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Atmospheric Measurement Techniques Discussions

Interactive comment on "Broadband Cavity Enhanced Differential Optical Absorption Spectroscopy (CE-DOAS) – applicability and corrections" *by* U. Platt et al.

Anonymous Referee #1

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This is a very interesting paper that presents a systematic study of the applicability of the well-known and very successful DOAS analysis method to the new BB-CEAS experimental technique.

I recommend the paper for publication but have some comments that are given below.

p. 483 The authors describe the great potential of BB-CEAS for atmospheric trace gas detection. The reference (Engeln et al., 1988) is wrong - it should be Engeln et al., 1998; moreover it is not at all a broad-band study as stated in the text but highly resolved using a diode laser - and I suggest to use here the reference: S. E. Fiedler et al., Chem. Phys. Lett. 371, 284-294 (2003) - the first use of BB-CEAS with an arc

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lamp.

p. 487 "In reality" should probably be "In practice" here the authors must cite the paper by R. A. Washenfelder et al., ACP 8, 7779-7793, 2008, also since these authors explicitly considered Rayleigh scattering. Furthermore, it is important to discuss here quantitatively the impact of using a broad-band LED for a ring-down experiment (as used in reference Meinen et al., 2008) that produces a multi-exponential decay - this must lead to substantial systematic errors. Same page (and elsewhere): I recommend using the words "effective light path" or "average light path" but not just "light path" or "light path length" to avoid confusion, throughout the paper.

General remarks:

1. The authors should point out very clearly that using DOAS for the analysis of BB-CEAS data differs from previous studies (e.g. Ball et al., 2004; Venables et al., 2006; Gherman et al., 2008; Vaughan et al., 2008; Washenfelder et al., 2008) only by using the DOAS analysis method, but that the experimental part is based essentially on the BB-CEAS experimental set-up as published before by these other authors. The idea of using DOAS is the essential and most interesting point of this paper, but leads to important problems with the concept of "average" or "effective" light path - previous papers describing the use of BB-CEAS for atmospheric trace gas detection actually use other fitting approaches that do not need to solve this difficulty and thus to make such corrections.

2. It is necessary to point out clearly and thus to discuss ***quantitatively*** the benefit of using DOAS (e.g. in terms of sensitivity or accuracy) compared to the previous papers using the BB-CEAS equations described in the paper by Fiedler et al., 2003.

3. In particular the authors must address here the very detailed comment made by D. Venables "Background extinction and concentration retrieval" (see http://www.cosis.net/copernicus/EGU/acpd/8/S5154/acpd-8-S5154_p.pdf) for the paper by Meinen et al. (2008). He shows that no such correction as discussed in the

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present paper is needed when the absolute absorption is used, as opposed to the differential absorption that needs such a correction. So this seems to be clearly a major ***disadvantage*** of using DOAS for the analysis of BB-CEAS data.

In conclusion, this is an interesting paper and merits publication if the comments above are addressed in detail by the authors in a revised manuscript.

Interactive comment on Atmos. Meas. Tech. Discuss., 1, 481, 2008.