

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-382

Anonymous Referee #2

Referee comment on "Quantification of major particulate matter species from a single filter type using infrared spectroscopy – application to a large-scale monitoring network" by Bruno Debus et al., Atmos. Meas. Tech. Discuss.,
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Review of '*Quantification of major particulate matter species from a single filter type using infrared spectroscopy – Application to a large-scale monitoring network*' by Debus et al:

The work by Debus et al. presents a methodology for analysing the aerosol composition using FT-IR analysis of PTFE samples, along with proof-of-concept measurements on samples collected on the USA IMPROVE network. As indicated by the authors, this approach offers a number of advantages over more traditional reference methods for analysing organic and inorganic aerosol composition, being faster and cheaper, making it attractive for large scale monitoring networks.

In my opinion, the authors have done a very good job describing the methodology, from the FT-IR analyses to statistical models used for calibration and prediction, and I was able to follow it even as someone who is non-expert in FT-IR. The reported results demonstrate that the FT-IR was able to predict total mass, organic (OC), elemental (EC) and total (TC) carbon, sulphate, and crustal elements (Si, Al, Ca, Ti, Fe) concentrations with a similar error to reference method. The exception was nitrate which demonstrated higher error, likely due to evaporation from the filter.

My one main comment is I would have liked to have seen more data on how the predicted composition by FT-IR compared to the reference data. My understanding is that 21 sites were used to build the statistical model required to extract the compositional data, and this was then applied to the remaining sites. Fig 4 is the main figure demonstrating how the predicted levels by FT-IR compared to reference for key species but appears to be for all samples and sites in 2015. What I was hoping to see (but may have missed) was similar data/figures demonstrating how the FT-IR predicted composition for individual sites, especially those sites not used to build the multilevel calibration model. This would help I think demonstrate that this method could be applied independently.

Overall, this paper is well written, clearly presented and would be of interest to many in the community.

Minor comments

- Line 337: Why was 2015 chosen for developing the model, when datasets from later years were available? Would using samples from later help with losses of semi-volatile species?
- Figure 1: Is the composition data presented here measured by FT-IR or the reference methods?
- Section 3.3.1: As there was good predictive capability for FT-IR for organic carbon, do the authors think that additional information on the organic aerosol could be extracted with FT-IR, perhaps related to the functional groups present?