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Atmospheric Measurement Techniques Discussions

Interactive comment on "Intercomparison of atmospheric water vapour measurements in the Canadian high Arctic" *by* Dan Weaver et al.

Anonymous Referee #2

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This article is a comparison of several hygrometers located at Eureka, Nunavut located on Ellesmere Island. Several instruments are compared including a Bruker IFS 125 HR, Sun Photometer, Atmospheric Emitted Radiance Interferometer, a microwave radiometer, and radiosondes. Most of the validation is for precipitable water vapor, but there are some profile comparisons as the 125 HR and radiosondes measure profiles. The general conclusion is that in most cases, these techniques are agreeing amongst themselves at the sub 10% level. I have only minor comments.

The good agreement in the upper troposphere for the 125 HR and radiosondes is because the measurement is relaxing towards its a priori which is based on radiosonde measurements. The authors do say the instrument loses sensitivity up high but should remind the reader that it uses a radiosonde apriori and thus the measurement will tend towards that it is being compared. page 17 line 15

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Discussion paper

Page 18 line 5. The large scatter seen for the profile coincident comparison is most like a consequence of comparing a point type measurement in a high variable volume to a remotely sensed instrument. If there is 20-30% humidity variability in the horizontal FOV observed by the 125HR, then it is certain that one will see a lot of scatter when comparing radiosonde measurements that sample just one point in the volume. You demonstrate this for yourself with a simple statistical math model.

Figure 10 does not seem consistent with figure 47 with regard to comparing E-AERI to MWR. Figure 10 shows poor agreement with the E-AERI (data after 2010), but the scatter plot (figure 16) suggest a slope of 1.02 or 2% agreement.

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