

***Interactive comment on “In-situ ambient quantification of monoterpenes, sesquiterpenes, and related oxygenated compounds during BEARPEX 2007 – implications for gas- and particle-phase chemistry” by N. C. Bouvier-Brown et al.***

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Thank you very much for the suggestions. The comments are re-written here in bold, and our responses are given below in normal text.

**General comments: The manuscript by Bouvier-Brown et al. describes the concentrations of mono- and sesquiterpenes and some oxygen containing compounds in a ponderosa pine forest in the Sierra Nevada Mountains in California.**

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These measurements are very interesting and of utmost importance since there are so few of this kind of experimental data available. The ozone removal technique adopted in the experimental set up did not allow quantitative analysis of  $\beta$ -caryophyllene and  $\alpha$ -humulene. This is unfortunate, because on the basis of emission rate measurements  $\beta$ -caryophyllene would be an important compound in the area. Hence the current results give only lower limits of the sesquiterpene mixing ratios and of the effect sesquiterpenes have on the OH and ozone reactivity. As pointed out by Thomas Karl these problems could now be avoided by using other ozone removal techniques as shown by Robert Arnts. In spite of this shortage the paper fits well to ACP and I recommend it's publication after minor revisions.

**Specific comments:** 1. The second measurement period was cooler, but how much cooler? Figure 1 shows the temperature, but the mean temperature and radiation could also be shown in Table 1. We have added these parameters to Table 1.

2. **What was the effect of rain on the mixing ratios? Did the relative contributions remain the same?** As shown in Figure 1, the immediate effect of the rain increased the monoterpenes, and just following the rain pulse, there was a large increase in methyl chavicol mixing ratios, thus the relative contributions would not be the same.

3. **Units are missing from Table 1.** Thank you. Corrected.

4. **Figure 4 is unclear. It could be divided into two different figures, one comparing the emissions and concentrations and the other one comparing the concentrations and reactivities. The concentrations of light alkenes could also be shown.** We feel that the emissions, concentrations, and ozone reactivity contributions should all be on the same figure because it provides a complete picture of BVOCs at Blodgett Forest. To enhance clarity, we added subtitles to each part (A, B, and C) of the figure. We have also included the average concentrations measured by the NOAA

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GC-MS (isoprene, MACR, MVK, 3-methylfuran, MBO, ethene, and propene) to Table 5.

**5. On the basis of emission rate measurements there are much more compounds emitted by the vegetation than are measured in the forest air. Wouldn't it be more correct to evaluate the reactivity on the basis of emission rate measurements than the concentrations because all emitted compounds react in the atmosphere, although some of the reactions are so fast that these compounds can never be measured in the air?** The branch enclosure measurements described by Bouvier-Brown et al. (2009a) focused on monoterpene, sesquiterpene, and methyl chavicol emissions from the Blodgett Forest ecosystem. Using the basal emission rates of those compounds, Bouvier-Brown et al. (2009a) addressed the amount of ozone that would be consumed by reaction with these compounds. Using emission rates and estimated ozone reaction rates ( $k_{O_3}$ ) from Bouvier-Brown et al. (2009a), the sesquiterpene contribution to ozone loss at the point of emission is 2.4 (0.74 emission mass ratio  $\times$   $k_{O_3}$  ratio  $\times$  molecular weight ratio) times that of the monoterpene ratio.

In the present study conducted at BEARPEX, we wanted to calculate the ozone reactivity using all olefins measured in ambient air, not just the compounds emitted directly from the ecosystem. With this calculation we can make the point that even a very small amount of reactive compounds left in the ambient air (e.g. 3.3 ppt sesquiterpenes) can make a significant impact on ozone reactivity.

Reference: Bouvier-Brown et al., Atmos. Environ., 43, 389-401, 2009a.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 10235, 2009.

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