AMT-2019-399: Portable Calibrator for NO Based on Photolysis of N_2O and a Combined NO_2/NO/O_3 Source for Field Calibrations of Air Pollution Monitors

Reply to the review by Anonymous Referee #1:

We appreciate the time and efforts of Referee #1. We would like to thank them for contributing their thoughtful comments. Their comments are listed below in **Bold** font followed by our responses in blue text. New text added is given in italics (quoted) along with page and line numbers within the new revised manuscript.

Reviewer #1.

The manuscript describes a portable calibration system/transfer standard for NOx monitors based upon photolysis of N2O from a small compressed gas source. A GPT system allows for calibration of NO2 conversion efficiency as well as NO sensitivity as is often required in the most common NOx air monitors employing NO chemiluminescence. Ozone monitors may also be calibrated with the same unit. The calibration system appears very well characterized and robust also the manuscript is clearly written, well presented, detailed, referenced etc. I recommend publication in AMT once a few relatively minor issues have been addressed.

General Comments

Stylistically there are lots of references to 'our' or 'we' in the manuscript which I would rather are depersonalized throughout. In a similar vein, the manuscript strays into becoming an advertisement of seemingly the entire 2B Technologies range of products. This is to be expected and is possibly unavoidable though it seems unnecessary to describe both the Model 408 and also the Model 306 (already described in Birks et al., 2018b) separately. The obvious competing interest of the authors is rightfully declared however.

After reviewing our writing style, we agree that the "our" and "we" were overused and often unnecessary. We have removed the majority of these – the remaining ones typically describe particular points that "we" (as the authors) are trying to convey either (i.e., conclusions or major points). We do feel it necessary to describe the Model 408 (the NO photolytic source) separate from the GPT calibrator since we have had more testing and experience with that instrument. We limited our discussion of the Model 306 to just describe the important points outlined in Birks et al., 2018b and the changes that were necessary for use in the GPT calibrator described here.

Specific comments

P2 L60 – ". . .a strong tendency for the concentration of NO in the cylinder to decline with time. . ." – please provide a reference e.g. Robertson et al 1977 (https://doi.org/10.1080/00022470.1977.10470491) or similar of the authors choosing. This is oft-claimed without reference.

We have included this reference as suggested. We thank Reviewer #1 for noticing this.

P25 L571 "Complete conversion of ozone to NO2 is not critical if NO is measured as well. . ." True, except if calibrating a photolytic NO2 converter whose conversion is a function of J and concentration of oxidants of NO. However, below it is shown that O3 is negligible.

We agree with Reviewer #1 and this is an important reason to limit the amount of ozone exiting the calibrator. At this point (page 26, line 607), we have added the text (and reference):

"It is also important to limit the amount of ozone exiting the calibrator in the case of NO_x analyzers that use a photolytic NO_2 converter as the NO_2 conversion efficiency of these converters is known to depend upon ozone concentration (e.g., see Pätz et al., 2000). "

Technical Corrections

P8 L226 “photolytic NO converters” should be “photolytic NO2 converters” I think

Corrected as suggested.