

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC2

<https://doi.org/10.5194/gi-2021-9-RC2>, 2021

© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on gi-2021-9

Anonymous Referee #2

Referee comment on "Accounting for meteorological effects in the detector of the charged component of cosmic rays" by Maxim Philippov et al., Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-9-RC2>, 2021

page 1, lines 14f:

The geographic coordinates of the Dolgoprudny station are not correct. Moscow is not in the South hemisphere and not in the West of the prime meridian (Greenwich). Please check. In addition, the meaning of the parameter "Rc" should be given in the text.

page 1, line 16:

"... barometric and temperature coefficients ..." -->
"... barometric and temperature correction coefficients ..."

page 1, line 18:

Please give information about what exactly you mean with "upper-air sounding of the atmosphere".

page 2, line 36:

I recommend to write "atmospheric pressure" instead of only "pressure".

page 2, lines 37ff:

"The CARPET installation detects particles of the following energies: in the UP and the LOW channels there are electrons and positrons with energies $E > 200$ keV, protons with $E > 5$ MeV, muons with $E > 1.5$ MeV, and photons with $E > 20$ keV (efficiency $< 1\%$).": Is "(efficiency $< 1\%$)" valid for all particle types or only for photons?

page 2, lines 46ff:

Please check the coordinates of the stations in this paragraph and if the effective cutoff rigidity is computed for the correct location. In addition, I would appreciate if you could give the time epoch for which Rc is given.

page 2, first paragraph under "2.1 Barometric effect":

I recommend to move the first paragraph starting with "Ground-based CARPET installations detect secondary charged particles, ..." under "2. Instrumentation and data analysis".

page 2, line 56:

What do you understand under "nuclear-active particles"?

page 2, line 70:

The meaning of σ_N and σ_p should be given in the text.

page 3, lines 74f:

You write that you selected June 2019 for the determination of the barometric coefficient β as during this month there were no large geomagnetic and solar disturbances. From Figure 3 I would expect that the months July and August may be even more appropriate. To disentangle the barometric effect from the temperature effect, I would expect that it makes sense to also use the temperature in the atmosphere as a criterion for the selection of the time interval for the determination of the barometric coefficient.

page 3, line 80:

I would change: "Average count rate" to "Average pressure corrected count rate".

page 3, line 88:

Definition of $\beta \sigma_p$?

page 3, "2.2 Temperature effect":

I would appreciate if you could give a short description of the physics behind the temperature effect.

page 3, lines 92ff:

I would write here something like:

"The muon component of secondary CRs is characterized by a significant temperature effect (Yanke, et al., 2011). To correct the CR measurements for this effect, it is necessary to carry out temperature measurements in the atmosphere close to the location of the CR instrument."

page 5, line 146:

Can you comment on the quality of the fit with $R^2 = 0,0049$.

page 5, line 147:

"As seen in Fig. 7, there is a slight positive temperature effect.": Can you give here some quantitative information. From comparing Fig. 4 c) with Fig. 4 d) it is hard to see any differences between the two curves.

page 6, line 156:

What is exactly the "temperature coefficient density"? Units of α ?

page 6, formula (7):

According to formula (6), I would expect also a Δx in formula (7).

page 6, line 171:

This formula has again the number (7) as above before line 165.

page 7, "3. Conclusion":

"The results obtained by the effective generation method and the integral method correlate with each other.": What do you mean with "correlate with each other"? From Fig. 4 graphs c) and e), it seems that they show quite large differences. Can you give here some quantitative information? E.g. ratio curve c) vs. curve e). It seems that the curve in Fig. 4 e) shows more pronounced variations than the curve in Fig. 4 c). See e.g. the decrease after day 10. Which of the curves c) or e) of Fig. 4 correspond better to the CR intensity near Earth? E.g. comparison with neutron monitor data which show almost no temperature effect.

page 7, "4. Acknowledgments":

In addition to NMDB you should thank the IZMIRAN group (operator of neutron monitor station Moscow). Should you also acknowledge the Federal State Budgetary Institution «Central Aerological Observatory» (CAO)?

page 11, Fig. 3:

Does Fig. 3 show "measured count rates" or "pressure corrected measured count rates"?

page 12, Fig. 4:

Does Fig. 4 show data for the years 2019/2020? What is shown by the grey curve and what by the black curve?