

Interactive comment on “Derivation of a new continuous adjustment function for correcting wind-induced loss of solid precipitation: results of a Norwegian field study” by M. A. Wolff et al.

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General Comments:

“Derivation of a new continuous adjustment function for correcting wind-induced loss of solid precipitation: results of a Norwegian field study” is a very important study on the field of solid precipitation correction. It contains a newly developed adjustment function for the underestimate of winter precipitation measured by Geonor precipitation gauge with single Alter wind shield. The derivation process of this new equation is well written, easy to understand. By comparison with the similar, less complex method on this field

C4243

it is obvious, that the presented method is more general, can be applied for all phases of precipitation and for higher wind speed range. This test site is part of the WMO SPICE experiment, which contains 20 sites worldwide. The description of the site is detailed enough, since it was already published elsewhere. The use of DFIR shield as a reference gauge is also part of the standard procedure of all SPICE locations.

All that written, it has some limitation not really discussed in the paper. The suggested new equation was tested only in Norway under very unique circumstances (the rain gauge installed higher than usual, at 4.5m). Therefore the actual parameters obtained in the calibration process probably cannot be applied under different circumstances without further testing. Another limitation of the equation is that it was developed and tested only for greater than 0.1 mm events, trace precipitation was completely neglected. In Canada (which has similar climate to Norway) we found, that trace precipitation may add up to 20% to the observed precipitation on the Arctic (Mekis and Vincent, 2011). Given the frequency and importance of trace precipitation, it cannot be neglected.

The general form of equation described in the paper can be applied under different circumstances. But in order to improve the confidence and applicability of the resulted parameters under different climate, further verifications would be required on different locations and longer time-series.

Specific Comments:

I agree with the previous two referees, the writing needs serious improvements. I found that the quality of writing is deterioration towards the end. Before the final publication, the grammar and text of the manuscript needs to be thoroughly cleaned up by the authors. Few suggestions are given below in the Technical Corrections portion of this comment.

Since the project has very strong tie to the SPICE experiment and the Haukelisetter location is one of the 20 sites selected worldwide, the SPICE internet site should be added as reference: SPICE:

C4244

Sec. 3.1.1. For curve development the trace precipitation (less than the minimum measurable amount but more than zero) is excluded. But trace observation is important over the Arctic, where precipitation amounts are very low and many trace events are recorded. Under these conditions, the sum of all trace amounts becomes a significant portion of the total precipitation. The authors should consider to include the small precipitation amounts and discuss the applicability of their equation in case of trace precipitation.

Figure 3 - references and description has to be corrected. Panel d is missing completely from the discussion.

Figure 4 – unit is missing on the classes (oC).

Table 1 and 2 - should be combined into one table.

Sec 5. The use of bush-gauge as further reference / validation would be still desirable for more general applicability of the equation with the introduction of another filter for events smaller than 9 m/s wind speed.

Sec. 5.1 In 6-7. Please describe the quality control steps performed on the wind speed observations. In the same context, the quality control of the temperature is important, should be mentioned.

Sec. 5.2. I assume the precipitation gauge in the center is different now from the Forland 1996 version. Can you please describe the possible effect of this difference on the results?

Sec. 6. It is important to state explicitly the applicability and limitations of the equation. The equation was not tested on small (< 0.1 mm) events.

Technical Corrections:

C4245

I agree all Technical corrections suggested earlier by J. Kochendorfer.

Some additional issues found, far from completeness:

Pg. 10045, ln 16. Not “Tretyjakov” but “Tretyakov”

Pg. 10048, ln 14. Figure 1 lower left panel: very informative, but not quite readable – can it be presented in a larger format (or separate figure)?

Pg. 10049, ln 20. The 30 year average of the site Vagsli is compared to the test site Haukeliseter. The reason in the difference can be due to the altitude difference (821 vs 991 m.a.s.l. is much higher).

Pg. 10064, ln 10-11. Replace “choose the model describing the data set best” with “choose the best model describing the data”.

Pg. 10064, ln 11-12. Replace “Only wind speed and air temperature are input variables for the derived adjustment”. with “The input requirements for the derived adjustments are only wind speed and air temperature”.

Pg. 10064, ln 25. Replace “It also let expect” with “It also shows”.

Pg. 10064, ln 11-12. Replace “but have up to now not been able to show” with “but until now have not been able to show”.

Reference used in the General Comments:

Mekis, E and L.A. Vincent, 2011: An overview of the second generation adjusted daily precipitation dataset for trend analysis in Canada. *Atmosphere-Ocean*, 49(2), 163-177.

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C4246