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Atmospheric Chemistry and Physics Discussions

Interactive comment on "An Atlantic streamer in stratospheric ozone observations and SD-WACCM simulation data" *by* Klemens Hocke et al.

Anonymous Referee #2

Received and published: 28 December 2016

RECOMMENDATION: minor revision

SUMMARY STATEMENT: The paper describes a model-observation case study of an Atlantic streamer. It identifies an ozone streamer, a water vapor filament and the related polar vortex erosion region in different datasets. An extended discussion would complete the paper - I suggest a minor revision.

MAJOR COMMENTS

The discussion should be extended: (1) One topic I could imagine is the represantativity of the observed streamer. How typical is it in relation to the climatologies of streamers (Martius et al., 2007) and Rossby wave breaking (Zülicke & Peters, 2008)? (2) Another topic is the proper resolution of three-dimensional structures in the data. You give some reason for the different appearance of filaments in SD-WACCM vs Aura-

MLS (gravity waves, resolution). You also mention the double-peaked anomaly in SD-WACCM and Aura-MLS vs GROMOS but do not further discuss these differences (10 % at about 40 km). (3) Another point worth a discussion is how close the SD-WACCM ozone concentrations are to the observations. Is it perhaps related to the dynamically produced tracer patterns? I suggest to state the problem of proper sampling of streamers and filaments in the introduction and to discuss them in the last section. For examle you give three times the same reasons for differences in structures from SD-WACCM and Aura-MLS (page 4 line 24, page 5 line 12 and 32) which should be placed in discussion section.

In was also expecting some concluding words on the result of the SD-WACCM validation. My impression after reading was that both the vertical and horizontal resolution is as good as the satellite observations, and also the ozone concentrations are realistic. Some discrepancies to GROMOS remain which should be commented. However, such statements should repeat the spatial and temporal scales of the validation exercise.

MINOR COMMENTS

page 2, line 10: "its included" is possibly not the best wording - may be "included" is better to read

page 2, line 27: The height ranges do not correspond to fig. 3: there it goes from 15 to 70 km, but here you write of profiles from 25 to 70 km?

page 2, line 28: replace "with an" with "to"

page 4, lines 1-3: Please check the reference to Fig. 1a and 1b! I think, in line 1 you refer to 1a and ind line 3 to 1b?

page 4, line 1: Replace "shown" with "included"

page 4, line 2: Replace "sees" with "reproduces"

page 4, line 22: Delete "nice" which sounds too subjective.

page 4, line 30: Replace "comes" with "extends"

page 5, line 7: Delete "pure"

page 5, line 9: What do you mean with "good agreement" - the overall zonal structure or the orders of magnitude? Please, specify.

page 5, line 16: This section does not only contain the conclusions if any, it is more a summary and repeated discussion. I suggest to place discussion and conclusion here, while a summary for this short paper is not necessary.

page 5, line 20: Delete "nicely"

page 5, line 31: You always refered to the high-ozone subtropical structures a "streamers" - may be its better to use this term here instead of "filaments"?

REFERENCES

Martius, O. C., C. Schwierz & H. C. Davies, 2007: Breaking waves at the tropopause in the wintertime Northern Hemisphere: Climatological analyses of the orientation and the theoretical LC1/2 classification. J. Atmos. Sci. 64: 2567 - 2592. doi:10.1175/JAS3977.1.

Zülicke, C. & D. H. W. Peters, 2008: Parameterization of strong stratospheric inertia-gravity waves forced by poleward breaking Rossby waves. Mon. Wea. Rev. 136, 1: 98 - 119. doi:10.1175/2007MWR2060.1.

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