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Discussions

Interactive comment on "Use of an Unmanned Aircraft System to Quantify NO$_x$ Emissions from a Natural Gas Boiler" *by* Brian Gullett et al.

Anonymous Referee #1

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General Comments: Gullett et al. describe the methods and results for a novel UAS-based sampling approach for stack emissions relative to standard stack continuous emission monitoring system (CEMS). Results indicate good agreement (within 9 percent) for Run-Averaged NOx Emission Factor between UAS and CEMS systems. Error values for UAS-based measurements range from 3 times greater to more than an order of magnitude greater than for CEMS measurement.

The paper would be strengthened by discussion of the implications of differences between methods and the greater error associated with UAS-based measurement. Such a discussion, in turn, may aided by addressing in the Introduction and Conclusions sections, the potential applications of UAS-based measurement for future research or regulatory purposes. The paper could benefit from additional background and discus-

sion of observed sensor performance in the context of known issues relating to sensor performance as affected by atmospheric conditions. The comment from Referee #2 asking for more detail on "extensive testing" is germane, and can be addressed by reference to other publications by the authors (if available) or through the inclusion of descriptions of such testing and data as supplemental materials. Suggestion for reconsideration after "major" revisions is based on author's ability to address above issues.

Specific comments: 1. Suggestion to include closer imager of mounted Kolibri to illustrate location of intake ports 2. Suggestion to include schematic of Kolibri as flown 3. How did the authors treat data values where CO2 readings were at or above the limits of the detectors, and what assumptions were made about error for such readings 4. Vertical axis scale adjustment for CO and NO2

Technical comments: 1. In Table 3, flight 4 is excluded from the table entirely and an explanatory note provided; however, in Table 4, Flight 5 is excluded from calculations (for reasons that appear similar to flight 4's exclusion from the previous table), but its data is retained in the table. Recommendation to leave flight 4 data in table 3 and use common language (e.g. "excluded from calculations") between tables.