

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2021-928

Anonymous Referee #2

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Referee comment on "Amplified role of potential HONO sources in O<sub>3</sub> 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-RC2>, 2021

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Zhang et al. investigated the role of several HONO precursors in enhancing O<sub>3</sub> during haze aggravating processes using the WRF-Chem model. This manuscript analyzed the contribution of several different HONO sources (e.g., gaseous reaction between NO and OH, heterogeneous reactions on ground surface, and aerosol-related reactions) to O<sub>3</sub> enhancement. A key finding is that the importance of different HONO sources in affecting HONO formation, or in O<sub>3</sub> enhancement changed with height. The authors also reported the contribution of particulate nitrate photolysis to O<sub>3</sub> enhancement, nitrate concentrations, and HONO formation, after adjusting the  $J_{\text{nitrate}}/J_{\text{HNO}_3}$  ratios from 1–120. I have several comments/suggestions that could be considered in the revised version of the manuscript.

1. The authors have indicated that ground-related heterogeneous reactions serve as the main HONO source at near-surface levels. The photolysis of HNO<sub>3</sub> adsorbed (HNO<sub>3</sub>(ads)) on ground surfaces might also produce HONO, and this pathway is not discussed in the manuscript. If this source appears as negligible for HONO production, please explain why. Here is an examples that reported HNO<sub>3</sub>(ads) as a daytime HONO precursor:

Zhou, Xianliang, et al. "Nitric acid photolysis on surfaces in low-NO<sub>x</sub> environments: Significant atmospheric implications." *Geophysical Research Letters* 30 (2003).

2. The information provided in the introduction section does not fully support the

default  $J_{\text{nitrate}}/J_{\text{HNO}_3}$  setting of 30. Several previous studies have provided insights showing that  $J_{\text{nitrate}}/J_{\text{HNO}_3}$  seemed to change with several chemical properties of the aerosol samples (e.g., Ye et al., 2016, Bao et al. 2018), and the authors did not attempt to estimate  $J_{\text{nitrate}}/J_{\text{HNO}_3}$  based on the aerosol chemistry at their sampling sites. Also, it is not clear whether the  $J_{\text{nitrate}}/J_{\text{HNO}_3}$  reported in marine environment could be extrapolated to the atmospheric environment of the North China Plain. I would expect that the acidity of aerosols in the polluted environment might lead to enhanced  $J_{\text{nitrate}}/J_{\text{HNO}_3}$ .

3. Could you explain why uncertainty analyses were only conducted for  $J_{\text{nitrate}}/J_{\text{HNO}_3}$ ? Are there uncertainties associated with the parameters in R3 and R4? Also, does uncertainties in HONO/NO<sub>2</sub> production ratio in R2 affect your results?

4. Please make sure that the supplement information is provided. Now the supplement is not available from the preprint webpage.