

Interactive comment on “Biomass burning emissions in north Australia during the early dry season: an overview of the 2014 SAFIRED campaign” by Marc D. Mallet et al.

Anonymous Referee #2

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Mallet et al. provide an overview of the multi-institutional measurement campaign conducted in Northern Australia during the dry season to measure the emissions and transformations of trace gases and particles emitted by savannah and grassland fires. The motivation for the measurement campaign is novel, the manuscript is well written and the results are appropriately described. The measurements from this campaign are likely to improve our understanding of biomass burning emissions at the local and global scale. The only major concern I have is that the manuscript, being an overview article, could be improved in terms of the presentation of the campaign specific information and data (see comment #s 3, 4, 5, 11, 12). This would make the manuscript much more citable and a serve as a gateway for anyone interested in SAFIRED-related liter-

C1

ature. I recommend publication of the manuscript after the following minor comments have been addressed and/or clarified.

1. The resolution of the figures is too poor and needs to be fixed. I would ask the authors to consider using vector images.
2. The font size on the figures in some cases is too small and very hard to discern on a printed copy of the manuscript.
3. While some of the relevant literature has been cited, it would be worthwhile to discuss (likely in the Introduction) similar measurement campaigns performed in other parts of the world that have examined emissions from biomass burning and how those earlier lab and field efforts (e.g., BBOP, SCREAM, FLAME1-5, etc) have helped inform critical gaps, research questions, instrumentation, analysis techniques etc. for the SAFIRED campaign.
4. Being an overview article, I think the manuscript could benefit from a schematic and/or cartoon in the introduction that sketches the region of interest (Northern Australia) and caricatures the emissions, processes and impacts being studied in detail in this campaign. Furthermore, a bulleted list in the beginning of the manuscript that lists the research/science questions for SAFIRED would provide context for the various measurements and analysis performed.
5. In the methods section, the manuscript could benefit from a Table that lists the instrument, quantity measured, accuracy/precision, frequency. For example, see Figure 1b, 1c, 2b, 2c, etc in Ryerson et al., (JGR, 2013).
6. In some cases (e.g., non methane organic compounds), too much detail is provided in the methods section describing the measurement.
7. I did not bother to investigate this further but I wasn't quite sure what the technical definition of the word 'fetch' is. It might be helpful to clarify this for the reader.
8. Too many significant figures (up to 6!) for some of the measurements in Table 1.

C2

9. Figure 7: Are those raw SMPS data or lognormal fits to the SMPS data? The distributions look uncannily smooth.
10. Line 590: The word 'aging' is commonly used to refer to chemical reactions but in the example is used here to refer to thermodynamics.
11. The 'Outcomes' section could benefit from the following: (i) discussion of the results in the context of earlier work and how the findings here are similar or different, (ii) how the SAFIRED measurements were insightful (iii) what questions still remain unanswered, and (iv) directions for future work.
12. Similar to comment 5, a Table listing the companion publications and its central finding would be helpful for the interested reader to track the measurement-specific paper.
13. Line 658-677: Will the NMOC emissions and speciation be discussed in a forthcoming publication? I did not see a SAFIRED-related reference for this section.
14. Line 762-763: How does primary organic aerosol interact with NMOCs to form SOA? I am not sure this sentence is phrased correctly. Do you mean primary organic aerosol serves as a seed for the SOA produced from NMOC oxidation?
15. Clarification question: Were aircrafts used to study the biomass burning plumes?
16. While I understand that the majority of the companion papers that deal with the specifics of each measurement are in the process of being prepared or are currently under review, are there any novel campaign-wide conclusions that the authors would like to discuss in the concluding section of the manuscript?

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