

## ***Interactive comment on “COCAP: A carbon dioxide analyser for small unmanned aircraft systems” by Martin Kunz et al.***

**Anonymous Referee #1**

Received and published: 22 November 2017

General Comments: The text describes a portable CO<sub>2</sub> observing device designed primarily for use on small unmanned aerial vehicles. The authors take a prototype NDIR device from a commercial gas sensor company and include additional hardware and sensors to enhance performance and test it on unmanned aircraft platforms as well as on a van in Colorado. Methodologies for calibration both in the lab as well as in the field, both including reference gases, are described in detail. It was found that air pressure plays a significant role in the reported value and must be accounted for in a calibration. A thorough set of evaluations were performed in a controlled laboratory setting, concurrently with a laser-based analyzer in a mobile experiment, and flying alongside the inlets of a high-accuracy tower. Through these evaluations, it was found that the developed sensing platform can make observations of sufficient quality for

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many scientific applications.

Specific Comments: Pg. 1, line 20: key word is “fully” cover, there are “missed approaches” for research aircraft where they can attempt a landing and get a vertical profile very close to the surface.

The sections on the various types of UAVs seems irrelevant to the paper. Consider saving yourself the cost of ~1 page and remove or shorten this section to just list them.

During the airborne test, interference from turbulence is accounted for. Is there any potential for interference from vibrations from the aircraft (the mirrors in the CO<sub>2</sub> sensor perhaps)? Could you examine this easily and if so, how would one account for this in your instrument design?

Sect. 4.2.1: Just to clarify, the drying of the inlet air is still performed on the COCAP, right? The first sentence with “changing humidity” may be a bit confusing, consider changing/rewording.

Technical Comments: Pg. 2, line 19: CO<sub>2</sub> is defined earlier, but here CH<sub>4</sub> is written without stating “methane (CH<sub>4</sub>)” earlier (and H<sub>2</sub>O as well, since it is water vapor specifically). It’s generally good practice to define future abbreviations.

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-207, 2017.

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