

Interactive comment on “On the role of monoterpene chemistry in the remote continental boundary layer” by E. C. Browne et al.

Anonymous Referee #2

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The authors examine, using a 3-D chemistry-transport model, the effects of monoterpene (MT) chemistry on tropospheric chemistry over boreal regions of Canada. The study centers in particular on the effects of nitrates generated from OH- and NO₃-initiated oxidation of the MTs on such issues as NO_x partitioning and lifetimes, OH, and ozone levels. In general, this is a straightforward and well-written study and I really only have a few comments to make.

There is obviously much still to be learned about gas- and particle-phase MT chemistry, and the authors have generally done a good job of representing this chemistry in their updated model. One area that I think should be discussed further is wrt the yield of MTN's in the reactions of MT-derived peroxy radicals with NO. The authors have assumed a roughly 20% yield, which is probably OK, but it seems to me that there are

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also measurements that suggest near-zero yields (e.g., Aschmann et al., 2002). Additional discussion on this issue, which directly affects the results obtained, is warranted in my opinion.

In Figure 3, the modeled altitude profiles seen for the biogenics and their reaction products differ from those measured during ARCTAS (measured profiles peaking at altitude, modeled profiles decreasing with altitude). A more detailed discussion of this qualitative difference is warranted, in my opinion. Is the model not capturing key processes? Is this different behavior likely to impact any of the conclusions reached?

On page 22303, line 7 – It would be more accurate to say that the nitrooxy-peroxy radicals (mostly) return NO_x upon further reaction, rather than saying that they decompose.

Page 22306 – Could the differences in the modeled vs. measured MVK/MACR ratios also be related to transport (age of air), since MACR is generally shorter-lived than MVK?

Page 22308 – I am confused by the statement that 90-95% of the ANs are biogenic. Aren't the biogenics more like 80% in Figure 5a, for example?

A few typos:

Insert “the” into the first sentence of the abstract, pg. 22298, line 2.

Top of p. 22298, should be ‘has’ instead of ‘have’, I think.

Pg. 22306, line 23, insert ‘is’ after ‘isoprene’.

Pg. 22315, line 8, should be ‘of’ instead of ‘in’.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 22297, 2013.