

Interactive comment on “Measurement of NO_x and NO_y with a thermal dissociation cavity ring-down spectrometer (TD-CRDS): Instrument characterisation and first deployment” by Nils Friedrich et al.

Anonymous Referee #3

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This manuscript does an overall good job of describing an instrument designed to measure NO_x, NO_y, and particulate nitrate by thermal dissociation – CRDS. The most useful aspect of the work is the demonstration of problems with the use of activated carbon denuders for removing gas-phase NO_y compounds. This will be of great use to many other researchers who use these types of denuders and activated carbon in general!

I recommend it be published after addressing the minor comments below.

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The detection limits are listed in the abstract (98 ppt for NO_x with 1 min averaging) but strangely are not described elsewhere in the manuscript. Is this for a signal-to-noise ratio of 2? 3? How the LOD is defined and these numbers are determined should be in the main text somewhere. Given how sensitive CRDS can be to NO₂, I am surprised that the LODs are as high as they are – I would have expected that with a minute of averaging the LOD would be quite a bit lower. Is this a result of the large correction (116 ppt) that must be made to account for the difference in Rayleigh scattering when sampling humid ambient air vs. dry zero air? In addition to that correction that must be made to account for the differences in humidity between sampling and zero measurements, doesn't the change in humidity also change the reflectivity of the mirrors (due to the change in the index of refraction of air), and thus the ring-down times?

The zero air used for zeroes is "CAP 180, Fuhr GmbH"- please clarify what this means – is it compressed zero air from a cylinder, or is it from a zero air generator? Rather than deal with the effects of ambient sampling vs. dry zeroes, why not use humidity-matched air? (e.g., ambient air that has been scrubbed of NO₂ via purafil or a catalyst?)

pg 6, last line - define BET pg 13, " However, when the main dilution flow was humidified significant," This sentence appears to missing a word. Or perhaps the last word should actually be "significantly".

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