Atmos. Meas. Tech. Discuss., 3, C1003–C1005, 2010
www.atmos-meas-tech-discuss.net/3/C1003/2010/

Atmospheric Measurement Techniques Discussions

Interactive comment on "MIAWARA-C, a new ground based water vapor radiometer for measurement campaigns" *by* C. Straub et al.

Anonymous Referee #1

Received and published: 22 July 2010

This is a generally well written paper which should eventually be publishable in AMT. The most serious omission, which I would consider serious enough to prevent publication in the present form, is that there is almost no discussion of instrumental baseline and how it is handled in the retrieval process. Such a discussion needs to include a figure showing the difference between the measured and modeled spectra from the atmosphere (i.e. something like Figure 10, but with the model spectrum subtracted). This should be shown with and without any subtraction of retrieved instrumental baseline. Without such a plot, it is extremely difficult to determine how well the instrument is working.

Also, it appears that an external microwave absorber is required to make this system

work, yet it doesn't appear in the picture shown in Figure 1. Is Figure 1 an accurate representation of a working instrument? This may seem like a trivial point, but given the importance place on this being a transportable campaign instrument, the operational set-up should be shown (unless perhaps the absorber is hidden somewhere in this picture). It's also confusing to leave this out, since Figure 2 shows the original instrument design which, if I understand the paper correctly, is not what is being used in the measurements shown here (which use an external absorber instead of the Colfet).

I'm not sure, but I would be worried about the almost 1 degree azimuthal pointing error. The geometry of a rotating angled mirror is quite complicated, and any inaccuracies in the angle between the mirror and the antenna will result in an error in the measurement. The authors should check this.

The following comments are mostly minor:

I think this pointing error is related to the statement: "There exists small asymmetry between the H-plane in the zenith and the E-plane in the horizon which is attributed to the off-axis 10 orientation of the mirror. Since this asymmetry does not lie in the scanning direction of the mirror it does not affect the measurements." I have to admit that I don't really understand this statement.

" which is to high to correctly balance the sky brightness temperature" – should be "too high"

There is a slope indicated in the title of the right hand plot of Figure 7? What are the assumptions on the relative errors of MIAWARA and TROWARA that are used in this slope calculation? These numbers (slope and errors) should probably be included in the text.

"Since the positive slope in the opacity decreases with increasing frequency the mean value is expected to be higher for the smaller bandwidth." – This may be true, but it sounds like the authors haven't really tried to quantify this properly. They could,

perhaps, try to quantify this effect by calculating the MIAWARA results using only 100 MHz bandwidth and then comparing to the 200 MHz bandwidth.

“An offset in the elevation pointing would lead to a systematic error in the sky brightness temperatures.” - Please provide an estimate for how much a given angular offset affects the error.

Some estimate of uncertainties would be appropriate in Table 2. The single scans shown in Figure 9 show quite a large variation, suggesting that this uncertainty (at least from the sky scan) is probably quite large. The quoted value: “From these results it is concluded that the MIAWARA-C pointing accuracy is better than 0.05 degrees.” seems to be plucked out of the air. It also contradicts the almost 1 degree pointing offset in the azimuthal direction.

“The spectrum relevant for the retrieval of water vapor profiles from MIAWARA-C is at the tropopause level in the zenith direction.” It took me some time to understand what this means. I assume what the authors are trying to say is something like: “For use in the retrieval, we calculate the spectrum of emission in the zenith direction from the tropopause upwards”.

It would be nice to show in the right hand panel of Figure 11 something like the “measurement contribution” or perhaps the sum of the averaging kernels.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 2389, 2010.