**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "PTR-MS measurements of non-methane volatile organic compounds during an intensive field campaign at the summit of Mount Tai, China, in June 2006" *by* S. Inomata et al.

S. Inomata et al.

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We thank valuable comments and suggestions from the anonymous referee #3. Responses to the comments and suggestions are given below. We reflected these responses in a revision of the manuscript.

Specific Comments:

1. We have added a table (Table 1, new table number) according to the referee's comment.

2. We believe that NO_y detected by our system is gaseous species.

3. According to the referee's comment, we have tried reducing the length of the experimental part using a table (Table 2, new table number) that includes principal parameters for PTR-MS operation. Since other parameters, source current, U_4, U_5, U_1, and U_{NC}, were the same as previously reported (Inomata et al., 2008), we omitted them to reduce the length of the experimental part.

4. We recognize that the background signals were obtained in the dry conditions during the field observation. Therefore, we examined humidity dependence of the background signals in the laboratory and confirmed that no significant humidity dependence of the background signals at the masses listed in Table 1, as mentioned in text. The background signals in the dry conditions obtained during the field observation were subtracted from the observed ion signals, and the ion signals were converted to the mixing ratios by using the detection sensitivity and the humidity dependence determined in the laboratory.

Since the background signals for all masses were stable during the observation, the efficiency of the zero-air supply in removing VOCs was, at least, stable during the observation.

The species with the detection limits of 10 pptv is acetonitrile and its mass number of the protonated molecule is 42. Background signals at even mass numbers are usually small compared with those at odd mass numbers. The averaged background signals at 42 were 0.4 ± 0.4 (2σ) ncps for 1-s integration. Therefore, the detection limits for 10-s integration were calculated to be 10 pptv ($= 0.4$(ncps)/sqrt(10)/12.8 (ncps/ppbv)).

We thank the referee for the information of the catalytic converter. We will try to use it to take the background signals in ambient air in future.

5. It seems to me that the referee misread the unit of the water vapor concentration used in Inomata et al. (2008); not 30 "ppmv" but 30 "mmol/mol". The range of the water

vapor concentration is similar to the typical ambient level.

6. When the point at about 1.5 ppbv was removed, the slope became 1.8 ± 0.9 and the correlation coefficient (r^2) became 0.40. Although the data shows more scattering as pointed out by the referee, reasonable agreement was still obtained.

With regard to monoterpenes, we have revised the sentences as "There is little correlation between Σmonoterpenes and M137 (Fig. 2(e)). The data of Σmonoterpenes (M137) will not be discussed in the following sections." Therefore, we have deleted the data of Σmonoterpenes (M137) in Fig. 3(d).

7. We obtained a positive relationship between n-nonanal and M143 and between n-decanal and M157, however the slopes were 2.6 ± 2.0 for n-nonanal ($r^2 = 0.13$, n (data number) = 10) and 8.6 ± 5.2 for n-decanal ($r^2 = 0.71$, n = 7). There are many kinds of isobaric and isomeric compounds for n-nonanal and n-decanal, probably resulting in the slope larger than 1. These data are not more informative than the fact that n-nonanal and n-decanal were measured during the campaign by means of other techniques as mentioned in text.

8. We have revised discussion with regard to the O_3 diurnal profile as "The net O_3 production rate was estimated by a box model to be 51 ppbv d^{-1} during the 16-30 June period (Kanaya et al., 2009). This rate is large enough to explain the observed O_3 increase shown in Fig. 3(b) ($\sim$30 ppbv). These suggest large influence from local photochemistry on the observed diurnal O_3 profile. On the other hand, it is interesting to note that the mixing ratios of not only O_3 but also CO started increasing in the early morning and reached a maximum in the early afternoon (Fig. 3(b)). This suggests a substantial role of the PBL development in shaping the profiles of these species. Hence a part of the daytime increase in secondary products like O_3 and NO_z, are likely caused by the development of PBL. O_3 itself and/or the O_3 precursors were likely transported from the ground surface to the top of Mt. Tai , resulting in the increase of O_3 as seen in Fig. 3(b)."

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9. We have replotted the diurnal variations of NO_x and NO_y in the same y-scale in Fig. 3(c), indicating that a fraction of NO_x in NO_y was very small (less than 10%).

Technical Comments:

1. We have revised the figures according to the referee's comment.

2. Since we have no experimental data with regard to naphthalene and methyl-substituted naphthalenes, we have removed the sentences "The peaks at m/z 129, 143, and 157 were...C_8-C_{10} aldehydes/ketones in the study."

3. We have revised this according to the referee's comment.

4. The sentence was removed in the revised manuscript.

5. We deleted "is predominant".

References

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