

# ***Interactive comment on “Case study of ozone anomalies over northern Russia in the 2015/2016 winter: Measurements and numerical modeling” by Y. M. Timofeyev et al.***

## **Anonymous Referee #1**

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Review of the paper “Case study of ozone anomalies over northern Russia in the 2015/2016 winter: Measurements and numerical modeling” by Y. M. Timofeyev, et al.

### General comments

The paper discusses a case study of ozone anomalies over N. Russia and assesses the role of chemical and dynamical processes in observed short-term ozone loss, using observations as well as CCM and CTM simulations. The paper contains new material.

However, improvements are needed before accepted for publication.

Overall, a clearer description is needed not only on the methodology but also on its

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application and the interpretation of results, as some paragraphs may be even confusing. For example, Section 3 on the “Comparison of total ozone column measurements and numerical modeling”, one of the papers’ essential sections, does not discuss at all the rationale of the use of two different models. Moreover, the two different models are forced (or nudged) with different data sets. Both of these facts introduce errors and discrepancies in the comparisons, which are not discussed at all. Moreover, there is no information on the comparison between the two models and the comparison between the two forcing data sets. Please correct also the figures, and clarify the Figure Captions. Figure 2 and Figure 3 contain solid lines with different shades of gray, and it can be hard to distinguish between them.

Specific comments:

1. Page 2, lines 10-11 end elsewhere in the paper: “TOC depletion...” Short term episodes of low ozone values are better described by “ozone loss” rather than depletion, a term which implies a longer-term decay with significant duration
2. Page 3, line 10: “three long periods of essential deviations of the average daily TOC...” I do not understand what is meant here. Please clarify
3. Page 3, line 10: “. . . from average long-term values. . .” What is the time period for this climatological average that you refer to?
4. Page 3, line 13: “of average values (191-257, . . .)” Please clarify what is this range of values referring to?
5. Page 3, line 18. Please indicate the location of the stations in Figure 1, and/or in Figures 4 and 5. It will be extremely helpful for the reader’s understanding.
6. Page 3, line 24 “including observed ozone depletion”. Do you mean here the ozone depletion in general (e.g. Northern hemisphere), or short-term ozone loss? Please clarify.
7. Page 3, line 30: “..during periods of ozone depletion” Again, does this refer to a

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general longer term behavior, or the short period examined here?

8. Page 3, line 31-32:” This then described the mean state . . .” I do not understand the meaning of this sentence

9. Also in line 32-33, “to improve. . . with the appearance of strong ozone anomalies”. Do you mean inclusion of ozone anomalies? It is not clear at all.

10. Page 4, “Comparison of total ozone column . . .” Section Please see my general comment in the beginning

11. .. Page 4, line 25: Figure 3. It is not clear which line is for each model. I can see (and print) two gray lines. Please correct.(also in Fig. 2)

12. Page 5, lines 10 and below: What is printed in the lower panels of Figure 5? The text refers to MERRA, but the figure caption refers to model output.

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2018-15>, 2018.

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