

## ***Interactive comment on “Examining the major contributors and controlling factors of ozone production in a rural area of the Yangtze River Delta region during harvest season” by X. Pan et al.***

### **Anonymous Referee #2**

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#### General comments:

The major contributors and controlling factors of ozone production during the summer harvest at a rural site in the Yangtze River Delta region (YRDR) are studied in this paper by analyzing field measurements of O<sub>3</sub> and its precursors, and results from box modeling, PMF source apportionment, footprint calculation, etc. It was found that on some days during June 2010, ambient air at the observation site was impacted by open biomass burning (OBB), and mixing of OBB plumes with urban plumes from the south

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led to high O<sub>3</sub> levels. The authors proved that the observed high O<sub>3</sub> was mainly caused by local production, identified six major sources of O<sub>3</sub> precursors, and calculated the fractional contributions of these major sources to O<sub>3</sub> production. In addition, they show that air masses from different sectors were highly different in compositions so that the controlling factor of O<sub>3</sub> production varied from case to case. This study suggests that solvent usage, OBB, and vehicular emission are most important contributors to the high O<sub>3</sub> level there.

The topic of this paper is within the scope of ACP. The authors made some in-depth investigations into the formation of O<sub>3</sub> in the rural area of the YRDR using sound methods and technique, showing the importance of solvent usage and OBB in O<sub>3</sub> pollution. The results obtained are interesting and valuable. The paper is well structured and written. However, I do have some points for the authors to address. I recommend publication of this paper in ACP after minor revisions.

#### Specific comments:

- 1) P30917, L18, “Fifteen NMHCs species were detected. . . .”. At a site impacted by significant open biomass burning, the air should contain a lot of NMHCs and other VOCs with higher mixing ratios. Why only fifteen NMHCs were detected?
- 2) P30918, L16, “The missing data were linearly interpolated”. What was the portion of the missing data? Can the data interpolation impact your results?
- 3) P30919, equation (2), the summation sign in the last term is not necessary. However, it may be necessary to include reactions of NO<sub>2</sub> with some peroxy radicals, such as peroxyacetyl radical.
- 4) P30922, section 4.2, how did you know the measurements were impacted by OBB? Was the burning near the site? If so, NO<sub>x</sub> from the OBB plumes may also be significant so that the OBB impact may be more important than the urban plumes transported from about 100 km away.

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- 5) The paragraph between P30925 (L 26) and P30926 (L9), and Figures 6 and 7. I disagree with your statements. Based on Figures 6 and 7, I think O<sub>3</sub> production on 19 June 2010 changed from VOCs-controlling to VOCs- and NO<sub>x</sub>-controlling, and that on 23 June 2010 was VOCs-controlling.
- 6) Section 5.4.1, are these results from Kudo et al. (2014)? The number of samples for the PMF analysis should be given. Very reactive species, such as isoprene, NO<sub>2</sub>, etc., were used in the PMF calculations. Such species may be largely reduced (NO<sub>2</sub> may also be produced) during the transport from the sources to the observation site. How did you treat this influence? What is the impact of this problem on the results? You attribute Factor 5 to vehicular-exhaust, but we know that VOCs are co-emitted by vehicles. Are there coal-fired power plants in the surrounding area? If there are, they may be major contributor to NO<sub>x</sub>.
- 7) P30916, L8, delete "anthropogenic".
- 8) P30916, L15-16, "from the middle of May to the end of June". Which year? In other places you use "June 2010".
- 9) P30916, L26-27, exchange the sentence "Local anthropogenic emissions in the Science and Technology park were very limited" with that after it.
- 10) P30917, L16, delete "mass".
- 11) P30917, L28, "Ionico" should be "Ionicon".
- 12) P30923, L8, delete "(not including oxygenated VOCs)". It is by definition clear that NHMC does not include oxygenated VOCs.
- 13) P30924, L19, "at 11:00 LST"? I think it is "at 12:00LST".
- 14) P30925, L3-4, how did obtain "the observed O<sub>3</sub> production (151 ppbv)"?
- 15) Table 1, units are missing. And you cannot say "the mixing ratio of black carbon (BC)".

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- 16) Figure 6, how did obtain the "observed" P(O<sub>3</sub>)?

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