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Atmospheric Measurement Techniques Discussions

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 #1

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The manuscript of Brooke et al. entitled "Greenhouse gas measurements over a 144 km open path in the Canary Islands", submitted to Atmos. Meas. Tech., covers an interesting topic appropriate for Atmos. Meas. Tech. The manuscript is well written and covers new aspects not published before as far as I know. I therefore recommend publication in Atmos. Meas. Tech. after the authors have considered the comments given below.

General:

All technical aspects related to the instrument, the measurement campaign and the data analysis are well covered and described in sufficient detail.

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However, I have a problem with the overall conclusions. For example with the last sentence given in the abstract stating that from the results presented one can conclude that the new method has a sound basis for monitoring CO2 and other greenhouse gases in the free atmosphere. Or with the first sentence of the coclusions (Sect. 4) starting with "We have successfully demonstrated ...". These statement are too strong and need to be re-formulated. This is because the reported uncertainty (+/- 14.7 ppm) appears to be quite large and a discussion is missing what the required accuracy and precision is and if the instrument is able to meet these requirements. I therefore recommend to add a discussion on what the requirements (and related applications) are for monitoring CO2 and other greenhouse gases in the free atmosphere and to what extent they are met or not. In this context it is also a clear limition that the measurements do not permit to judge to what extent temporal changes can be detected with the proposed measurement system. This is a key limitation of the presented data as this is a mandatory aspect for the envisaged monitoring application. This needs at least to be mentioned in the manuscript.

I also find the following statement given in Section 4 too strong (page 3312 line 8 and following): "For an ACCURATE-type mission, the sources of error will be smaller ...". I recommend to modify this as follows: "will likely be smaller ..." or "are supposed to be smaller ...".

Specific:

Page 3310, line 7: Please explain CRDS.

Figures 4-5 and A1-A3: The figures would highly benefit from adding (transmission spectra or Jacobians) showing seperately the target gas absorption (CH4, CO2) and the absorption features of major interfering gases (e.g., H2O).

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 3303, 2012.