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## ***Interactive comment on “Cirrus clouds triggered by radiation, a multiscale phenomenon” by F. Fusina and P. Spichtinger***

### **Anonymous Referee #1**

Received and published: 25 February 2010

#### Overall comments

The manuscript “Cirrus clouds triggered by radiation, a multiscale phenomenon” by Fusina and Spichtinger is a modeling study on how radiative cooling and small eddies can affect cirrus formation. The study is conducted with a non-hydrostatic, anelastic model with newly developed ice microphysics schemes and newly implemented fast radiation transfer code. Several sensitivity tests are conducted where potential stability, wind shear, relative humidity and temperature is varied. The importance in variations of the different parameters are discussed and put in the content of the simple phase-diagram.

The written English language is at times difficult to read and I believe the manuscript could be improved upon. I suggest that someone proficient in the English language

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should edit the manuscript for language content. However, the scientific concepts and work itself are clearly presented, and I believe this manuscript is importance for the scientific community. This paper should be published in ACP after addressing a few minor comments.

## Main comment:

I think the study here is interesting and important. But I still wonder how the results can be used in a broader contest by the community. I would like to see a small discussion in the conclusion how the findings in this paper can potential be built on in further research.

## Minor details:

Page 1136, line 23: remove “(over)”

Page 1136, line 25: remove parenthesis around “over Southern England”. Remove comma after “The fact”.

Page 1137: I do not understand the sentence from line 2 to line 4.

Page 1137, line 14: Was the properties of global distributions really discovered? Maybe estimated, investigated or determined is a better word? Also use “over” instead of “during”

Page 1138, line 2: Sentence is hard to read.

Page 1139, line 9: Change ”Theses” to “These”.

Page 1139, line 26: Remove “more interested”. The same on page 1140, line 4.

Page 1139, line 7: Change “from” to “for”

Page 1142, line 14: change “this” to “these”. Remove comma after “significantly”.

Page 1142, line 27: I think the figure is 4c, not 4d.

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Page 1143, line 10: Which part in Figure 4 do you refer to (a, b, c or d)? Or do you mean Figure 5?

Page 1143, Line 12: For a smoother transition to the new section, I suggest to start the first sentence with something like “For sensitivity tests . . .”

Page 1143, line 25: Can remove “reference case” in parenthesis, since it is mentioned in sentence above.

Page 1144, line 1: Change “of” to “in”

Page 1144, line 8: Remove comma after “conclude”.

Page 1145, line 10: Change “for” to “of”

Page 1145, line 17: Add a comma after mid-latitudes. Change “for” to “at”

Page 1145, line 26: Add “n” after “a”

Page 1146, line16: Remind the reader of the RHI value used in the reference case.

Page 1147, line5-6: Something is missing in the sentence after “destabilization”.

Page 1147: Comments about RH = 150 %. Did you do this simulation, or is it an assumption? Maybe say “not shown” if you did the simulations.

Page 1148, line 7: “an” instead of “a”

Page 1148, Subsection 4.7: Radiative impacts. I suggest changing the title to “Discussion of radiative impacts”. It would be interesting to see the radiative impact discussion in the sense of susceptibility. How much does for example a 10% change in X (X = stability, RHI etc) cause changes in optical depths. This could be a better estimate in which parameter changes has the most effect on optical depths.

Page 1149, line 13: Change “this” to “these”.

Page 1149, point 1: “an” instead of “a”.

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Page 1150, point4: Remove comma after “shown”. Also, N is never shown in any figures, as alluded to in point 4.

Page 1150, line 10: Change “to weak” to “too weak”. The same with “to high”. This mistake also is repeated further down.

Page 1150, line 13: Remove comma after “enough”

Page 1150, line 19, remove comma after “distinguish”

Page 1150, line 24, remove comma after “implies”

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 1135, 2010.

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