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Atmospheric Measurement Techniques Discussions

Interactive comment on "Dynamic Infrared Gas Analysis from Longleaf Pine Fuelbeds Burned in a Wind Tunnel: Observation of Phenol in Pyrolysis and Combustion Phases" *by* Catherine A. Banach et al.

Anonymous Referee #2

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General Comment

This work focused on gases emissions, and in particular volatile organic compounds (VOCs), by plants materials burned in a wind tunnel, simulating in laboratory a field scenario. The experiments allowed isolating and characterizing pre-combustion phase (pyrolysis) with its specific VOCs sign employing two different methods (FTIR and IR thermal imaging), to validate findings. Moreover, the other fire phases and phenol temporal profile were characterized. Topic is of relevant interest, characterizing an always more spread process in the world, focusing on VOCs emissions, which are

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Discussion paper

increasingly key factor in atmosphere chemistry and dynamics worldwide. Manuscript is qualitatively satisfactory, fitting journal topic and carrying new useful knowledges to the scientific community. I only have some doubts about the experimental/technical part about VOCs sampling system, based on my experience in VOCs experimental campaigns. I am going to report these perplexities in the specific detailed comments below. However, I recommend accepting this manuscript with some minor revision in structure and specific observation for the technical part.

Specific Comments

1. Line 60, 73. Typing error. There is a dot and then brackets with references and another dot after.

2. From line 72 to 128. There is too much space to explain the entire project into the introduction, respect to the specific goals of the paper. I would summarize the details of the whole project. Indeed, at a first reading it was little bit confusing for me, because I did not find connection in the results.

3. Line 136. I would specify '1 m s-1 wind condition'. Could be confusing.

4. Line 149. I do not know how FTIR Spectrometer works in details, but based on my experience in VOCs measurements with PTR-TOF-MS and cartridges, the best option for VOCs sampling is to use PTFE (Teflon) for sampling line. This is because it is the most inert and least reactive material, avoiding the loss of the sticky compounds as many VOCs could be. It is true that the high temperatures of the gas inside the probe mitigates sticking of compounds on probe walls (showing an average gas temperature inside the probe could be useful, it is available), but I would insert few lines that would take into account consequences of using a stainless steel probe. Because of the stickiness, some compounds could be lost, they could react and become something slightly different from what is primarily emitted by pyrolysis and combustion, or they could be underestimated. This concept is valid in the same way also for the White cell. This is noticed at line 279 for the ammonia in the results.

5. Line 154-156 and Table 1. Why if in the manuscript are reported only the 21 experiments carried out in November 2018, at the beginning of the paragraph all measurement were reported? This could be confusing. I would mention only the experiments showed in the paper.

6. All Chapter 2. Experimental. Always based on my experience in VOCs sampling, I wonder how you took into account the possible contribution to VOCs identification and quantification of the Wind Tunnel, white cell and other canisters? Some compounds could be already present because released by one of these sources and not from the processes that you are surveying in this work, or both could emit them and bias your quantitative estimation. In my experience it is always needed a blank (zero) measurement of the surveying matrix and means. This is important also for the ceramic plant holders. What they emit? What they emit when they burn? This could bias your results.

7. Table 2. I would report standard deviation, since reported mixing ration come from multiple scan averaging of 30 minutes. In this way, it is possible to observe the mixing ration variation during process observation.

8. Line 466-480, paragraph 3.3 . This is a state of art about phenol emissions by burns. It should stay in introduction defining the background knowledges at the base of this study.

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