

Comment on acp-2021-83

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Community comment on "Measurement report: Saccharide composition in atmospheric fine particulate matter during spring at the remote sites of southwest China and estimates of source contributions" by Zhenzhen Wang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-83-CC1>, 2021

In this study the authors reported measurement of PM_{2.5} component over 3 different sites in China during a sampling period of 1 month, during spring 2019. Different saccharides were measured, including biomass burning proxy such as levoglucosan, manossan and galactosan, as well as more uncommon mono(di)saccharide, aiming at tracing the primary biogenic and possibly secondary biogenic sources. After a discussion on the potential link between emissions sources based on correlation and ratio of species, the authors attempt a source-apportionment of the different saccharide using a Non-Negative matrix Factorization (NMF) method and successfully identify 5 different factors of saccharides.

This interesting study reports a comprehensive observational dataset (although not covering the full year) and gives useful insight concerning the sources of organic components thanks to the use of proxy species not-usually used in the literature.

Specific comments:

- Samake et al. (2019) highlight that the different polyols are mostly in the coarse fraction of the PM. Also, it has been hypothesized that the different size distribution of polyols may be a proxy of the different microbiota. Did the authors have also sampled the PM₁₀ fraction and could provide the size distribution of the different saccharides?
- The source apportionment (SA) is a very interesting part, although it lacks of important information that should be reported:
- Why didn't you include the whole species available in the SA? It could help identify more robustly BB, but also saccharides from soil resuspension (with Ca²⁺), and moreover quantify the apportionment of the different factors to the total PM_{2.5} mass.
- It is stated that the SA is still uncertain, but no estimation of the uncertainties is given. It would be of great interest to report the species uncertainties, for instance with bootstrapping your input data.
- The timeserie contribution would also be of great interest. Even if the authors did not include a total variable (namely, PM_{2.5}), the timeserie of the total saccharide for the 5 factors would be informative.
- The « Soil microbiota » factor, identified mainly by the presence of Threosulose and Mannitol (and Arabitol) denotes with the finding of Samake et al. (2020) that found

that Arabitol and Mannitol are associated with fungi and bacteria from the leaves and not with the soil (even if some mixing are probable). I would suggest naming it « Soil and leave microbiota ».

- Overall, the naming of the different factors identified is too rapidly explained, and more detailed could be written to ease the interpretation of the different factors.

Minor comment :

- Please provide the pie chart of Figure 6b in a non-3D way, as the relative proportion is much harder to see in 3D compare to regular 2D graph.

Sincerely,

References:

Samaké, A., Jaffrezo, J.-L., Favez, O., Weber, S., Jacob, V., Albinet, A., Riffault, V., Perdrix, E., Waked, A., Golly, B., Salameh, D., Chevrier, F., Oliveira, D. M., Bonnaire, N., Besombes, J.-L., Martins, J. M. F., Conil, S., Guillaud, G., Mesbah, B., Rocq, B., Robic, P.-Y., Hulin, A., Meur, S. L., Descheemaeker, M., Chretien, E., Marchand, N., and Uzu, G.: Polyols and glucose particulate species as tracers of primary biogenic organic aerosols at 28 French sites, 19, 3357–3374, <https://doi.org/10.5194/acp-19-3357-2019>, 2019.

Samaké, A., Bonin, A., Jaffrezo, J.-L., Taberlet, P., Weber, S., Uzu, G., Jacob, V., Conil, S., and Martins, J. M. F.: High levels of primary biogenic organic aerosols are driven by only a few plant-associated microbial taxa, 20, 5609–5628, <https://doi.org/10.5194/acp-20-5609-2020>, 2020.