

Review of Akritidis et al

Akritidis et al present a study which assesses a stratosphere-to-troposphere transport event (STT) that occurred over Europe during the cold winter of 2017. STT is a very important source of ozone into the troposphere but has and remains challenging to simulate given the laminar like structures that are associated with these events and their transient in time nature. Akritidis use results from a range of models including the ECMWF Copernicus Atmosphere Monitoring Service to understand the drivers for this event and to use the observations of this event from aircraft and ozonesondes to evaluate the models.

In general this is a well written manuscript and one I would recommend published after the following general and technical points are considered.

General comments:

1. A table with the model acronyms and set ups used in the analysis would be very useful for the reader. Most of the information is already in the text but I feel a table would help the reader quickly appreciate the differences between RegEns, CAMS and IFS.
2. What more can we learn from this event? The RegEns models all differ in structure and I wonder what further analysis could be done to help understand (a) the role of resolution in the vertical (b) the role of horizontal resolution in biases that occur in the models. The use of the IFS with and without DA is instructive but I feel there is more to be teased out from RegEns and would like to see some more effort to that extent.

Technical comments:

Page 1, line 1: Technical point. I'm not sure I agree with the opening statement. STT tends to produce about 200 Tg (O₃)/yr. Lightning NO_x (natural) produces XXX..

Page 3, line 24: I find the phrase "weather-chemistry feedback" a bit puzzling.. I think you could be more specific here. What exact feedbacks are included and how are they represented?

Page 4, line 2: I guess when you mean data assimilation you mean chemical data assimilation?

Page 4, line 8-9: Pernickety, I know, but you have used "seven" on line 8 and "7" on line 9 to refer to the number of models in the CAMS ensemble. Sticking with one or the other would be better.

Page 6, line 10: Define FYROM please.

Page 6, line 13: Remove "the" before sea-level.

Page 7, line 7: Can the authors confirm why pressure-interpolation of the chemical fields from model levels onto pressure levels could not be performed? I would think this is a fairly standard procedure. Could they elaborate on the errors introduced for example by not accounting for the exceptionally low real temperatures when using the US Standard Atmosphere for unit conversion? In addition, with respect to Figure 4, I would be intrigued to know what the spread is within RegEns or the standard deviation of the ensemble? In general, what can we learn more about the models from this event?

Page 8, line 16: I'm not sure what you mean by "mind the angle of view"?

Page 9, line 14: Can you speculate why the spread in RegEns increases in the vertical?

Page 10, line 1: What constitutes “satisfactory”?

Page 10, line 22: Insert “the” before CAMS.

Figure 2 caption, missing information about panels e and f.