

Interactive comment on “Sources of nitrous acid (HONO) in the upper boundary layer and lower free troposphere of North China Plain: insights from the Mount Tai Observatory” by Ying Jiang et al.

Anonymous Referee #3

Received and published: 10 July 2020

The work by Jiang et al presents measurements of HONO and other supporting species at Mt Tai, a mountaintop site in the North China Plain. Concurrent ground level measurements were also performed, and comparison were made to explore the source differences. The authors present an interesting data set and provide modelling work to aid their interpretation. Overall, this paper is well thought out and written, with the results clearly presented in the tables and figures. I would recommend publication after consideration to the comments below.

Minor comments Section 2.2: Were the same instruments used at Mt Tai as the ground-level monitoring stations? This is particularly important for HONO measurements, as

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previous work has shown significant differences can be reported for co-located HONO instruments, even of the same type (See e.g. Crilley et al., 2019). Furthermore, were there any inter-comparison measurements of the instruments at Mt Tai and ground to account for any differences between instruments that may affect the comparison? Page 5, line 3: Typically, the baseline is measured every 4-8 hours with a LOPAP (see e.g. Crilley et al., 2019; Kleffmann and Weisen 2008) to capture the temporal variability. Measuring the baseline every 11h 30min may not be sufficient to capture the baseline variability and I am curious why the authors chose to do it like this. Page 6, line 22: I don't quite follow this sentence 'based on the CO (temperature) data and the measured correlations with CO (temperature) for anthropogenic (biogenic) VOCs' What do you mean by CO (temperature)? Page 10, line 23: are the reported j(HONO) and OH concentrations noontime maxima or daily averages? Page 12, line 7: Here you state that heterogenous reaction with NO₂ on aerosol surfaces should be a significant daytime HONO source at Mt. Tai rather than on ground. What is ratio of ground vs aerosol surface area? I am asking to try and understand why this NO₂ reaction may preferentially occur on aerosol surfaces at Mt Tai, unlike previous work at ground level. Page 13, line 10: it would also be good to report the percentage HONO photolysis contributes to OH production from the model, as this would enable comparison to other work. Figure 3: Why is there so much more noise in the HONO/NO₂ diurnal plots compared to HONO and NO₂? Figure 5: I am surprised that there is no noon-time maxima in HONO pss, as the OH should peak then (as seen in Fig 8) along with the NO_x? (as shown in Fig2)?

References Crilley, L. R., Kramer, L. J., Ouyang, B., Duan, J., Zhang, W., Tong, S., Ge, M., Tang, K., Qin, M., Xie, P., Shaw, M. D., Lewis, A. C., Mehra, A., Bannan, T. J., Worrall, S. D., Priestley, M., Bacak, A., Coe, H., Allan, J., Percival, C. J., Popoola, O. A. M., Jones, R. L., and Bloss, W. J.: Intercomparison of nitrous acid (HONO) measurement techniques in a megacity (Beijing), Atmos. Meas. Tech., 12, 6449–6463, <https://doi.org/10.5194/amt-12-6449-2019>, 2019. Kleffmann, J. and Wiesen, P., 2008. Quantification of interferences of wet chemical HONO LOPAP measurements

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2020-377>, 2020.