

Reviewer #1 comments to the revised manuscript

The revised manuscript has been much improved by the intensified validation of the model by the observed values obtained in EMeRGe. The present version of the article is basically acceptable for publication and the following comments are for improving the paper to an advanced stage.

The article will be logically more understandable if the validation of the model and the discussion are presented in the following order.

1. Comparison of the measurement data and the CHASER simulation for HONO/NO<sub>x</sub> in the urban/suburban boundary layer, where aerosol concentration is high and cloud contribution may be negligible.

There are a few numbers of papers reporting high HONO in urban/suburban area in China and US, e.g.,

Lee et al., *Atmos. Chem. Phys.*, 16, 2747-2764, 2016.

Ye et al., *Atmos. Chem. Phys.*, 18, 9107-9120, 2016.

Zheng et al., *Atmos. Chem. Phys.*, 20, 5457-5475, 2020.

Xue, et al., *Atmos. Chem. Phys.*, 22, 1035-1057, 3149-3167, 2022.

Please show the comparison of the measured and model simulated values for HONO/NO<sub>x</sub> using the best selected common  $\gamma$ -values for heterogeneous HONO formation processes on aerosol- and ground-surfaces including the heterogeneous photochemical HONO formation.

2. Next, show the comparison of measurement data of EMeRGe and model simulation demonstrating that the inclusion of heterogeneous formation of HONO on cloud water improves the agreement. Discuss the relative importance of cloud surface process for HONO formation in the free troposphere in a global scale.
3. Decrease of HO<sub>x</sub> and O<sub>3</sub> formation by the inclusion of HONO formation processes in the free troposphere have been discussed, which is against the general understanding that HONO formation increases HO<sub>x</sub> concentration and O<sub>3</sub> production in urban area. If it is ascribed to the situation under low concentration region of NO<sub>x</sub>, threshold concentration of NO<sub>x</sub>, where positive to negative contribution of HONO formation to the oxidant formation will occur, should be discussed.

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