

## ***Interactive comment on “Overview of the Mount Tai Experiment (MTX2006) in Central East China in June 2006: studies of significant regional air pollution” by Y. Kanaya et al.***

### **Anonymous Referee #2**

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Review of “Overview of the Mount Tai Experiment (MTX2006) in Central East China in June 2006: studies of significant regional air pollution” by Y. Kanaya et al., for ACP

MTX2006 appears to have been a successful field campaign as described in this Overview. My main comment is about the relations between this Overview and the primary papers that came out of MTX2006.

There are portions of the present paper that appear to be based on new ways of analyzing the data. The trouble is that I don't know where the presentation of work by others stops and presentation of new work begins. I suppose I could go back to the papers cited and figure it out by looking for overlaps, but in most cases I didn't. Should

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I assume that all of Section 6, titled Overview of MTX2006 contains only work previously published? Or is there a value added component of Sec. 6, where new insights come from combining the results of several previously published studies? Or are there places where you go off into new territory? This paper needs a statement of intent, probably placed in the blank spot between Heading 6 and Heading 6.1.

Page 1532, line 5 does contain the statement that this paper presents an overview of obtained results and a synthesis of individual papers. However, it is often unclear as to what has been previously presented. An example is the first few paragraphs in Section 6.1 presenting temporal variations of gasses and aerosols. There are references to measurements at other location, but as far as I can tell none to MTX2006. Readers should know where the data is presented in more detail. Also, this lack of clarity makes the Reviewers job difficult. Am, I raising issues about studies that have already been vetted or about new material?

I realize that there is significant overlap between the authors of the primary papers and the Overview. The attribution “we” is usually enough to distinguish the current paper from others. In this case I don’t know who the “we” are. Primary work is cited but not always in places that address my question.

I recommend that this paper be published after there is clarification about what is original and also after the following points are taken care of.

There are many comparisons for gas phase and aerosol species between Mt Tai and other locations in and out of China. Some of these are easy for those of us who are not familiar with Chinese geography to appreciate, for example Beijing. Other locations have little context. For example Miyun is described as a rural site 80 km NE of Beijing. I don’t know what to expect. Are there several “small” cities near Miyun with population 1 – 2 million people?

I have a general impression that the daytime NO/NO<sub>2</sub> ratio is too low, but no calculations to back that up.

Page 1530, line 18. Site is 1534m above sea level. What is approximate altitude above surrounding terrain. This is important later on when free tropospheric air is mentioned.

Page 1533, line 17. Please supply a date that separates the first and second halves of the campaign.

Page 1537 line 7. 1950 ppb is higher than 1500 ppb. Species concentration live on a log scale. I do not believe the description, “much higher” is warranted.

Page 1537, line 13. Work by Parrish in about 2010 showed that the CO to NO<sub>y</sub> emission ratio in the US had decreased to around 6, because of emission controls.

Page 1538, line 3. Is PM 2.1 a misprint?

Page 1538, line 20 Air quality, in the sense of concentration of harmful pollutants is according to your data similar to Beijing. However, the chemical composition is very different because of photochemical ageing.

Page 1539, Diurnal profiles in Fig. 6. Are there differences in diurnal profile between BB and non BB periods. Is there evidence that fire emissions are being transported within FT. If so, does this account for differences in OC and BC as compared with NO<sub>y</sub> and CO. If not where does the early morning BC come from? My recommendation is to just show non-fire data on diurnal cycle graphs.

P1542 line 16. Regarding regional photochemical production of ozone within CEC: It would be very helpful to have a map showing the CEC other than Fig. 1 of Liu et al (2008a). Or at least a sense of the dimensions of the region. Percentage contributions to ozone from CEC (regional photochemical production, I assume) are given. Are these percentages for the daytime or for all 24 hours. Is free tropospheric air, which is observed at night, affected by regional sources? On line 9, local photochemical production is discussed. Again a description of local is needed besides a reference. This is an important part of the story and at least the geography should be self-contained.

Page 1543 line 15. Am I to assume that low ozone days had hourly values under 100

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ppb or is there a stricter criteria, leaving a gap between low and high ozone days?

Page 1543, line 22. The unspoken assumption in comparing a change in ozone with a time integral of an ozone production rate is that the air does not move. Nor does the mixed layer increase resulting in dilution. This may be why it was felt that heterogeneous chemistry was needed to get agreement.

Page 1544, line 5. Changing “ this heterogeneous loss” to this heterogeneous loss of HO<sub>2</sub>” would add clarity.

Page 1544, line 1 – 9. I was surprised to find that the ozone loss was calculated in Taketani et al. (2012). It is not mentioned in this paper that this high ozone loss depends on a net reaction HO<sub>2</sub> + aerosol which yields no gas phase products (Eq. 14). This should be added along with a one sentence description of Mao et al (2013) in which coupled catalytic reaction were invoked to explain why hydrogen peroxide is not generated. Mao et al (2013) admit in their conclusion that there are large uncertainties about the mechanism. In this paper the appearance is that having determined the uptake coefficient for HO<sub>2</sub>, a large loss of ozone follows.

Page 1548, line 23. MAAP results based on absorption gave overestimates. Please correct me if I'm wrong. The MAAP measures light absorption. It yields BC only because there is a conversion factor built into software. It is hard enough to measure absorption and one can argue whether the MAAP does or does not do a good job compared to less intrusive measurements such as a PASS. As the MAAP does not measure BC mass, a comparison with real mass measurements is solely an assessment of how well the mass absorption coefficient in the MAAP software compares to the real atmosphere.

Page 1550 line 1. Regarding Fig. 10: The data is extremely noise and the change OC/(CO-background) from youngest to oldest samples is only about 15%. It may not be statistically significant. Its hard to draw conclusions from this data. The dots representing binned data do not persuade me of statistical significance.

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Fig. 3 There is a brown trace on the second pane (CO, CO<sub>2</sub>, benzene) that is not identified. It is almost impossible to see light color traces. In particular the yellow used for NO in the third panel and for NO<sub>y</sub> in the fourth panel.

Fig. 4 Color coding with a range of colors rather than a brown monotone would allow the reader to more easily distinguish between high emission regions and extremely high emission regions. To better make that clarification, I would consider changing the display to a Log scale.

Emission rates are per unit area. The figure caption or legend should specify what that area is.

Fig. 6 Yellow traces are nearly invisible. NO in one plot and NO<sub>y</sub> in another. Greenish blue and turquoise traces in bottom two panels are hard to distinguish.

Fig. 7 The view has shifted between the top and middle panel. What looks to be a tower in the top panel has not disappeared (no claim made to that effect). It certainly is hazier in the bottom two panels but the nearby mountain is still clearly visible. There are some hills in the distance in the top panel, which become covered with haze. Unfortunately these hills are do not protrude much above the nearby mountain. It would be helpful to know distances to objects.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1527, 2013.

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