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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Volatile organic compound emissions from *Larrea tridentata* (creosotebush)" *by* K. Jardine et al.

Anonymous Referee #1

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The paper by Jardine et al. reports interesting measurements of VOC emissions from desert vegetation. However, the paper lacks in clarity of its results. There is a long list of Figures presenting time series of the emissions and concentrations of different compounds. (eight figures, each with six to ten panels). I feel this is too much especially as the time series look quite similar and they are not discussed so much. I would suggest to the authors to try to condense this information better. A lot of the information in the figures is already in Table 1. I would suggest including some measure of the variability to this table and moving most of the time series to supplementary material. Also I suggest the authors try to be more clear on what they think are the main messages of the paper.

The methods of VOC measurements and calibrations should be presented in more

detail. It is especially important for the reader to understand the methodology used as the authors give recommendations on calibration in the beginning of chapter 3.1. Also more information on chamber measurements should be given (including how many replicates were measured). I my opinion just referring to supplementary information is not enough. The paper should be understandable alone.

Detailed comments:

Page 17115, line 20: Reference to Karl et al. (2004) on VOC emissions from tropical rainforests and to Rinne et al., (2005) on boreal forests. Here one could refer rather to reviews on tropics by Kesselmeier at al. (2009) and boreal region by Rinne et al. (2009).

Pages 17116-17117, lines 27-1: How are the emissions adjusted to 30 C. As there is no commonly accepted formula for e.g. methanol and acetaldehyde it unclear how comparable are the normalized emissions.

Page 17120, lines 14-15: "In the case where more than one compound contributes to a given m/z value measured by PTR-MS, we estimate that they possess similar normalized sensitivities". What is meant by normalized sensitivity? The authors should present the equation as there can be different ways to define this (are the changes is cell pressure, water cluster and zero counts taken into account).

Page 17121, lines 14-16: "Because methanol production in plants is related to cell wall expansion during growth and not recently photoassimilated carbon. . ." I believe methanol can also be emitted from decaying or drying plant matter (e.g. de Gouw et al., 1999; Warneke et al., 2002). Could this have an effect on measurements?

Page 17121, line 27: "2000–2500 PAR". PAR is not a unit but abbreviation for photosynthetically active radiation. Please insert proper units (most likely μmol m^{-2} s^{-1}).

Page 17123, lines 13-14: "large loss of nitrogen from these ecosystems of 8.4 ng N m-2 s-1 with a maximum loss rate of 35 ng N m-2 s-1 (normalized to leaf area)" It would

ACPD

10, C7680–C7683, 2010

make the comparison with other ecosystems easier is the normalization would be to land area. How does this compare to other N fluxes at these ecosystems?

Page 17124, lines 3-5: "dimethyl sulfide (DMS) and 2,4-dithiapentane measured with PTR-MS at m/z 63 (0.2 μg C gdw$-$ 1 h$-$ 1) and m/z 109 (1.2 μg C gdw$-$ 1 h$-$ 1), respectively" Was the identification confirmed by GC?

17126: Volatile isoprenoids: Here it would be interesting if the authors would look at the dynamics of the monoterpene emission more closely. Does the emission originate from synthesis or from monoterpenes stored in specific storage structures (see e.g. Grote and Niinemets, 2008; Ghirardo et al., 2010).

Technical comments

The authors should check the order of figures. It seems that they are not referred in their numerical order.

Page 17116, lines 8-9: "...contributions to regional biogenic VOC emissions could be significant. Creosotebush leaves are opposite..." I would start a new paragraph between these sentences as the subject changes from land-cover to finer structure id creosote bush.

Page 17117, lines 7-8: "...10 to 30 times less..." and "...3 to 8 times less..." This expression is not very clear. I believe the authors mean 3 - 10

Page 17122, line 6: "Unlike the Geron et al. observations..." I would rather write "Unlike the observations by Geron et al.

References

de Gouw, J. A., C. J. Howard, T. G. Custer, R. Fall, 1999: Emissions of volatile organic compounds from cut grass and clover are enhanced during the drying process, Geophys. Res. Lett., 26, 811.

Ghirardo, A., K. Koch, R. Taipale, I. Zimmer, J.-P. Schnitzler J. Rinne, 2010: Deter-

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Kesselmeier, J., A. Guenther, T. Hoffmann, M.T. Piedade J. Warnke, 2009: Natural volatile organic compound emissions from plants and their roles on oxidant balance and particle formation. In: M. Keller, M. Bustamante, J. Gash P. Silva Dias (Eds.): Amazon and Global Change. Geophysical Monograph 186. American Geophysical Union, Washington DC, USA.

Rinne, J., J. Back H. Hakola, 2009: Biogenic volatile organic compound emissions from Eurasian taiga: Current knowledge and future directions. Boreal Environment Research, 14, 807-826.

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