Atmos. Meas. Tech. Discuss., 7, C115–C117, 2014
www.atmos-meas-tech-discuss.net/7/C115/2014/

Atmospheric Measurement Techniques Discussions

Interactive comment on "A high-resolution oxygen A-band spectrometer (HABS) and its radiation closure" *by* Q. Min et al.

Anonymous Referee #1

Received and published: 5 March 2014

General comments:

In this paper, the authors verified the instrument function and SNR of polarized HABS, developed a fast HABS simulator, and evaluated the spectra performance of HABS by comparing with the HABS simulator. The HABS simulator developed by the authors is based on the DISORT code coupled with oxygen absorption profiles calculated from LBLRTM and collocated HITRAN2008 database, and a double-k approach to reduce the computational cost. The HABS measured spectral radiation is quite consistent with the related simulated spectral radiation for both direct and diffused beams, for different solar zenith angles and for different air mass. The main differences between observations and simulations occur at or near the strong oxygen absorption line centers mainly due to a combined effect of week signal, low SNR, errors in wavelength registration

and absorption line parameters. Overall, the manuscript is a significant contribution to HABS literature and helps for the HABS development and future researches on clouds and aerosols. However some improvements/explanations are still needed. Please see my comments/suggestions below. I think the paper well fits within the stated scope of the journal and should be published with minor revisions.

Major comments:

1. The paper needs an improved introduction. As a newly developed instrument, HABS needs continuous studies. What had been discussed in the paper is a part of its development and certainly crucial. Please enhance your statement about the importance and interests of your research, what had been done in previous researches, and what would the research contribute to future researches. And also please give a brief introduction about your paper organization.

2. It gives me an impression that the figures in the paper are not well introduced and analyzed. When you show the readers a figure, please explain first how do you plot the figures (i.e. time, data, methods) and then explain in more detail what can we get from the figures? There are much more to explain from your figures and please guide the readers to get useful information from these figures. For example in Figure 3, in which period did you calculate the spectrum ratios? Is it representative for long-term statistics? What can we get from the figure (as much as possible)? Similarly in Figure 6, why could you conclude the oxygen A-band spectra has the capability to retrieve vertical profiles of clouds, please illustrate in more detail and make the readers understood.

Specific comments:

Pp 1030, Line 13: Where do you discuss the potential application of HABS spectra measurements? If not please delete it.

Pp 1032, line 21-23: Please cite

AMTD
7, C115–C117, 2014

Pp1033, Line 3: What is lamp GS0937?

Pp 1033, line 24: What are R and P branches?

PP1033, line 23-26: Please explain in more detail or please cite. In Fig 5, at which solar zenith angle is the SNR obtained? How does your algorithm automatically adjust to solar zenith angle and sky conditions?

PP1034 line 4-6: With his method, how much error can be produced? Please state it in your paper.

PP1034 line 22: “and the MFRSR derived AOD (at 760 nm) is about 0.04” -> “and the MFRSR derived AOD (at 760 nm) is about 0.04 (Fig. 8b)”

Figure 1 is useless. Please delete it

Figures 3, 4, 5, and 7: In these figures, the x-axis represents the pixel index, which corresponds to the wavelength. As we don’t know how to translate the pixel index to the wavelength, it would be better for us to understand if you use wavelength instead of the pixel index, as shown in the figures 6, 10, and 12.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 1027, 2014.