

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-711

Anonymous Referee #1

Referee comment on "Measurement report: Underestimated reactive organic gases from residential combustion – insights from a near-complete speciation" by Yaqin Gao et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-711-RC1>, 2022

General comments:

This study constructs a near-complete chemical description of ROGs emitted from residential coal and biomass combustion using GC-MS/FID and Vocus PTR-ToF-MS. ROG emissions were underestimated by $44.3 \pm 11.8\%$ and $22.7 \pm 3.9\%$, considering the uncharacterized species, which resulted in the underestimation of SOA formation potential and OH reactivity. In the current framework, 125 species were quantified, accounting for approximate 90% of the total ROG emission. SOAP and OHR were re-estimated incorporating the newly identified species and the spatial distribution and annual variation of ROG emissions from residential coal and straw combustion in China are reported. The topic is covered by ACP and the data is of interests to relevant readers. However, novelty is lacking with respect to methodology and results and the discussion lacks depth. Also, the manuscript is not well drafted, mistakes and errors are commonly seen.

Specific comments:

Line 113-116. PTR-MS with H₃O⁺ detects the VOC molecules with higher proton affinity than water and PTR-MS with NO⁺ extends the range of compounds that can be detected. As you mentioned, a total of 1005 peaks were extracted with m/z lower than 200 in H₃O⁺ mode and selected peaks in NO⁺ mode.

- What are the range of compounds that NO⁺ mode supplements and the criteria of selecting these compound species

- What are the organic gases that are not sensitively detected by PTR-MS with H₃O⁺ and NO⁺ modes and how can GC/MS-FID complement the measurement? This information should be included, either in the main text or the SI. Currently, the analysis section is brief.

Figure 1, when conducting the mass closure analysis, how to quantify the organic gases that are not effectively detected by PRT-MS and GC-FID/MS. Given FID is adopted, THC data (if any) may help.

Line 118, 162 ions with a relative high degree of certainty... Again, the introduction of the data treatment is inadequate. What is the standard of selecting these ions and how to determine the certainty threshold. Similar question goes to line 156, 87 out of 162 species were used....please give more details regarding data treatment.

Line 122.... assuming all the signals with the same sensitivity as acetone. Does this assumption stand, since acetone has a higher proton affinity than many VOC compounds.

Line 169 why is formaldehyde not reported in your study since PTR ionize formaldehyde efficiently.

Line 255 figure 2. What is the x-axis label, m/z or numbers of identified species. Add x-axis label.

Technical corrections:

Line 73, 276, 320, 360 space missing before the left bracket.

Line 94 "particles was" should be "particles were"

Line 97 space missing beforeâ□□.

Line 100 there were 23 samples were collected, grammatical mistake

Line 130 space missing before the left bracket.

Line 135 10 carbonyls are included in Table S2.

Line 137 delete including 68 species.

Line 185 add a space before and after and check throughout the whole manuscript.

Line 211 as □ that

Line 227 as Fig. 2(c) shown □ as shown in Fig. 2(c) or as Fig. 2(c) showed/shows.

Line 251 253 two types of data format shown, i.e., $xxx\% \pm xxx\%$ or $xxx \pm xxx\%$. Check throughout the whole manuscript keep consistency.

Line 276, according SOA yields □ respective SOA yields.

Line 351, due to is a preposition and should not a complete sentence.

Line 354, comparing with □ compared with

Line 357, 2017 benefiting □ 2017, benefiting

Line 397, in rural of China □ in rural China

I believe the above technical corrections are not complete, authors should check carefully.

