

***Interactive comment on* “The nitrogen budget of laboratory-simulated western U.S. wildfires during the FIREX 2016 FireLab study” by James M. Roberts et al.**

Anonymous Referee #2

Received and published: 13 April 2020

The paper presents a unique and high quality set of observations of reactive nitrogen from smoke emanating from laboratory burns of predominantly western U.S. fuels. Variability in the emissions of specific reactive nitrogen species are modeled using a positive matrix factorization (PMF), and the paper makes recommendations on specific markers to be used for emissions of reactive nitrogen emissions from combustion, high-temperature pyrolysis and low-temperature pyrolysis. The overall content is already largely suitable for publication in ACP, but some improvements to the structure could make it much easier to digest. Thus most of my comments are editorial in nature.

Edits:

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Line 135: It seems like particle phase measurements were made during the FIREX burns? I immediately wondered. . . . Why is there no use of the LTOFAMS data to compare to the “particle-bound” species that are “not included in this analysis”?

Section 2.3 PMF Analysis: The methods/details in this section really do need to be expanded so that this analysis is actually reproducible. Please add Q/Qexp values, FPEAK values, and the number of bootstrapping runs for all calculations.

This section would substantially benefit from some better organization. I had to read many of the paragraphs twice to make sure I understood them and I often felt like the order was random. I recommend looking through this section and dividing it into several new more specific sub-sections, rather than just one sub-section (i.e. current 3.1). Perhaps it would be better to have non-western U.S. fuels (e.g. the Yak Dung) just appear in the SI, rather than in the main text. This might help Section 3 feel more focused.

Comments Specific to Figures:

Figure 1: This is really nice. Could you add a list (or denote in some way – that would be even better) all the species not measured in this study?

I think there is value in having Figure 2 in the main text. It is nice because it shows the evolution of the fire, and how the reactive nitrogen and carbon-containing species evolve as a result. However, the use of Figure 5 and Figure 6 feels tedious. The text is sufficiently wordy that the reader has to go into those time series and try to interpret/summarize the patterns themselves. I would recommend that there is only one time series Figure and then the others are moved to the SI. If there is something specific to see in Figure 5 and Figure 6 that is contrasting between the fires or called-out in the text, then those sections of the plots should be highlighted somehow, maybe with transparent yellow bars.

Figure 3: Why is Duff twice without noting differences between them?

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Figure 11: I would combine the top two panels of Figure 11. Why show a R2 of a linear fit in panel d) when that relationship is not linear?

Minor Edits:

Line 97: Combine parentheses around citations.

Lines 115 – 123: This paragraph should be in present tense, not future. The jump to future tense here is disorienting.

Line 168: change “into” to “by”

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-66>, 2020.

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