

Interactive comment on “Ozone formation under low solar radiation in eastern China” by Xuexi Tie et al.

Anonymous Referee #2

Received and published: 10 June 2019

This work tried to explain the measured co-occurrence of high PM_{2.5} and O₃ concentrations. The authors report that the high daytime HONO concentrations could be photo-dissociated to be OH radicals, which enhance the photochemical production of O₃, although depressed solar radiation under heavy PM_{2.5} pollutions. It is an interesting scientific issues. However, the data and method in the manuscript do not support such a conclusion very well at this stage. My major concerns are listed as follows: (1) The authors mixed observations from Shanghai and Beijing to create an illusion. There are no observations to show high PM_{2.5}-O₃-HONO concentrations both at Shanghai and at Beijing. I just see high PM_{2.5}-O₃ during Oct.5-6, 2015 in Beijing and high PM_{2.5}-HONO during September, 2009 in Shanghai. (2) Is the observed co-occurrence of high PM_{2.5} and O₃ concentrations of statistical significance? Are the authors sure

C1

it's (measurements during Oct.5-6) not a special case? (3) Could the authors make an effort to exclude the effects of precursor emissions (e.g., being sure that the VOCs/NO_x ratios are not more beneficial for ozone production during Oct.5-6 than other days) and meteorological conditions (e.g., temperature and relative humidity; under low humidity, although the PM_{2.5} concentration is high, the solar radiation would not be depressed much) ? Moreover, there are no observations show the solar radiation are exactly depressed during Oct.5-6 in Beijing or September in Shanghai ? (4) If the authors insist the high PM_{2.5}-O₃-HONO mechanism, could this possible new mechanism be added to the WRF-Chem model for verification? (5) Discussion in sect.3.3: the conclusion (solar radiation in winter reaches a threshold level to prevent the OH chemical production, even by including the HONO production term) came too hastily without no direct evidence. Specific comments: (1) L167-169: there are no data to show the solar radiation are reduced (2) L185: same above (3) L188-190: same above (4) L199: "Chine" should be "China" (5) L201: removed "OH" (6) L218: what is "am" in O₁D + am-→O₃P (7) L222: "Madronich and Flocke (1999)" should be "(Madronich and Flocke, 1999)" (8) L295-296: one of "P1" should be "P2"? (9) L298-299: one of "P1" should be "P2" ? (10) L241: What are possible sources of HONO?

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-354, 2019.

C2