*Dear Reviewer,*

*Thank you for your concerns and suggestions, which will help focus the paper.*

*Based on the comments of both reviewers, we suggest the following main changes:*

- *Change title to "Thermospheric nitric oxide is modulated by the ratio of atomic to molecular oxygen and thermospheric dynamics during solar minimum"*
- *Move Figures 2 (NO timeseries) and 3 (electron densities) of the preprint to a supplement. Only the two extreme cases, WACCMx and EMAC, will be shown and discussed in Figures 5 and following. Figure 5 with all models will be moved to supplement as well. The discussion of the O/N2 ratio is also moved to the supplement, as it does not provide additional insights but strengthens the conclusions from the discussion of O/O2.*
- *Increase font sizes in all figures*
- *Add table listing advantages and disadvantages of different model geometries to Summary section*

*A more detailed response to your concerns is given below. Reviewer comments given in* black*, our response in blue.*

This study focused on the simulation of NO in the lower thermosphere by comparing 5 numerical models with observations. They concluded that "two processes interacting with each other are identified as likely sources of these discrepancies, quenching of N(2D) by atomic oxygen in the mid-thermosphere, and meridional transport and mixing from the mid-thermosphere to the lower thermosphere". The results and conclusions will contribute to our knowledge on the variation of NO and also will contribute to further improve the first-principle based models in the future. However, there are some major issues to be addresses before it was considered to be published.

Here are some detailed concerns and some suggestions:

The structure of the paper lacks clarity, making it hard for readers to follow. I recommend having a native English speaker review and revise both the language and the logical flow to improve overall clarity.

*Thank you for this suggestion. The paper was read carefully by co-author and native British speaker Dan Marsh before submission, and he will do this again before submission of a revised version.*

The title of the manuscript is difficult to understand. Please consider rewriting it for clarity.

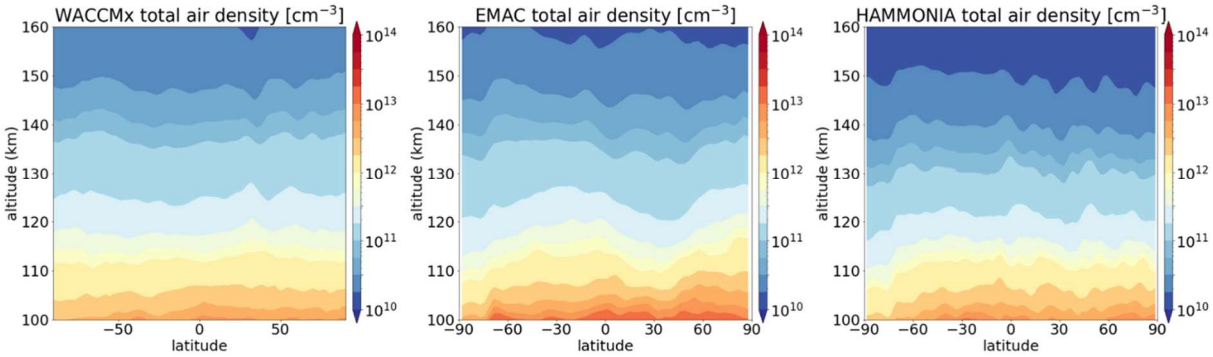
*Thanks for pointing this out. We suggest to change the title to "Thermospheric nitric oxide is modulated by the ratio of atomic to molecular oxygen and thermospheric dynamics during solar minimum"*

The font size of the text in the figures should be larger for better readability.

*This will be addressed.*

Figure 7: The authors did not discuss why O/O2[N2] from HAMMONIA is lower than that from WACCMx, because both of which considered photodissociation of O2 in the SRBC.

*In HAMMONIA, total air density is lower than in WACCMx or EMAC above about 130 km, see figure of the snapshot along 0°E at 12:00 UTC on January 1, 2009 below. This has an impact on the reaction velocities of most reactions including quenching and photolysis reactions, potentially affecting the relative amounts of species. The reason why the density is lower in HAMMONIA was not explored further because it was felt that this is out of scope of the paper. Because we could not clarify this point to our complete satisfaction, we suggest to concentrate on the extreme cases WACCMx and EMAC in our analysis in a revised version.*




I recommend the authors add a table to list the advantage and disadvantage of these models before the Summary section to clarify the simulation results.

*That is a good suggestion, thank you! A table will be added:*

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|---|---|---|---|
| *Top altitude* | *70-100 km EMAC* | *115 – 150 km KASIMA, WACCM-D* | *>150 km WACCMx, EMAC* |
| *Advantages* | *NOy upper boundary condition well constrained by observations, e.g., Sinnhuber et al., (2018)* | *Auroral NO source in model domain* | *Auroral and EUV sources of N and NO self-consistently in model domain* |
| *Disadvantages* | *Source region of thermospheric NO not covered* | *EUV production of N above model top: upper boundary condition necessary, but not well constrained* | *High spatial resolution necessary due to lack of adequate gw drag parameterization* |