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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Undisturbed and disturbed above canopy ponderosa pine emissions: PTR-TOF-MS measurements and MEGAN 2.1 model results" *by* L. Kaser et al.

Anonymous Referee #3

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This is a very interesting paper nicely matching the scope of ACP. Particularly novel seems to be the significance of wind-related mechanical stresses triggering biogenic emissions. Thus, it might be important to account for such disturbances in the models. The story is nicely presented and I would have just a few comments/suggestions below. Similarly to other referees I would like to recommend the paper for publication in ACP if the comments can be addressed.

1) The prescreening approach (chapter 2.3 flux calculation) sounds interesting but might not be very clear for a reader. a) Did you perform prescreening for all the 30 min periods for all the 649 peaks? b) Would this method be also sensitive to low-

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concentration VOCs? c) Would pre-averaging of the covariance (e.g. as in Taipale et al., 2010) help the accuracy and sensitivity of this approach. Would preaveraging affect the pattern of the red dots in Fig. 1?

2) Another criteria the authors have used are a 0.1 mg m-2 h-1 cutoff. I am slightly worried about how this may impact the representativeness if we focus only on large flux players and neglect all small fluxes which can add up to significant flux. For example, assuming that just 10% of the remaining mass peaks (649-17) showed the flux of up to 100 ug m-2 h-1, this would give an upper limit of 6 mg m-2 h-1 which is close to the maximum flux reported for the sum of MBO and isoprene in this paper (Fig. 10). a) Was the 0.1 mg m-2 h-1 limit chosen arbitrarily or how was it determined? b) how many more peaks in the mass spectrum would have shown a clear peak in the covariance function if you reduced the constant cut-off flux detection limit to 50, 10 ug m-2 h-1? c) Was it not possible to use an instantaneous limit of flux detection (e.g. as in Spirig et al. 2005)? Some compounds may be low emitters but can show occasionally high fluxes.

3) In terms of modeling hailstorm-related wound stresses, is there a perfect VOC tracer (styrene?, homofuraneol?) to give a proxy for hailstorm disturbance?

4) There can be high emissions of monoterpenes from resins (Eller et al., 2013). Is it possible that during a hail storm more resin can be exposed and vaporized?

5) Can you please make the caption of Fig. 7 to spell out the acronyms so the reader does not have to refer to the text?

6) Can you break the y axis in Fig 8. The precipitation spike makes other peaks look very small.

7) Is it possible to add error bars in Fig 9.?

8) The monoisotopic mass of C7H10O3-H+ which is shown unidentified in Table 8 would be consistent with homofuraneol.

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Literature:

Spirig, C., Neftel, A., Ammann, C., Dommen, J., Grabmer, W., Thielmann, A., Schaub, A., Beauchamp, J., Wisthaler, A., and Hansel, A., 2005, Eddy covariance flux measurements of biogenic VOCs during ECHO 2003 using proton transfer reaction mass spectrometry: Atmospheric Chemistry and Physics, v. 5, p. 465-481.

Taipale, R., Ruuskanen, T. M., and Rinne, J.: Lag time determination in DEC measurements with PTR-MS, Atmos. Meas. Tech. Discuss., 3, 405-429, doi:10.5194/amtd-3-405-2010, 2010.

Eller, A.S.D., Harley, P., and Monson, R.K., 2013, Potential contribution of exposed resin to ecosystem emissions of monoterpenes: Atmospheric Environment, v. 77, p. 440-444.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 15333, 2013.