Atmos. Chem. Phys. Discuss., 8, S604–S606, 2008
www.atmos-chem-phys-discuss.net/8/S604/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Modelling of cirrus clouds – Part 1: Model description and validation" *by* P. Spichtinger and K. M. Gierens

Anonymous Referee #3

Received and published: 7 March 2008

The article describes the development and implementation of a microphysical scheme for cirrus modelling. The scheme is tested on a well known ideal zero-dimensional case, and a previously studied semi-realistic 2 dimensional case of stratocirrus formation. As the authors mention this is not the only existing microphysical scheme, and as such the novelty of this article is limited. The novelty, if any, lies in the well considered choices made during the implementation. The implementation is described very carefully and in great detail, clearly with the purpose of later reference. This allows the reader to follow practically all the rationales, which I for most parts appreciate, even though it makes the article relatively long. I believe that in the present state, with the existing uncertainties of cirrus microphysics, the scientific community may benefit from having several existing partly redundant models focusing on different aspects of cirrus,

and as such the publication of this technical article is justified. The language is very good, and I found no typos. Note that I am not a native English speaking person, so I cannot really guarantee that everything is written in proper English. The authors draws a few scientific conclusions from their 2-d simulations which I find needs some comments/considerations. I will get back to that at the end of the report. Not being aware what exactly the criterion is with respect to technical reports, I will let the editor decide whether this first part of the article should be separated from the second scientific part. It is basically a technical report, but I think that the applications serves well as examples.

My overall conclusion is that the article is good, and I recommend publication I ACP, after consideration of a few points:

608, l 16 In line with P. Wang I would like a few words on the rationales behind choices and parameterization. E.g. here, why not consider collision processes?

611, l 4 "evaporation" -> "sublimation";

618, l 1 Implementation of heterogeneous nucleation is clearly relevant, but the approach seems too unrealistic. In Karcher et al 2006 they use a slightly more detailed parameterization which prevents all background aerosols to nucleate instantaneously at a single threshold RHI.

619, l 15 "with / whereas" is that line break intentional?

621, l 20 Why explaining in details the "Koenig ansatz"; when it is overruled by a substantial correction anyway? A place to cut down the length a bit maybe? By the way, I think that the colours have been swapped in the figure legend of Fig. 5.

626, l 23 8220;usually does not occur8221; could that be qualified a little better?

631, l 15 Being surprised by the large pressure effect I would like to understand exactly which pressure is quoted. The pressure at the simulation start, at RHI=1, or at the nucleation time or...?? Pressure decreases during the experiment.

ACPD

8, S604–S606, 2008

Figure 18 Caption: $0.0ms^{-}1?$

644 .l 3 Generally I find the supersaturation study too weak to justify a publication on its own as it is now, not saying that it cannot act as an example in this technical article . 1)It does not really address the fact that in cloud supersaturation occurs mainly at extremely low temperatures. 2)The wind shear chosen is moderate. A stronger realistic wind shear would probably smear out variations in RHI. 3)Most important: The two moment scheme has implications on the sedimentation which is only justified with a hand waving statement about different sedimentation velocities for mass and number densities. For exactly this study I think that a size resolving (binned) microphysical scheme should be employed.

References [Karcher et al 2006] B. Karcher, J. Hendricks, and U. Lohmann. Physically based parameterization of cirrus cloud formation for use in global atmospheric models. Journal of Geophysical Research (Atmospheres) , 111(D10):12058211;, January 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 601, 2008.