

## ***Interactive comment on “Annual cycle of volatile organic compound exchange between a boreal pine forest and the atmosphere” by P. Rantala et al.***

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Dear Editor,

Please find the revised manuscript and answers to the reviewer's comments. We have addressed all the comments raised by the reviewers. In addition, we found a small indexing error identifying the measurements from different heights, leading to small changes in the derived fluxes. Absolute concentration gradients were generally slightly overestimated which led also to an overestimation of absolute flux values. The revised monoterpene flux values are for example ca. 30% smaller than the old ones. However,

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even though the quantitative values of the fluxes changed, this had only a minor effect on the main findings and conclusions of the paper. Thus we hope that the paper will be acceptable for publication after these revisions, and the possible questions arising from them have been addressed.

Below is the list of the changes made in the manuscript, in addition to those described in the responses to the reviewer's comments: As the VMR gradients decreased, the fluxes had higher uncertainties. To compensate this, the average day-time and night-time values (Table 2) were calculated using data from 11 am – 5 pm and 2 am – 8 am instead of 2 pm – 5 pm and 2 am – 5 am, respectively. Although more data were taken for calculating the monthly averages, for example mean monoterpene flux from November was statistically insignificant ( $4\sigma$ -level). In addition, we were not able anymore to detect significant fluxes at  $m/z$  85. Therefore, the amount of observed flux compounds dropped from 14 to 13.

Monoterpenes:

- According to the pool algorithm, the highest emission potential would be in July instead of May. The hybrid algorithm gives still the largest emission potential in May.

Methanol:

- Emission potentials of May and June are almost equally large (earlier the largest potential was in May).
- $R_w$  value was changed from  $73 \text{ s m}^{-1}$  to  $120 \text{ s m}^{-1}$  due to decreased deposition values. In addition, the parameter was determined from period Jul–Aug instead of May–Aug because the deposition values were slightly noisier in June and May than before.

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Other compounds:

- Acetic acid: in a monthly scale, net deposition was not detected anymore
- Significant deposition of  $m/z$  47 could not be detected anymore.

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