes the ASTAR airborne experiment held in Svalbard during March/April 2007. More precisely, a case study concerning a subvisible midlevel ice cloud is analyzed. The analysis consists of downward backscatter and depolarization ratio profiles given by an airborne lidar, combined with in situ measurements given by a polar nephelometer (PN), a cloud particle imager (CPI), and forward scattering spec-

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trometer probe (FSSP-100). Moreover, the SMART albedometer, and Eppley pyrgeometers were installed on board the aircraft. This experiment was performed with only the Polar-2 (Do-228) aircraft, so remote and in situ measurements were not obtained simultaneously, but with about half an hour of time lag. Then, a true synergy between these two kinds of measurements is not really possible, but taking into account the low evolution of the cloud deck during the experiment, some analysis are indeed possible. The authors took well account of this restriction in their analyses.

This paper contains interesting material, but the present study could be improved before publication.

Major comments:

P. 605, line 16. Could the authors list the different the microphysical models tested? Are the authors sure that the proposed combination is unique? Considering all the ice crystal models available with different size distribution, it is pretty sure that other combinations could work. Why not a three - component representation?

Line 18: Could the authors quantify the term ‘deeply’

P. 607, line 12-14: Could the authors explain quickly the methodology? The authors should not expect the readers to seek out an earlier paper to find basic informations about the method.

P. 610, line 24: By studying the difference of downwelling radiance under clear and cloudy sky, it is theoretically possible to determine the optical thickness of cirrus cloud, and it would be interesting to compare it with lidar determination. The authors must perform such a study.

Some minor corrections:

This paper concerns a case study, it describes optical and microphysical properties of an Arctic cirrus. The reviewer suggests to add the term ‘case study’, in the title.

ACPD

9, S281–S283, 2009

Interactive Comment

In situ is a latin locution. Please write it without the indent.

In the particle backscatter coefficient Aer and the particle extinction coefficient Aer, the exponent Aer suggests aerosol particles. In the current case, this appellation is not suitable, it would be better to find another exponent, for example ‘Crys’ for crystals.

Concerning pyrgeometer measurements, between 3 and 50 micrometers (for example p 614, line 6), the term thermal infrared radiation is inadequate, the reviewer suggests the term ‘longwave radiation’. The thermal infrared region is rather in the interval between 8 and 13 micrometers.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 595, 2009.