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Atmospheric Measurement Techniques Discussions

Interactive comment on "A low power automated MAX-DOAS instrument for the Arctic and other remote unmanned locations" *by* D. Carlson et al.

Anonymous Referee #2

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The paper by Carlson et al. describes a new field-deployable MAX-DOAS instrument which has been optimized in terms of power consumption and automation. The paper describes some new ideas which have the potential to further improve this technique in particular in terms of long-term and low-cost deployment at remote locations. In general the paper is very well written and an interesting piece of work and merits publication in AMT. However, I have some points to be addressed by the authors to illustrate better the performance of the instrument.

The paper comprises in total six sections. In the first one (Introduction) the authors give a quite comprehensive overview on the history of (MAX-)DOAS measurements. Here the list of references seems to be a little bit biased. Several groups which have

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further developed the MAX-DOAS technique are missing (Wittrock et al., 2004, Irie et al., 2008, Heckel et al., 2005). On the other hand some of the information given on e.g. the idea of absorption spectroscopy in general is needless in this more technical publication.

The second section explains in detail the instrument. Here some information is missing: What is the field of view (FOV) of the instrument? A reasonable small FOV (<1°) is crucial for the retrieval of trace gas profiles. The spectral resolution was stated to be 0.65 nm at 334 nm. Is this true for the whole wavelength range or is it changing towards the visible? What is the sampling of a single line? What is the line shape? Is it Gaussian and symmetric also towards the edges? From several intercomparison campaigns we've learned that in particular the BrO retrieval is quite sensitive to these parameters.

After explaining the operation mode in the third section the authors report on some instrumental performance tests in the fourth paragraph. Again, I'm a bit sceptical concerning the real performance of the instrument. In particular for polar regions with small variations in solar zenith angles it is important to analyse the spectra with a single reference spectrum not only from the same day. This has not been demonstrated by the authors. I would prefer to see the results from one single day (with clear sky conditions) for all absorbers (O4, ozone, NO2, and BrO) using a solar noon spectrum as a reference. In this context: what is the typical wavelength shift of the spectrometer for a single day?

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