

Interactive comment on “Contribution of HONO to the atmospheric oxidation capacity in an industrial zone in the Yangtze River Delta region of China” by Jun Zheng et al.

Anonymous Referee #2

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This work combines comprehensive field measurements and full box model simulation to investigate the unknown sources of HONO and the contribution to atmospheric oxidation capacity. The results and conclusions highlight the large contribution of HONO to OH radical source and the important role of light-induced enhanced heterogeneous processes in daytime HONO formation. Overall, the manuscript is written with clear logic, fluent language, deep analysis and full discussion. However, there are some major and minor comments which require to be addressed before the manuscript is accepted.

Major comments: 1. With consideration of the high concentrations of NO (dozens

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of ppbv) from time to time in the morning from Fig. 2, suggest carefully calculating and assessing the contribution of primary emissions from urban vehicle exhausts to the HONO source. 2. Light-induced enhancement of HONO formation on aerosol surfaces was found by the authors, particularly within industrial plumes. So, what photosensitized aerosol components were responsible for the photo-catalyzed processes? Aerosol composition data or additional discussions are required to elaborate this issue. 3. The accurate simulation by using one-dimension box model requires stable meteorological conditions. In this study, how to select the simulation periods and what are the criteria?

Minor comments: 1. Line 37–39, point out the detailed period of time. 2. Line 172, how about the zero calibration or background detection for the HONO measurement? With zero air or using other method? 3. Line 206–207, describe the potential uncertainty aroused by the limited VOC species used in the box model. 4. Line 214, “VOC” can be “VOCs”. 5. Line 235, 238, 239, suggest adding a word such as “averaging” before the “maxiuma” and “minimum”. 6. Line 241–243, the “similarity between the diurnal profile of HONO/NO₂ ratio and that of HONO” cannot suggest that HONO was likely originated from NO₂ heterogeneous reactions. Unchanged NO₂ concentration also led to similar trends between HONO/NO₂ ratio and HONO concentration. Similar trends between HONO/NO₂ ratio and S/V ratio could be an evidence for heterogeneous formation on aerosol surfaces. 7. Line 295, state the possible uncertainty or influence on the model simulation results due to the assumption of constant H₂O₂ concentration of 3 ppbv. A linear or non-linear estimation of H₂O₂ concentration from other pollutants or parameters is better than a constant value. 8. Line 300, point out the detailed period of time, e.g., 7:00–16:00 local time. 9. Line 334–336, are there PM_{2.5} composition data to support that most of the PM_{2.5} components came from secondary formation during the two industrial plume events and the enhancement of secondary aerosol components simultaneously occurred with elevated HONO photolysis rate? If there is no enough evidence, suggest removing the deduction that “high levels of HONO promote the formation of PM_{2.5}” in the main text, Abstract, and Highlights. 10. Line 342,

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the HONO emission ratio was expressed as HONO/NO_x ratio, right? 11. Line 350–351, with consideration of the high concentration of NO particularly in the morning (see Fig. 3), the influence of traffic source possibly cannot be ignored. Suggest carefully evaluating the influence from traffic source. 12. Line 357, as to “the two different time points”, how were the time periods selected? Based on what criteria? 13. Line 374, as to “for several individual days”, which days? What are the criteria for the selection? 14. Line 397, “timely” can be temporal. 15. Line 413, carefully evaluate the HONO emission from traffic sources, due to sometimes NO concentration was very high, particularly in the morning (see Fig. 3). 16. Line 498–500, were there aerosol composition data to show the fractions of secondary components and primary components during the industrial plume events? Were there high levels of photosensitized components such as metals, black carbons, and brown carbons? 17. Line 524–525 and the subsequent paragraph, was the enhanced HONO formation during daytime was dominated by humid heterogeneous reactions, or photosensitized reactions, or together?

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