

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-297

Anonymous Referee #2

Referee comment on "Emissions of organic compounds from western US wildfires and their near-fire transformations" by Yutong Liang et al., Atmos. Chem. Phys. Discuss.,
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This paper shows the results of analysis of gas- and particle-phase organic compounds emitted from western US wildfires using GCxGC coupled with mass spectrometry. The measurements were performed by the Aerodyne Mobile Laboratory (AML) as a part of the FIREX-AQ project. The authors calculated emission factors (EFs) and emission ratios (ERs) for various gas- and particle-phase compounds. Then, those properties were evaluated from the points of correlations with modified combustion efficiency (MCE) and relationship with saturation concentration and so on. I think that this paper includes the latest new results regarding real-world biomass burning and is valuable for researchers in the fields related to atmospheric and environmental sciences. Therefore, I recommend this paper to be published in Atmospheric Chemistry and Physics. But, I have comments to be addressed before publishing. My comments are listed below.

Major comments:

The biggest issue of this paper I think is that details of sample treatment and the relationship between sampling and data points in several figures and tables are not shown clearly. The authors collected 33 hourly samples, but they didn't describe how many samples were collected for individual fires and the corresponding sampling condition (e.g., when the AML was stationary or in transit). Figures 2 and 3 show 9 data points for the Nethker Fire and 2 for the Arizona Fires. How were these data points obtained (if those data points included both samples obtained when the AML was stationary and in transit, how were EFs calculated individually)? I think such details must be described due to credibility of this manuscript.

Minor comments:

Line 232: "markedly higher terpenoids+resin acids EF" Here the authors mention terpenoid and resin acid separately. But according to the description in line 131, resin acid is included in terpenoid group. The statement of this should be consistent throughout the manuscript.

Line 284-285: I didn't follow the difference between "the field adjusted EFs" mentioned here and other EFs used in this paper. More detailed description should be added.

Line 327-330: "The average nighttime concentration of nitroaromatic compounds ... in FIREX-AQ (Decker et al., 2021)" Is this a result of this work? If so, the corresponding results should be added.

Line 334-335: "We observed possible SOA marker compounds such as butanedioic acid and octanedioic acid in the samples." How much were those compounds emitted? It would be good if more discussion on the relationship between SOA formation and these compounds can be added.

Line 342: "OH" and "NO3" should be "OH concentration" and "NO3 concentration", respectively.

Figures 2 and 3:

- Why don't the results from the Cow Fire include?
- These figures are very similar to Figure S3. Also, according to the story from line 230, it would be good to combine Figure S3 with Figures 2 and 3.

Figure 6:

- What does color code mean?
- Which markers correspond to the Fire Lab 2016 laboratory or this study? Markers

should be shown with different symbols.

Technical corrections:

Line 164: "Organic Carbon (EC)" should be "Organic Carbon (OC)".

Line 225: "...(Coggon et al., 2016). for the EFs..." Period should not be needed.

Line 238: "Simoneit et al., 1993).. " One of period is not needed.

Line 372: "f_44" should be "f_CO2+".