Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-1133-RC2, 2021

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Firewood residential heating – local versus regional influence on the aerosol burden" *by* Clara Betancourt et al.

Anonymous Referee #2

Received and published: 7 January 2021

Summary:

The authors reported isotope ratios of the biomass burning tracer levoglucosan with both model simulation and measurement in two sites in Germany. The simulations indicate that the largest part of the sampled aerosol is 1 to 2 days old, and thus originates from local to regional sources. The isotopic ratios of levoglucosan showed high variability in the observation and this reported as a result of different local sources instead of aging or transportation.

Overall Comments:

The article provides new, insightful information regarding how to examine the long-range transport and local influence of biomass burning emissions using both simulation

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and measurements of levoglucosan. The overall completeness of the manuscript is decent and the presentation is clear. I recommend publication if the authors properly address the following comments.

Specific Comments:

One of the major conclusions here is that a large fraction of biomass burning aerosols were local. However, it was only lightly discussed with several sentences in Line 197-203 simply as the result of the simulation. An in-depth justification and discussion are needed here since this is fundamental to the manuscript.

Similarly, the lack of discussion of the source-specific isotopic composition of levoglucosan also undermines the completeness of the manuscript.

Line 26: " -25.3 to -21.4 ‰. These numbers are different from " -26.3 ‰ and -21.3 ‰ïn Line 265. Why are they different?

Line 29: " These findings demonstrate that the aerosol burden from home heating in residential areas is not of remote origin and thus it can be mitigated by reducing local emissions. " I find this statement too general for the scope of the paper.

Line 139: "Since anthropogenic biomass burning aerosol is emitted into the lower mixing layer, in-cloud scavenging is not likely." More justification needed here to eliminate in-cloud scavenging. It is not rare for particles emitted in the lower mixing layer going through in-cloud scavenging.

Line 204: " The simulations thus show that the major part of the sampled aerosol originates from local sources being emitted during the sampling day and the day before." Is this a common way to define local? In figure 2, the two-day-old region are pretty far away from the measurement site.

Editorial Comments:

Line 258: Please add figure number

Line 264: Please add figure number

Line 268: "rations". Typo

Line 353: "we" Why bold?

Figure 7: The legends and the markers don't match.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-1133, 2020.

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