

Interactive comment on “Low temperatures enhance organic nitrate formation: evidence from observations in the 2012 Uintah Basin Winter Ozone Study” by L. Lee et al.

Anonymous Referee #1

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General Comments:

This paper describes results of a field study conducted in Utah during winter to investigate the effect of temperature on the formation of organic nitrates. It is known that organic nitrate yields from reactions of organic peroxy radicals with NO increase with decreasing temperature, and that this can affect radical cycling and O₃ formation. Data on VOCs, organic nitrates, NO_x, O₃, light, and literature data on rate constants, reaction branching ratios, and organic nitrate yields were used to calculate the average nitrate formation yield by two independent methods. This quantity was used to obtain quantitative insight into the role of organic nitrates in atmospheric chemistry in this area

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and was also compared to values measured in summer and in studies conducted in other environments. The results demonstrate that at these low temperatures organic nitrates were the major radical and NO_x sinks and were more important than would be the case in summer. It is thus clear from this work that air quality models should attempt to account for temperature effects on organic nitrate formation in order to better predict concentrations of O₃ and secondary organic aerosol. The measurements, data analysis, and interpretation were very well done, and the results are interesting and important. The manuscript is clearly and concisely written and in my opinion can be published in ACP essentially as is, although the following minor comments might be helpful.

Specific Comments:

1. Page 17409, line 20: Are the amounts of aromatics reacted high enough that this source of alkyl nitrates could be significant if the alkyl nitrate yields from reactions of the ring-opened products (which are typically > 90% of the OH reaction products) are a few percent?
2. Page 17415, line 1–4: It might be useful to remind the reader that small and large alkanes have different effects on the ratio because alkyl nitrate yields increase with carbon number.

Technical Comments:

1. Page 17408, line 25: I believe there should be “constant” after “rate”.
2. Page 17411, line 1: Should either be “calculations proceed” or “calculation proceeds”.
2. Page 17419, line 23: It looks like the subscript 4 is a typo.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 17401, 2014.

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