

Interactive comment on “Snowpack concentrations and estimated fluxes of volatile organic compounds in a boreal forest” by H. Aaltonen et al.

Anonymous Referee #2

Received and published: 27 February 2012

The manuscript of Aaltonen et al. describes measurements of VOCs within snowpack over the course of two seasons in a boreal forest. The work aims to quantify the importance of soil processes to wintertime fluxes of VOCs to the atmosphere. This work represents one of only a few studies to address this in the literature, and the only study to discuss terpenoids (in winter) in detail. Interestingly, different meteorological conditions existed in the two seasons discussed, shedding some light on the importance of soil processes, snowpack physical morphology and surface forest damage in VOC emissions. Overall the paper is generally well written and concise. Several suggestions and comments below could help improve clarity.

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It would be useful to put the measured VOC fluxes in context with other reported values (e.g. how does the winter flux from soil compare to e.g. summertime vegetation production – even if just an order of magnitude comparison; how does it compare to other types of VOCs from soil, etc?). The authors mention that the VOC concentrations were similar to (unpublished) belowground VOC measurements collected during the snow-free period, but don't go much beyond that to put these measurements into context otherwise.

The authors should make some mention in the methods of the instrumental/method blanks. The analytical variability is rather high in some cases – this is calculated from "parallel samples" but it is not clear if this represents replicate "environmental" samples or variability based on analysis of replicate standards? Were any lab studies done to determine what the typical recovery of analyte is under typical sampling conditions (e.g. to approximate wall losses, etc)?

Specific comments/suggestions:

Abstract, line 1: suggested wording "Soil provides an important source of volatile organic compounds (VOCs) to ...". To where? Atmosphere? State so explicitly.

Abstract, line 13: "...suggesting soil as the source for terpenoids."

Abstract, line 13: It is unclear in the abstract alone what you mean by "forest damages", it becomes clear in the text of the manuscript, but this sentence needs clarification if it is to stand alone in the abstract.

Abstract, line 19: "...when other biological sources, such as plants, have lower activity."

Page 529, line 1: sentence referring to above or below soil surface activity ... isn't it rather apparent that the activity necessarily comes from above or below the surface? Where else could it be?

Page 529, sentence beginning "The air chemistry in the troposphere..." seems out of place as written. Perhaps starting the sentence with something like "Because the soil

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could be an important VOC source..." will make this clearer.

Page 529, line 14: "...biological contributions to these fluxes..."

Page 529, line 26: "...but could also act as sinks..."

Page 530, line 20: "We measured the concentrations of terpenoids inside the snow-pack..."

Section 2.3: Use section title of "Supporting" data instead of supportive?

Page 536, line 9: Instead of saying the temp "never dropped even to -1C", it would be clearer to say the temp "never dropped below X".

Page 537, line 27: "However, for the sesquiterpenes the ratio was similar in both winters..."

Page 541, line 1: "...organic compounds are affected not only by..."

Page 543, line 2: "...already in section 4.1..."

Table 2: Define if 0 cm represents the soil surface or the snow/air interface.

Figures 2, 3 and 4 are difficult to read. The lines in 2a are hard to distinguish, especially using just black and white figures. The data points in Figures 3 and 4 are hard to see, they need to be made darker, bolder, colored, larger, etc.

Figure 4: Is panel (a) meant to not have any data shown?

Interactive comment on Biogeosciences Discuss., 9, 527, 2012.