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Biogeosciences Discussions

Interactive comment on "Rapid mineralization of biogenic volatile organic compounds in temperate and Arctic soils" *by* Christian Nyrop Albers et al.

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General comments

The manuscript shows rapid mineralization of different BVOCs in temperate and Arctic soils. The manuscript is concise and clear. I appreciate your chosen scientific approach and use of relatively low BVOC concentrations, which are more realistic compared to the earlier studies. I recommend this manuscript for publication after it has been modified. Scientific significance of the manuscript would have been stronger if the number of BVOCs and soil types studied would be higher. Considering the Table 4, I would like you to justify, why you decided to choose the compounds that were not the dominating ones in the ambient air close to the soil surface. Why to choose p-cymene

if several other monoterpenes showed much higher concentrations in the atmosphere above the sampled soils? Especially when you say in the conclusions that BVOC degradation by soil microbes could have atmospheric implications. I would also like to read your reasoning behind why you decided to study only six different BVOCs when the spectrum of different BVOCs emitted by vegetation and soil processes is very high. One value of this study is that you studied different soil types. You should mention different soil types already in the abstract.

Specific comments

Line 12. You wrote in the text: "Their release into the atmosphere is important with regards to a number of physical and chemical processes." Please keep in mind that you will sell your manuscript to your readers. Please be more precise. What do you mean with this?

Line 33. Please remove "though".

Lines 37-38. Please clarify that this is a chain reaction from BVOCs and oxidants (OH, O3, NOx) to SOA and from there to cloud formation and properties.

Line 41. "Owe to" is not good. Please use another verb.

Line 43. Please clarify what is a fate model.

Lines 44-45. You wrote that "The microbial degradability of BVOCs - and especially the rate of degradation - are on the other hand very difficult to predict." Could you please clarify why microbial degradability of BVOCs is difficult to predict? In soil, there is a high diversity of compounds with varying properties for microbial degradation. Microbial population diversity is high. Chemical transformation from one compound to another happens also in soil. Soil conditions vary in time, which can affect degradability of BVOCs.

Lines 54-55. Field study or laboratory measurements? Which ecosystems/soil types? Please clarify.

Line 61. “The ultimate proof” is not scientific language.

Table 1. Please specify in the table that 16s is bacterial biomass and ITS2 is fungal biomass.

Line 105. “A snap-shot” is not scientific language.

Line 110. Please be more precise: a gas chromatograph–mass spectrometer, and please include the instrument details.

Line 137. Please correct “all BVOC was present”. It should be: all the BVOCs were present in the headspace of the flasks.

Lines 210-220. It would be more easy to read if you would discuss methanol first and benzaldehyde after that. Now you discuss methanol first, then benzaldehyde, then methanol again and so on.

Line 344. You talk about communication between soil organisms. Please add a reference.

Line 327. PTR-MS should be the proton-transfer reaction mass-spectrometer.

Line 351: It is needless to say “In conclusion”, when the title is Conclusions. Please make the conclusions more concise.

Table 2. Please specify in the table that Sw means water solubility.

Table 4. You could consider to add reactivity of each compound or reactivity range of each compound group, because it will likely affect your results. You should also present analytical methods and calculations in the M&M section.

Figure 3. You didn’t do any statistical analysis on how the BVOCs behave in the different soil types. You should use valid statistical tests and add p values into the text. Please include statistical methods into the M&M section. Please remove the framing. Same for the Figure S1 in supplements. You should clarify in the figure caption that

chloroform was measured for 25 days and others for 150 hours.

Finally, it would be nice to see a map that shows locations of the sampling sites in supplements.

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