Atmos. Meas. Tech. Discuss., 4, C2141–C2143, 2011
www.atmos-meas-tech-discuss.net/4/C2141/2011/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Infrared emission measurements in the Arctic using a new extended-range AERI" *by* Z. Mariani et al.

Anonymous Referee #1

Received and published: 22 November 2011

The manuscript "Infrared Emission Measurements in the Arctic using a new Extended-range AERI", by Z. Mariani, et al. describes a new instrument installed at the Canadian high-latitude observatory. This spectrometer supply calibrated down-welling radiance with spectral resolution $\sim$ 1 cm-1 in a wide spectral range. As such, it makes possible a very wide range of scientific applications. In respect of the atmospheric gaseous composition, for instance, its great advantage is a possibility of working during the polar night. Important scientific results from this team are pending. A necessary pre-requisite for using this instrument is a careful investigation of its parameters and stability in laboratory and in the severe polar conditions. This paper generally satisfies requirements for technical notes of this type.

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Discussion Paper

Introduction section should be improved. A very interesting comparison of two instruments at different heights above sea level has been carried out. Please point out the height of the PERL Ridge lab (610 m) in the abstract(15 km of distance also should be specified) and in page 6414 line 4. The E-AERI was operational during one year after October 2008. Nothing was said about its further fate. Is it operational now? If not, why its operation was stopped? What are the plans for using it in the Arctic? Where is it now? Where is P-AERI now? Will it be installed at zero level during the future research?

Sections 2 and 3 are good, two tables are very helpful for operators. A reason for discrepancies between 2300 and 2400 cm-1 is not clear. Is the P-AERI evacuated or nitrogen-filled? Why CO2 is in E-AERI and not in P-AERI?

Investigation of cloud impact on the radiation budget is really important and the results presented are really not comprehensive. They may be considered just an illustration of usefulness of the instrument in the Arctic conditions. The same is valid for the investigation of the lower 610 m. Fig. 8 requires to be re-considered and probably be replotted. Red spots are tiny and hardly visible. Too long color scale obscures small variations during "normal" days. Try to limit the scale by -0.06 and +0.002; the case in February may be displayed separately.

The sections 4.3 and 4.4 are written not so well as the beginning of the paper. Which line is which in Fig. 9 (and also in Fig. 5)? Please specify by words in the figure caption, the legend is not legible. I could not find "large negative residuals" in the 2200-2400 cm-1 region in Fig. 9d. Generally, it is difficult to understand Fig. 9: a mixture of E-AERI vs P-AERI and measured vs calculated spectra. Explanation of differences by errors in radiosonde profiles is questionable. It can be excepted if you would not have these differences for accurate sondes (e.g., at positive temperatures in Wisconsin). Ice crystal impact (4.4) requires more detailed investigation.

A paragraph on SFIT-2 in conclusions looks not connected with the text of the paper;

AMTD

4, C2141–C2143, 2011

you did not have results and did not describe SFIT-2 in the study. It might be moved into the introduction as for future developments.

A note that is common for almost all figures: increase fonts, esp. on the axes.

Resuming, this paper does not contain sound scientific results, but, nonetheless, is helpful as a technical note for a proper maintenance of the instrument.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 6411, 2011.