

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-928

Anonymous Referee #3

Referee comment on "Amplified role of potential HONO sources in O₃ formation in North China Plain during autumn haze aggravating processes" by Jingwei Zhang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-928-RC1>, 2021

General comments The manuscript reported the WRF-Chem model evaluation of several HONO sources and their impacts on multiple aspects of photochemistry, such as HONO production, O₃ production, OH production, nitrate production etc. The discussion is not limited to ground surface, but is spreading over regional and vertical distribution of pollutant budget. A rather comprehensive understanding on the HONO sources' impacts is thus shared with colleagues in our society. However, the model validation is not fully convincing. Also, discussion on the many results and figures appears to be oversimplified.

Specific comments

1. Model-measurement comparison on regional and vertical distribution of pollutant budget would be helpful to convince that the HONO source is potentially missing process in current WRF-Chem scheme. Would it be appropriate to directly compare the stationary measurements with the model? If column density is useful to verify model calculation on the regional and vertical distribution, considering vertical gradient measurements are rare?
2. How the nitrate production and partitioning are setup in the model and compared with your measurements? Please refer to the reference of Kasibhtla et al., 2018.
3. Production of HONO from NO+OH route is offsetted by HONO photolysis, so is OH production from HONO photolysis. Was the net production of HONO or OH plotted in these figures?
4. In figure 2, why nitrate loading is still higher in 6S model as it is consumed in the photolysis reaction, compared to base model?
5. The impacts of those tested HONO sources varies from clean day to pollution day and from the surface to higher levels. What are the key parameters mediating it?
6. Figure 10&13 infers an underestimated P(OH)/O₃ as a function of PM_{2.5}? Was this verified anywhere? What is the reason of it?
7. Figure 18 suggests less perturbation of nitrate budget by Phot_{nitrate}? Is there a measurement confirmation of this? What is the reason of it?
8. Long sentences for example in the abstract are not easy to follow.