

The Cryosphere Discuss., community comment CC1
<https://doi.org/10.5194/tc-2021-124-CC1>, 2021
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Comment on tc-2021-124

Alain Royer

Community comment on "Snow water equivalent measurement in the Arctic based on cosmic ray neutron attenuation" by Anton Jitnikovitch et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-124-CC1>, 2021

General comments

Very interesting paper.

But, it is a rather technical article on the evaluation of a CRNS sensor, in that sense it is generally not the type of article from The Cryosphere?

Unfortunately, one regrets the comparison of the SnowFox with the CRS-1000 which was also installed at TVC, I think?

The weak point of this sensor raised about the need for soil water calibration is clearly highlighted. The authors could refer to the sensor comparison paper:

Royer A., A. Roy, S. Jutras and A. Langlois (2021). Review article: Performance assessment of electromagnetic wave-based field sensors for SWE monitoring. The Cryosphere Discuss. [preprint], <https://doi.org/10.5194/tc-2021-163>, in review, 2021.

The continuous SWE measurement from 5 sensors along a transect (even a short one: 5 m) is new and interesting. The comparisons of the 5 sensors in Fig. 8 clearly show the spatial variability along the transect. This also shows the difficulty of linking in-situ measurements to the CRNS measurements.

Have you tested the intercalibration between the 5 sensors?

We would have liked to see a figure showing these spatial variations for some dates, in relation to the height of the shrubs for example. Is the sensor on the edge really representative of the tundra (it seems close to the shrubs, as seen in Fig. 3)? An analysis of the evolution of snow heights and densities along the transect would have been very interesting.

Specific comments (L = line in the pdf version on line)

L49-50 The statement "Measurements of snow depth are typically not representative of the surrounding natural terrain as they are limited to point observations using ruler measurements or acoustic distance systems" is also valid for SWE.

L87 "the SF measuring point SWE along a transect." specify: with several instruments. As written it is not clear.

L 175 The map in Fig. 1 does not seem to me to be very useful or necessary?

L210 "standard measurement error » for snow core: see also the discussion in Royer et al. 2021 TCD.

L245 Result section: Accuracy statistics should also be given relative to the SWE average, which is very low at the Ontario site (between 0 and 40 mm), and quite low at the TVC site (0-400 mm).

Unfortunately, the distribution of the measurement points at TVC results in a regression (SWE vs. Counts) being defined almost by two points: a "0" point and a mean ~350 mm SWE point.

And why no scatterplot between SWE CRNS and SWE snow core?

L421 Conclusion: Finally, what is the recommended sampling frequency?

Would it not be advisable to shield the sensor to avoid the important problem of contamination of the SWE signal by soil moisture?

Alain Royer, Université de Sherbrooke.