Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., author comment AC1
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Reply on RC1

Baoye Hu et al.

Author comment on "Exploration of the atmospheric chemistry of nitrous acid in a coastal city of southeastern China: results from measurements across four seasons" by Baoye Hu et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-723-AC1, 2021

Hu et al. performed seasonal field observations of HONO in Xiamen, China in August, October, and December 2018, and March 2019, along with measurements of trace gases, aerosol compositions, photolysis rate constants (J), and meteorological parameters. The result shows that the average observed concentration of HONO is 0.54 ± 0.47 ppb. Vehicle exhaust emissions is an important source of HONO. By considering the influence factors on HONO formation, further explains nighttime heterogeneous conversion of NO_2 to HONO. The daytime unknown sources are likely to be related to light, it is find that there is a logarithmic relationship between $P_{unknown}$ and particulate nitrate photolysis in four seasons. Then, the different parameters of nitric acid during photolysis are discussed, and using the resulting parameters for simulation. The simulated results are compared with the observed values. Finally, daytime HONO photolysis forms significantly more OH than daytime photolysis of O_3 in four seasons except for summer afternoon, further explains the importance of HONO in atmospheric chemistry. The manuscript can be considered to be accepted after addressing the following comments. The language can be further improved to make it easier for readers to follow up.

Response: Thanks for your valuable comments and positive feedback. We have corrected this manuscript according to your suggestion. Below are the point-to-point responses to general and specific comments.

Manuscript should be proofread before resubmission to avoid minor errors, such as Line 32, add "ppbh^{-1}" after 2.05; Line 100, "gas" should be "gases"; Line 173, "Figure 2" should be "Fig. 2", I think it should be uniform throughout the text.

Response: Thanks for your responsible review. Manuscript has been proofread to avoid minor errors. "ppb×h^{-1}" has been added after 2.05 in Line 32, "gas" has been changed into "gas" in Line 100, and "Figure 2" has been changed into "Fig. 2 in Line 173".

Lines 107-108. the English usage in the statement of " The surrounding soil is used for green not for agriculture " is not understandable and the sentence should be rephrased.

Response: Thanks for your careful working. This sentence has been changed into "The surrounding soil is used for landscape greening not for agricultural production".

Lines 118, There should be more detailed information in the parentheses, such as model

number, manufacturer, and region.

Response: Thanks for your careful working. Model number, manufacturer, and region have been added in the parentheses like this: (QE65000, Ocean Optics Inc., USA).

Lines 158-159, the sentence is grammatically incorrect. And correct other similar mistakes in this manuscript.

Response: Thanks for your careful working. This sentence and similar mistakes have been corrected. This sentence has been changed into "The O_3 concentration was determined by ultraviolet photometric analyzer [Model 49i, Thermo Environmental Instrument (TEI) Inc.], and the limit of the instrument is 1.0 ppb".

Lines 254, delete an "in".

Response: Thanks for your careful working. An "in" has been deleted in Line 254.

Lines 268-272, The concurrence of both "(2) short duration air masses (<2 h)" and "(5) NO/NOx > 0.50" may result in inaccuracies, the emission factors need to be calculated in fresh plumes, wider constraints do not guarantee that most of the calculated NO comes from vehicle emissions.

Response: Thanks for your careful working. DNO/DNOx>0.85 was adopted to indicate fresh plumes(Liu et al., 2019). DNO/DNOx>0.80 was adopted to indicate fresh plumes(Xu et al., 2015). DNO/DNOx>0.7 was adopted to indicate fresh plumes(Li et al., 2018). Therefore, DNO/DNOx>0.85 has been adopted to characterize fresh plumes in this study to replace DNO/DNOx>0.50 to guarantee that most of the calculated NO comes from vehicle emissions.

Lines 382-384, dose "H" is the mixing layer height? If we use the mixing layer heights (1074.4 m) in spring and =0.2 cms^{-1} to calculate the dry deposition time, the dry deposition time is 14.9h, that's longer than HONO's life span. So I think the author should reconsider the meaning of "H".

Response: Thanks for your valuable suggestions. "H" is the mixing layer height. A mixing height of 1000 m was used to parameterize L_{dep}(Sörgel et al., 2011; Yu et al., 2021; Su et al., 2008). 500 m were used to parameterize L_{dep}(Xue et al., 2020; Zhang et al., 2019) because the solar radiation reduces significantly. Due to the rapid photolysis of HONO at daytime during its vertical transport, most of HONO can not reach the height above 200 m(Li et al., 2018; Alicke et al., 2002; Liu et al., 2019). Therefore, the mixing layer height 200 m was used to parameterize L_{dep} in four seasons.

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Please also note the supplement to this comment:
https://acp.copernicus.org/preprints/acp-2021-723/acp-2021-723-AC1-supplement.pdf