

Interactive comment on “Integrated studies of a regional ozone pollution synthetically affected by subtropical high and typhoon system in the Yangtze River Delta region, China” by Lei Shu et al.

Anonymous Referee #3

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This study discussed the combined effects of two synoptic systems on O₃ pollution in eastern China city clusters. Subtropical high was identified as the main cause of O₃ episode, which was also influenced by a typhoon system. The case study was meaningful and to some extent representative of the typical O₃ episodes in summer of eastern and southern China. However, many scientific and technical problems must be addressed before this paper is reconsidered to be accepted. Scientific problems: 1. Both VOCs and NO_x are key precursors of O₃, the authors only mentioned and analyzed the patterns of NO₂ and CO. It was not enough to explain the spatial characteristics of O₃ pollution. Even so, the authors did not well establish the possible rela-

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tionships between O₃ and NO₂ and CO. Then, why to show them in Table 2. Suggest to add more O₃ precursors and deepen the discussions. 2. Page 17, lines 410-413, the explanation to biases of O₃ and NO₂ were not convincing. The first sentence was meaningless. Although the second sentence described a common sense, it was not responsible for the discrepancies between simulation and observation. Note that the real conditions of O₃ photochemistry are also non-linear. 3. Throughout the paper, the authors did not say why to select these four cities? Particularly for Wuxi, it was not a provincial capital or an extremely polluted city according to the information the authors provided. 4. Why were the modellings of wind speed and direction not validated with the observation data. They are closely related to the transport processes. 5. The northwest movement of high O₃ centers from 10 to 12 Aug. was not obvious. On the basis of Fig.6, the center located at around 34N, 34N and 33N on these three consecutive days. Clarify and revise the discussions accordingly. 6. What was meant when vertical diffusion was used? How to explain diffusion process aggravated O₃ pollution? Whether it was accurate to use vertical diffusion if the downward air flow transported high O₃ to the surface. 7. Page 23, lines 541-549, evidences need to be provided to confirm whether NJ was influenced by typhoon. 8. In the section of process analyses, the observed and simulated weather conditions in terms of spatial and temporal patterns should be provided to aid the analyses. 9. Page 25, lines 586-591, why sea-land breeze contributed positively to land O₃ and negatively to oceanic O₃? More supporting information are needed, such as the distribution map of O₃ and wind fields. 10. Subtropical high is a common weather system dominating East Asia region in summer. Why did it only cause O₃ episode in this period? Whether the effect was strengthened by the typhoon? On one hand, in the typhoon periphery, the strong downward flow stimulates O₃ formation and suppresses air pollutants diffusion. On the other hand, had typhoon brought dirty air to the region from inland cities? Overall, the process analyses need to be more comprehensive. During the episode, when the subtropical high dominated and when typhoon dominated? Their combined effect was promotion or offset? Technical problems: 1. Too many grammatical errors in this paper, e.g. page

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1, line 15 “is detected”, line 16, “exceeding”, “reaches”, line 22 “abnormal strong”, line 25 “worse air pollution”. I cannot list all of them. Strongly suggest to correct the errors with the aid of a professional language correcting company. 2. Define the abbreviations at their first appearances, e.g. WRF-CMAQ. 3. Page 4, line94, what is the knowledge gap? 4. Past tense was suggested for the Introduction section, except for the common senses. 5. Website references needed to be added for the citations of meteorological and air pollutants data. 6. Page 9, lines 236-238, the function of water vapor and the evidence for its more abundance in Shanghai. 7. Page 17, line 395, WRF/CHEM or WRF-CMAQ? 8. Fig. 6, the legends need to be provided. Positive wind speeds with solid lines mean downward air flow? 9. Conclusion needs to be reorganized after the revision of the whole paper.

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