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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Factors controlling contrail cirrus optical depth" *by* B. Kärcher et al.

Anonymous Referee #2

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This article is of very high quality, high scientific interest and well suited to be published in ACP.

I have only very minor comments and recommend this paper for publication.

The paper describes a new, analytical microphysical cloud model, which is then used to evaluate optical and microphyical properties of contrails of different ages, and in particular those of aged contrails evolved into extended cirrus. These contrail cirrus are one of the major uncertainties when assessing the impact of aviation on climate, as they are difficult to study both with global models or to identify them in satellite observations. Therefore, this is a very important analysis and the development of the new model will allow further studies to study the evolution from linear contrails to cirrus on a statistical basis.

The results presented in this paper include distributions on contrail optical depths for different aged contrails which are novel and important and can help together with the improved knowledge on the other contrail parameters to quantify the impact of contrail cirrus with better precision. The choice of the correct optical depth for contrails is one of the problems in present model studies, and these new results will clarify these questions. The result of this study that only about 50% of line shaped contrails are typically detected by satellites is another important point helping model versus observations comparisons.

As far as I can judge, this analysis is very thorough, possible uncertainties or biases have been addressed appropriately, and other work has been cited where necessary.

Minor comments:

1. page 11607, line 25: the reference (Radel and Shine, 2007) treats data from the whole UK, not only Southern England.

2. page 11624, line 15: the sentence 'This may suggest a low bias.' is a bit confusing. From the previous sentence one might conclude just the opposite. I think I understand what is meant, but could be formulated easier.

Typos:

page 11614, line 14: seldomly -> seldom or rarely

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 11589, 2009.