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## ***Interactive comment on “Emissions of BVOC from Lodgepole Pine in response to Mountain Pine Beetle attack in high and low mortality forest stands” by T. R. Duhl et al.***

**Anonymous Referee #1**

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This manuscript describes a study where trees from two lodgepole pine stands (Chimney Park, Wyoming and University of Colorado Mountain Research Station), and with and without a bark beetle attack, are compared and their emissions of volatile organic compounds are characterized. This issue has general importance, since the reactive compounds released from damaged forests can regionally impact the atmospheric chemistry and affect the ozone and other oxidant levels and production of SOA from their precursors. The biotic interactions have been seldom quantified, especially in field studies, as in field conditions many confounding factors may influence the results. Therefore the rather unfortunate bark beetle episode at the Rockies has provided researchers a unique possibility for analyzing the responses of forests in a wide scale to

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the bark beetle damage.

The ms was done as a preliminary screening study, in order to determine potential significant differences between the sites in branch-level BVOC emissions. The other objective was to characterize the seasonal variability in emissions among healthy and beetle-attacked trees at one of the sites. However, the number of trees within each site, sampling time and damage category is rather small, and as one of the controls was later found to be also infested by an unknown pathogen, it is hard to make proper statistical analyses for the data. Also, several sampling times and two different sampling approaches were used which makes comparisons between the sites even more difficult. Thus, many of the results are merely indicative, and definite causal relationships are difficult to obtain.

The manuscript will need major revisions and concentrating on the main findings. Due to the complex samplings and the difficulties involved, the message of the study is not transparent and clearly argumented in the current ms. I get the impression that the authors were not able to decide what their main message was, and therefore decided to list all data without a proper analysis. Therefore the results -section is in many places tedious to read, and in fact it occasionally is just listing the individual measurements, instead of summarizing the message in figures and tables. Further, the tables are far too detailed, and need to be condensed or changed to figures. The discussion should concentrate on the main findings and leave speculations out.

In summary: the ms needs to be condensed, and concentrated around the main, significant results.

Specific comments:

- How were the trees and the sampled branches selected? Was shoot growth quantified between the samplings?
- Can you quantify the beetle-induced damage to sample trees somehow (e.g. x% of

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foliage turned red)?

- The calculation of emission rates should be presented in the materials and methods (now in results).
- Although this is one of the reasons why the number of samples is so small, it is not necessary to describe the destroyed samples in such details (p 9137 lines 17-21).
- Table 1 and 2: Currently there are too lengthy descriptions of sites (with even some references!), these should be moved to the main body of the text. What does 'Stand-membership' (Table 2) mean?
- I suggest revision of the tables 1 & 2: TABLE 1: the most relevant characteristics of the sites (infestation category, tree age, stand density, management, soil type, long-term T and precipitation etc.), and TABLE 2: conditions during measurements (date, T, PAR), numbers of sampled trees, etc
- tables and figures should be self-explanatory with all abbreviations out-spelled in the legend. Since there are quite many abbreviations used in the ms, it is very hard for the readers to remember them by heart.
- most of the tables are very busy and should be condensed, or the results illustrated in figures (and not all measured numbers need to be listed)
- table 7: give the degrees of freedom for the statistical tests
- figures 2-4 are poor quality and the legends are unclear
- fig 3: which data was used for the regression lines? Did you combine the controls and old beetle measurements?

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