

Response from the authors for community comment of ‘Proposed improvement of the detection and measurements of light precipitation in the Canadian Arctic’.

We thank the commentor for the constructive comments. Please find our response below.

Community Comments:

Citation: <https://doi.org/10.5194/egusphere-2025-5195-CC1>

This paper highlights some much needed research on the impact of precipitation gauge measurement bias as it relates to small but significant solid precipitation amounts in cold regions and speaks for the need for techniques to augment conventional gauge measurements of solid precipitation in harsh environments.

I do have a comment about the statement made on Page 10 (lines 230-233) about Geonor gauge sensitivity. If interval precipitation is being calculated as the bucket weight differential between time T and time $T-1$, you are correct to assume that precipitation collected in the bucket that is less than the sensitivity of the gauge will not be reported at time T . However, unless evaporation occurs, that unreported precipitation that has accumulated in the bucket will likely register as an increase in bucket weight in a later interval, usually following more precipitation. The mass is conserved. This means that the timing of the precipitation is impacted, but not the long-term total, so those small accumulations are ultimately shown in your accumulated time series in Figure 5. As you point out, many small amounts still go unreported because of wind undercatch (snow that never falls into the bucket in the first place) but this is unrelated to gauge sensitivity.

Also, if timing of precipitation is critical for comparison with the MRR, your raw bucket weight filtering technique may also impact the distribution of measured precipitation between adjacent intervals. Depending on the severity of the noise in your raw data and the effectiveness of your noise filter, this may have a more significant impact on interval totals than gauge sensitivity and should probably be mentioned as a source of uncertainty in your comparisons.

Response: Thank you for this comment. We agree that our original wording overstated the impact of gauge sensitivity on accumulated precipitation totals. While precipitation amounts smaller than the Geonor gauge reporting threshold may not be reported during a given interval, the associated mass remains in the bucket and is typically recorded during a subsequent interval, assuming no losses due to evaporation or other processes. Therefore, gauge sensitivity primarily affects the timing and temporal distribution of precipitation among measurement intervals rather than the cumulative precipitation total.

The manuscript has been revised to clarify this distinction and to distinguish between the effects of gauge sensitivity and wind undercatch. While gauge sensitivity primarily influences the timing of reported precipitation, wind undercatch affects the total amount of precipitation collected by the gauge and therefore represents a separate source of uncertainty.

We have also expanded the discussion to acknowledge that the raw bucket-weight filtering procedure may redistribute precipitation between adjacent measurement intervals. This introduces additional uncertainty into interval precipitation estimates and may influence comparisons with MRR-derived precipitation rates at short timescales. This source of uncertainty is now discussed in the revised manuscript.