

Interactive comment on “Influence of meteorology and anthropogenic pollution on chemical flux divergence of the NO-NO₂-O₃ triad above and within a natural grassland canopy” by D. Plake et al.

Anonymous Referee #2

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In general, this is a very interesting paper that focuses on the relative timescales of transport and chemistry of NO-NO₂-O₃ within a grassland. The measurements appear to have been performed very carefully, and the insight that transport timescales within grassland canopies can be as slow as within tall forests is important. I recommend publication after the authors address the following comments.

P 10739, L5-8 is the ozone production discussed here ozone production from differing rates of NO₂ photolysis above and within the canopy (e.g. a redistribution of O_x), or new O_x formation from RO₂ + NO ?

C5566

Section 2.3.1 The form of Eq 2 is not obvious, and the reader would benefit from more context into how this is derived. At the end of Section 4.2, you suggest that O₃+VOC reactions can be discounted, however that the impact of RO₂ + NO cannot be quantified. This would be easier to assess if we could see how these terms would play out in a more generalized version of Equation 1. For example, if peroxy radicals were responsible for an equivalent amount of NO oxidation, would the chemical lifetime decrease by half (or more, or less)?

Section 4.1.2 It was not intuitive to me that R_{ac} for the whole canopy was intermediate to R_{ac}(L1) and R_{ac}(L2). I would have thought that it includes resistance across L1 and L2. Why is this not the case?

Section 4.2 I have a hard time following the logic in lines 15-25. Are you saying that the variability in chemical timescales was influenced most strongly by variability in O₃? And that this is because the absolute variability in O₃ was larger than for the other species (as opposed to the relative variability)?

Section 4.4.1 Can you explain more clearly why the timescale of NO₂ uptake was much longer during the night? Which of the terms in Equation 7 changed substantially?

Section 4.4.2 While the analysis in this section is interesting, how robust are the conclusions given that peroxy radicals are not included? It seems like your statement on P10760, L18-19, that this is an interesting result that goes against other studies may not hold.

P 10749, L19 – It would be useful to have a formal definition of $\Delta T(L_n)$

Technical corrections:

P10738, L22 “found especially distinct” should read “found to be especially distinct”

P10738, L24 does “3-4 times higher as in forests” mean “3-4 times higher than in forests”

C5567

P10745, L16, 20, 21 and throughout the manuscript 'ws' should be 'wind speed'

P10751, L9-10 The phrase "the diurnal course of Rac was inversed in the layers above" is confusing. Do you mean that it's the mirror image?

P10755, L 11, wording is unclear here 'the nighttime DA of all and the high NOx periods data'

Interactive comment on Biogeosciences Discuss., 11, 10737, 2014.

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