

Atmos. Meas. Tech. Discuss., referee comment RC2
<https://doi.org/10.5194/amt-2021-382-RC2>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on amt-2021-382

Anonymous Referee #1

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., <https://doi.org/10.5194/amt-2021-382-RC2>, 2022

Overall, this paper clearly presents a novel solution to increase the efficiency of IMPROVE measurements using FTIR. The results are comprehensive, as well as surprisingly good and consistent, with a few relatively small exceptions. In addition to the method comparison, there is a brief discussion characterizing the different sites with their regional similarities, and a slightly awkward overview map showing the CONUS concentrations, but with problematic nitrate.

The abstract omits that measurements of nitrate on the PTFE filter cannot adequately access particulate nitrate in the atmosphere. This is a pretty limiting feature and should be highlighted in the abstract, even if it has been reported previously, since it has significant impacts for this method.

The method seems sound in terms of separating training and testing sets, but there are a few aspects that should be shown in more detail:

- 1) the outlier results should be shown in supplement.
- 2) the comparison before the calibration to the limited sites (at least include in SI).

3) the statistics in the summary table should also be given including outliers and without biomass burning corrections, i.e. an untrained, uncorrected, full-dataset comparison.

If these things can be added, the paper would present a much more complete evaluation of the method for future potential users.

Specific Comments

Nitrate is one of the two most abundant inorganic anions that is quantified in the network (if not the most abundant component overall: see Fresno, Ebgert sites) yet determining nitrate from PTFE has a large uncertainty due to volatilization of nitrate on the filter. It was suggested that nylon filters that are analyzed by IC can be used as a reference method but how would this affect costs since this paper promotes FTIR+PTFE as a cost effective single-filter/single-technique. References to papers that successfully performed these alternative techniques for quantifying nitrate would be good to include (for quantifying ammonium nitrate: <https://www.tandfonline.com/doi/full/10.1080/02786820701272038>).