

## ***Interactive comment on “Greenhouse gas measurements over a 144 km open path in the Canary Islands” by J. S. A. Brooke et al.***

**Anonymous Referee #2**

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"Greenhouse gas measurements over a 144 km open path in the Canary Islands" by J. S. A. Brooke et al. is an extremely well written paper about an experiment of carbon dioxide measurements over a long path for potential satellite applications. The experimental setup is described in a succinct way allowing reproduction of the experiment. The paper first describes the experiment in some detail with technical supporting information added in an appendix. A publication in Atmos. Meas. Tech. is appropriate after addressing the following comments.

The abstract contains a motivation for the experiment, instead of providing more information about the experiment itself. A description like in the first line of the conclusion for example would have been more informative here. Also a sentence about what is

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called the "new technique" or the "new method" would have been good here.

At the end of the abstract and in the Conclusion it is written that the "new method" has a sound basis for monitoring carbon dioxide and other greenhouse gases. I agree with referee #1 that these are strong words. While I think that carbon dioxide is well covered, I feel that for other greenhouse gases there are still issues. It seems that for methane there were equipment problems or there was not enough time for the experiments and for water the spatial variability was too large. Therefore at most it could be said that based on the carbon dioxide experiments, other greenhouse gases are likely to be measured in the same way with a certain accuracy, too. The caveats for other greenhouse gas measurements are indicated. Was there no exploitable methane data from the measurements during night 7?

In the conclusions I could not follow the statement that "for an ACCURATE type mission the sources of error will be smaller than in the demonstration." This statement should be better motivated.

"It is necessary to improve these HITRAN line parameters substantially..." With this statement in the conclusions the authors show that their technique does not work to the intended accuracy. Does this mean that the HITRAN data base has to be improved before the ACCURATE mission can deliver results?

Technical issues: 1. Introduction: it would be good to mention the experiments or instruments by name e.g. TCCON, IASI etc.

2. Experimental Is there a word missing or is the section called "Experimental"?

Fig. 1: The lat/lon indications are very rough! The actual lat/lon differences are less than 1° for both latitudes and longitudes.

Fig. 2: I could not find Label C-ARTEMIS beam collimator in the figure.