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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Observation and modeling of the evolution of Texas power plant plumes" *by* W. Zhou et al.

W. Zhou et al.

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We would like to thank Anonymous Referee #2 for the thoughtful comments. The following are our responses:

I found the manuscript to be a bit too long and rambling in many places to arrive at the main points of the study. The use of English is also a bit poor. I strongly suggest tightening up the manuscript and proofreading it thoroughly. Specific comments are annotated in the attached manuscript, and I recommend publication after they are addressed.

Reply: The manuscript has been thoroughly proofread and made more concise where possible.

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Interactive Discussion

Discussion Paper

1. Is this for cloudy day only or also for cloud-free days? Pleas revise the sentence to make it clear. (Line 3-4 of page 2)

Reply: this is for the cloudy day only. The manuscript has been revised accordingly: "Model-based estimates of ozone production efficiency (OPE) in PPPs are 20–50% lower than observation-based estimates for the cloudy day."

2. Is it correct to say that the model "under-predicted" OPE when in fact the observation-based estimates are biased high because of rapid removal of NOy from the plume? (Line 6 of page 2).

Reply: the discrepancy between the modeled and observed OPE was mostly due to the rapid removal of NOy in PPPs which was not captured in the model. The last sentence of the abstract has been deleted in the revised manuscript.

3. I am not sure I follow what this sentence is trying to say. What are intensive clouds? Is the word "interactive" used correctly here? (Line 12-14 of page 3).

Reply: Statement removed.

4. This reference seems to be missing in the reference list. (Line 18 of page 3).

Reply: Statement removed.

5. Ambiguous sentence. Can the authors clarify how much detail are they referring to in this statement? (Line 19-20 of page 3).

Reply: The sentence has been deleted.

6. HNO3 is part of NOy. Was the rapid loss of NOy entirely due to HNO3 in these studies? (Line 21 of page 3).

Reply: The studies have primarily attributed the NOy loss to HNO3.

7. As it reads, this statement inadvertently implies that ozone is emitted. Delete primary and change it to "NOx and SO2 emissions" (Line 1 of page 4).

ACPD

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Reply: the suggestion is accepted. Changed “primary” to “NOx and SO2”.

8. trace gases? (Line 9 of page 4).

Reply: changed “Chemical” to “trace gases”

9. Aerosols cannot be "absorbed" into cloud water like gases are absorbed in cloud water. Do you mean the accumulation-mode aerosols are assumed to be completely activated to form cloud droplets? (Line 20-21 of page 8).

Reply: Yes, the accumulation-mode aerosols are assumed to be completely activated to form cloud droplets. The manuscript has been revised accordingly.

10. Above mean sea-level or above ground level? (Line 13 of page 9)

Reply: above ground level.

11. What is the value of the dry deposition velocity for HNO3 in CMAQ? (Line 15 of page 20).

Reply: in northeastern Texas on September 16 2006, the dry deposition velocity for HNO3 in CMAQ was around 2–5 cm/s.

12. This section heading should be changed to Summary and Conclusions. (Line 14 of page 23).

Reply: the suggestion is accepted. Changed “Discussion and Conclusions” to “Summary and Conclusions”.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19953, 2011.