

Editor comments

Please expand your response on the following recommendation by reviewer #1:
"After line 53: Suggest to insert a line or two mentioning previous TD-based methods developed for nitrate aerosol determination: Garner et al Environ Sci Technol. 2020, Keehan et al AMT 2020. Then you can later also mention how your modifications improve on these previous methods. "

Section 3.3 would be a place to compare with the earlier TD- methods. For instance, Garner et al. 2020 have published a Figure very similar to your Figure 2.

Reply:

We have added a few lines of text in section 3.3 as suggested:

The TD-CRDS instruments described by Garner et al. (2020) and Keehan et al. (2020) have many similarities to that described here and also to its previous version (Friedrich et al., 2020). There are however some significant differences: In order to separate contributions from particulate and gas-phase nitrate to NO_Y Garner et al. (2020) used a filter to remove particles rather than a denuder to remove the gas-phase. This approach has the potential disadvantage that filters will not only collect particles but also to a variable extent (depending e.g. on ambient humidity, filter age and level of contamination) also trap HNO_3 thus potentially biasing the measurement of gas-phase NO_Y to low values and resulting in large memory effects that may hinder measurements at high frequency. While Garner et al. (2020) focussed on inorganic particulate nitrate, Keehan et al. (2020) also examined the response of their TD-CRDS to organic particulate nitrate formed from reaction of NO_3 with various VOCs (including Δ -carene, limonene, α -pinene and β -pinene) in a 400 L chamber and compared results to those obtained using an AMS. Their correlation of TD-CRDS with AMS data shows significantly more scatter than observed in the present experiments and a slope close to 0.9. Keehan et al. (2020) suggest that some of the scatter (i.e. variability in relative sensitivity) may be related to differences in the alkyl-nitrate structures that may alter the sensitivity e.g. of the AMS. As in the present study, Keehan et al. (2020) used an activated carbon denuder to remove gas-phase components of NO_Y and report time dependent changes in transmission of the denuder. They did not explore the effects of changing relative humidity on their denuder efficiency.

Also, we mention the similarity in thermograms (Figure 2) on line 125:

Similar thermograms for HNO_3 and NH_4NO_3 have been reported by Garner et al. (2020) and Keehan et al. (2020).

Typo: Line 85, pg 3 - NO_Y should be subscripted.

Correction made !