**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.

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We thank valuable comments and suggestions from the anonymous referee #1. Responses to the comments and suggestions are given below. We reflected these responses in a revision of the manuscript.

1. Although we referred to Inomata et al. (2008), where the method to determine the humidity dependencies of detection sensitivity was described for formaldehyde, there was no information on the range of the water vapor concentrations examined. We have

added the sentence "The humidity dependence was examined in the range of 0 to 25 mmol/mol for the absolute water vapor concentrations." in this revised version.

2. We agree with the referee's comment. As we compared the calibrated detection sensitivities of the VOCs listed in Table 1 except ethanol ($\sim$5 to $\sim$14 ncps/ppbv) with the calculated detection sensitivity using the typical rate constant of 2×10^{-9} cm^3 molecule^{-1} s^{-1} (9 ncps/ppbv), we recognize that the uncertainty in eqn. (1) is approximately $\pm$50 % for the VOCs. We have mentioned this after eqn. (1) as " The uncertainty in eqn. (1) is thought to be approximately $\pm$50 %, according to the differences between the calibrated and calculated detection sensitivities for the VOCs listed in Table 3 (new table number) except ethanol.".

3. 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.".

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

Tani et al. (2003) reported that the monoterpenes, α- and β-pinenes, 3-carene, and limonene, produce fragment ions of *m/z* 67, 81, and 95 as well as a protonated molecular ion of *m/z* 137. We do not think that monoterpenes produce fragment ions at *m/z* 93.

The GC-FID measurement/analysis was conducted by the co-authors of Tokyo Metropolitan University (TMU) group and their method with regard to canister-GC-FID system is well accepted (Kato et al., 2004, 2007; Suthawaree et al., 2010).

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

6. We wanted to show in Fig. 3 that the diurnal variations mainly depend on local

photochemistry in the absence of regional influences . During $24-28$ June, prominent diurnal variations, with a daytime maximum and night time minimum, were observed every day for formaldehyde (Inomata et al., 2008), NO_z, and wind speed. Therefore, we chose this period to explore diurnal variations for other VOCs. We mentioned this at the 1st paragraph of Sec. 3.3.

7. As already mentioned, the observed O_3 increase can be explained enough by the in situ photochemical reactions (Kanaya et al., 2009). However, the effect of PBL was apparently observed in the diurnal profiles of several species. The referee #2 pointed out that the increase of CO, O_3, and NO_z, starting at around 8:00 CST and reaching a maximum at around 14:00 CST, could also be caused by the development of PBL. Therefore, we hypothesize that O_3 itself and/or the O_3 precursors were transported from the ground surface to the summit of Mt. Tai, which would have contributed to the increase of O_3 in Fig. 3(b). We revised the text properly.

We have decided to delete the data of Σ monoterpenes (M137) in Fig. 3(d) because there was little correlation between Σ monoterpenes and M137 in Fig. 2(e), according to the comments by the referee #3.

8. The F/A ratio of $\sim$0.6 was derived from the averaged value of the ratio of [formaldehyde] to [acetaldehyde] during the whole observation period. During "without BB plume" period, there may be the contribution of the secondary production of formaldehyde. As mentioned in page 26715 at lines 4-5, we did not consider the photochemical age of the OVOCs for the emission ratios summarized in Table 3. That may be the reason why the correlation between CO and formaldehyde without BB plume was negligible (r^2=0.01) as shown in Fig. 9(b). Hence we have deleted the emission ratio for formaldehyde without BB plume from the table.

9. The sentence starting from "This result is similar….." may be confusing, as the referee pointed out. We found that the emission ratio of methanol to CO in the BB plume was similar to that without BB plume. Indeed, the high concentrations of methanol

were observed not only near tropical forest fires but also at urban areas (Liu et al., 2009; Warneke et al., 2007). We revised the text, referring to these papers.

10. We investigated the emission ratios for other NMHCs such as aromatics. We found substantial enhancement in the emission ratios for the NMVOCs listed in Table 2 in the BB plume but not for other NMHCs.

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