

Interactive comment on “A low-cost portable fibre-optic spectrometer for atmospheric absorption studies” by J. Bailey

Anonymous Referee #2

Received and published: 8 April 2013

The article by Bailey reports on a potentially important technical topic, namely a low-cost and portable Fabry-Perot spectrometer for accurate atmospheric trace gas retrievals. The manuscript is very technical, mostly describing the instrument and each interface in detail. However, the integration into the scientific questions as a motivation for the instrument falls rather short and it is not at all clear whether this instrument could achieve the accuracy required for monitoring total column abundances over longer time-periods. Agreeing with reviewer #1, an actual analysis of the spectral data and comparison with benchmark measurements (e.g. TCCON) would be indispensable to evaluate the true potential of this method.

Some more specific comments:

Page 1068, Line 13: "spectrum of the sun" sounds like this is a prime reason, not the
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Earth's atmosphere. Please rephrase

Page 1069, line 9: typo "Intereferometer"

Page 1070, line 16: Define "small loss of performance", by how much? In what sense?

Most important part of such a network is long-term stability. How would the "creep" effect impact this?

Page 1075, line 27: Define "majority vote"? The algorithm description is not very quantitative and words like "majority vote" don't help in that respect. E.g. Line 1, page 1076: "in most cases" why does it fail sometimes?

ILS: This is very descriptive but at the heart of any retrieval algorithm. The extended wings are somewhat disconcerting. Can you quantify those? How well can you determine the ILS and how stable is it? These are questions that are most important to the absolute calibration of the retrieval as well as its stability in time.

Page 1080, line 1: "It is planned to test": I would suggest to wait until such a test has indeed been performed. As the paper stands right now, it is merely a qualitative instrument description but very hard for the reader to figure out whether such a system will indeed prove reliable and accurate in actual retrievals. The author mentions instrument tests at the University of Wollongong. Why not team up with some of the TCCON experts there and at least test some real retrievals and/or convolve co-located TCCON spectra for comparison?

Suggestions for more intermediate corrections: An example of stability within a day would be to check whether the depths of Fraunhofer lines actually remains stable throughout a day. The author could create ratio spectra of the respective times (for spectral ranges that overlap) and show how CO₂ absorption depths change (maybe quantitative as a function of Airmass!) and how Fraunhofer lines remain stable (if they do! This would be a very good indicator of stability though).

My apologies for the late review.

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