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Interactive comment on “A climatology of formation conditions for aerodynamic contrails” **by K. Gierens and F. Dilger**

Anonymous Referee #2

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Review for Manuscript No: acp-2013-344: A climatology of formation conditions for aerodynamic contrails

(K.Gierens and F. Dilger)

The authors of this manuscript study formation conditions for aerodynamic contrails, a form of condensations trails that did not get much consideration in the scientific community yet compared to the much more studied exhaust contrails. In this manuscript formation criteria for aerodynamic contrails are studied and then applied to a case scenario and to one year of ERA interim analysis data leading to a global climatology of formation probabilities. These are put into relation to actual air traffic and compared to probabilities for exhaust contrail formation. The main conclusion of the authors is that

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the climate impact of aerodynamic contrails is small, much smaller than that of linear exhaust contrails. It could however increase with rising air traffic in the tropics.

The manuscript is clear and well written and the analysis is sound and original. It is an important result to understand the production mechanism and probabilities of occurrence (dependent on height, location and season) for aerodynamic contrails and get an estimate of their climate impact. I therefore advise to publish this manuscript with minor revisions.

General comments:

I very much enjoyed reading this manuscript and found it really interesting. I do not have any comments questioning the analysis, which I think is sound and also well described. My main general point concerns the presentation, i.e. the English and the style. I find it a pity that somehow neither abstract nor introduction contain a clearly stated motivation for this paper. I think especially the abstract should be made more interesting to make the reader want to read this article. For instance, now it is only in the very last paragraph of the conclusions that “The most important question” is formulated and discussed. Also it should be clearly stated somewhere what this analysis adds to previous publications on aerodynamic contrails like Kärcher et al. 2009 and Gierens et al. 2009/2011.

In my opinion also the style especially in the introduction and at the end of the conclusions could be improved. And some of the figures and their legends are difficult to read, at least in the printed version (I will specify this in the technical comments section).

Special comments:

Abstract: As said above, the abstract could be made a bit more exciting, but in particular the last sentence should be changed, to write ‘believe’ there waters down the conclusion completely. Also I do not think ‘currently’ should be in italics.

Introduction: The introduction is a little unusual. I am missing that the scope of the

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paper is outlined, the motivation is stated and an overview of the currently existing literature is given, clearly stated which is the new insight we will get from this paper compared to existing ones. Also it is not very nice to read with all those enumerations. Practically the whole text consists of subsequent enumerations (three times: First.. second..etc))

Section 2: page 14672, line 5/6: Here I am not sure, maybe it is just me, but I have difficulties to understand what has been done to calculate the pressure drop Δp .

Section 3.3: page 14678, line 18-20: The fraction of flown kilometers in cold ice super-saturated regions has also been already calculated by Rädcl and Shine, 2008 (you are actually citing that paper) and shown in their Figure 2.

Figure 5: I wonder what is the reason for the very 'asymmetric' behaviour of the Northern and Southern hemispheres in summer at 350 hPa ?

Technical comments:

Page 14670, line 3: after 'cannot' you forgot to delete some words

line 15: 'requires special states in the atmosphere' sounds strange, what is meant is that one needs 'the atmosphere to be in a special state', right? line 16: 'where, when and how..' is repetitive with four lines above..

Page 14671, line 15: 'Let us make an example' sounds a bit informal here.

Page 14674, last paragraph: sometimes numbers smaller than ten are written as numbers instead of being spelled out. This is at least inconsistent, maybe also elsewhere in the text.

line 29: doesn't -> does not

Page 14675, line 3: BADA as an abbreviation should be spelled out and cited.

Page 14679, line 14: 'a bit randomly distributed' is too informal and not very scientific.

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In fact maybe the figure could be changed to show only significant data?

Page 14680, line 25-26: The part of the sentence after the comma is grammatically not correct.

Page 14681, line 11: On -> At

line 12: much -> many

Figures: In Figure 3 it is difficult to distinguish three shades of blue I find. Also, at least in the printed version of the article the panels are too small in order to see well all the information. And the text and numbers are impossible to read. The latter is true for almost all the other figures too.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 14667, 2013.

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