

## ***Interactive comment on “Seasonal measurements of total OH reactivity fluxes, total ozone loss rates and missing emissions from Norway spruce in 2011” by A.C. Nölscher et al.***

**Anonymous Referee #2**

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This paper reported the measurement of total OH reactivity rate (TOHRE) from spruce branch enclosed by cuvette. TOHRE is new idea for evaluating the emission from plants. From the measurements of TOHRE from spring to autumn, there are several interesting results. Missing TOHRE was observed but it is quite variable at different season. Variation of TOHRE seems related to some factor like wind speed etc., but the factors are different for each season. But there are some questions in this paper.

[general comments] It is better to use same word for TOHRE to avoid confusion. The words of “Total OH reactivity flux” is used in Title, but “total OH reactivity emission rate” in section title (2.4) etc. In my understanding, TOHRE is flux (emission rate) and its

C5680

unit is  $[s^{-2} g(dw)^{-1} m^{-3}]$ . In some case, “total OH reactivity emission” (without rate) is called TOHRE (for example, in figure captions). “Total OH reactivity emission (TOHRE) rates” (3 Results, line2) will be better to change “Total OH reactivity emission rates (TOHRE)”

How often was calibration of PTR-MS performed? Or was the concentration derived from PTR-MS compared with the concentration from GC-MS results for each season? The differences between measured and calculated TOHRE are quite different in different season (small difference at first but large difference at last). I just worried if the results of PTRMS were calibrated only at first, but the results from PTR-MS became underestimated concentration later measurement period.

[specific comments] Page 13505 line 15: During cuvette is closed, are there any decrease of trace species (NO<sub>2</sub>, CO . . .) like O<sub>3</sub> ? If the uptake of trace species are important, the observed TOHRE will be underestimated. For example, if NO<sub>2</sub> is absorbed to the surface of cuvette or take into plant, observed total OH reactivity will be decrease and the slope for TOHRE calculation (Fig.2) will be decrease. And if the absorption of NO<sub>2</sub> happens and it has humidity dependence, this cause seasonal difference.

Page13505 line18: Why data point of total OH reactivity measurements change? I imagine you can control the measurement time period.

Page13506 line 20: Wall loss is assumed to be constant. But I am afraid if it is depend on relative humidity or other factors.

Page13508 line13, page13516 line17: Is it possible to estimate roughly the ratio of uncelebrated and unidentified peaks to measured terpenes? If they are only minor, it is no matter. But if they are major, it would be important as explanation for discrepancy of THORE during late seasons.

Page13512 (Fig.8): With TOHRE, different factors are shown in right side for each period (b – e). I just wonder how these factors changes during other seasons? Strong

C5681

wind makes high TOHRE? Unexpected TOHRE was observed with high benzene ( $m/z=97$ )? Total O<sub>3</sub> loss rate are similar variation of TOHRE? Methanol is decrease during night during other seasons?

Page13513 line13: It is very surprising benzene was high when missing TOHRE was high. Is benzene checked by GC-MS? Or It is just  $m/z=79$  detected by PTR-MS? Is it possible that some unknown biogenic species make fragmentation peak at  $m/z=79$  in PTRMS?

Table2 : About the values of ambient O<sub>3</sub>. Are they average of maximum concentration? If this is average of entire period (include daytime, night time), standard deviation seems be too small.

[technical corrections]

Page13514 line8: It is better to say at first you will explain about "late summer".

Page13514 line15: It is better to say at first you will explain about "autumn".

Fig.2: It is better to show the time to close and open the cuvette for better understanding this method. (They should be around 15:05:30 and 15:08:30.)

Fig.4 and 5: It is better to show the value of total emission rates and total OH reactivity emission rate for first and second measurements periods. (Because two circles are shown in same size, it is difficult to compare absolute value at a glance.)

Fig.8: Is it possible to separate a) and b)-e) in different figures? There are detail explanation about the result of each season (b)-e)), but they are too small follow the explanation.

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