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 PM2.5 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 PM2.5 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 PM2.5-O3-HONO concentrations both at Shanghai and at Beijing. I just see high PM2.5-O3 during Oct.5-6, 2015 in Beijing and high PM2.5-HONO during September, 2009 in Shanghai. (2) Is the observed co-occurrence of high PM2.5 and O3 concentrations of statistical significance? Are the authors sure
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/NOx 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 PM2.5 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 PM2.5-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?