

Interactive comment on “An important mechanism of regional O₃ transport for summer smog over the Yangtze River Delta in East China” by Jun Hu et al.

Anonymous Referee #3

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General comments

This manuscript, using chemistry transport model WRF-Chem results to investigate one of typical summer ozone episodes observed in the Yangtze River Delta Region (YRD) in Eastern China. The model results was validated by meteorological and air quality observational data. The specific ozone episode was characterized by the nocturnal ozone transport over the residual layer (RL) and the daytime vertical mixing process. The decoupled RL holds the ozone produced from daytime and redistribute ozone concentration there due to large-scale circulations. The ozone-rich air mass from RL can be touch surface and enhance surface ozone levels by strong daytime

C1

CBL mixing processes. The authors clarify the ozone episode with the important mechanism. The results are very interesting and the study is meaningful for understanding the formation of the high ozone episodes in the YRD region. I recommend its publication in a revision in accordance with the following review comments.

Major comments

1. Maximum 8-hour ozone is used in observational ozone analysis, for example in Table 1. However, the model results are hourly-basis. That may lead to some mismatches in the description of the variation of ozone concentrations because the diurnal cycle of hour-ozone and 8-hour ozone are different and time of peak values is shifted from each other.
2. Diurnal cycle of Temperature, solar radiation, hourly, and 8-hour ozone are peaked in different time. It is hard to directly relate those parameters with 8-hour ozone concentrations.
3. Different high air temperature and maximum total radiation described in Table 2 may lead to significant difference of biogenic VOC emissions. I agree with you about the anthropogenic emission can be considered as constant during the episode. But the impact of changes in BVOC on variation of ozone concentrations may also need to be checked.

Minor comments

Line 59 on Page 3: “. . . by the downwind the low-level jets over the eastern coast of U.S. Lee et al” might be “. . . by the downwind the low-level jets over the western coast of U.S. Lee et al”

Line 79 on Page 4: “WRF-Chem model methodology and validation . . .” is better to change into “WRF-Chem modelling methodology and model validation . . .”

Line 91 on Page 4: “maximum 8-hr running mean values” should be “maximum 8-hr running mean values”.

C2

Line 68 on Page 3: I do not understand how the large-scale and long-term climate change of East Asian summer monsoon can significantly influence the surface ozone variations like this two days episode.

Line 84 and 87 on Page 4: change "the chemical data" into "the air quality monitoring data".

Line 142-144 on Page 5: Re-write "...The simulation reasonablein the following section" because it is hard to be understood.

Line 170-173 on Page 8: please re-write this paragraph for more clear.

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