Atmos. Chem. Phys. Discuss., 2, S155–S157, 2002
www.atmos-chem-phys.org/acpd/2/S155/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Properties of subvisible cirrus clouds formed by homogeneous freezing" *by* B. Kärcher

B. Kärcher

Received and published: 29 May 2002

comment 1:

Fallout and freezing time scales are usually well separated, so, yes, sedimentation will not significantly alter the number of ice particles nucleated.

I have added a note in the revised paper.

comment 2:

Ice number densities from the analytic model are in good agreement with detailed parcel simulations (within a factor of 2 or so over a wide range of w and T). A comparison between numerical (symbols) and analytical models (curves), taken from Kärcher and Lohmann (2002b, their Fig.4, now in press at JGR). If necessary, I can send the figure to the Editorial Office from where it can be accessed.

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The extinction efficiency from van de Hulst's approximation is not applicable in the Rayleigh scattering regime. It yields good results for larger particle sizes, but consistently underestimates the wiggles of the true Mie curves (by 20% at most), the error becoming smaller with larger particle size.

I have added a note in the revised paper.

comment 3:

The wavelength is 1 μm (see line after Eq.(16)).

comment 4:

This is what I say at the end of the second but last para of Sect.2.4. Eq.(20) is just added for completeness, but not used thereafter.

comment 5:

I hesitate to quote an optical depth value in the paper; I do not readily see for what they would be helpful in this paper. If needed, the reader my estimate one using the extinction values.

comment 6:

This point is answered in more detailed in my reply to referee 2 (see reply to comment: p.7, para 3).

comment 7:

The reviewer may wish to visit http://eos913c.gsfc.nasa.gov/gcss wg2/ and take a look at results from different parcel models. Those may scatter considerably in the prediction of n, although I believe that most of the scatter can be traced back to different model formulations (esp aerosol water activity and freezing rates). Inspecting Lin et al. (2002) will show that my parcel simulation results are well within the bulk of results from the other colleagues that participated in the GEWEX comparison excercise. The

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same holds for the parameterization results.

comment 8:

I have emphasized this aspect both in the abstract and in the summary.

comment 9:

Good point; I have mentioned it in the text (Sect.3.5). The theoretical model is clearly not applicable in such cases.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 357, 2002.