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Hydrology and Earth System Sciences
Discussions

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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The paper "Derivation of a new continuous adjustment function for correcting wind-induced loss of solid precipitation: results of a Norwegian field study" authored by M. A. Wolff, K. Isaksen, A. Petersen-Øverleir, K. Ødemark, T. Reitan, and R. Brækkan presents an innovative approach to a complex topic of significant interest to multiple communities of users of precipitation data; the work is a substantial contribution to scientific progress in the fields of hydrology, climatology, etc.

As noted in the paper, the previous adjustment methods proposed for measurements

of solid precipitation, had applied traditional mathematical models. The continuous equations proposed by Dr Wolff and her team would provide solutions for adjusting solid and mixed precipitation data, including for wind regimes of horizontal speeds exceeding 7 m/s, not available previously.

The conclusions are reflective of the experiments conducted by authors, at the Haukeliseter site. The broader application of methods proposed should be validated with datasets from other sites and other climate conditions, thus confirming the transferability of proposed methodologies. The manuscript indicates that SPICE datasets could be used in this sense.

Additionally, it is recommended that the manuscript includes an evaluation (preferably quantitative) of the improvement in the reported accumulation based on the gauge measurements from this site, following the application of the proposed adjustment methods, over the entire observation period, or subsets of it.

The authors have outlined well the experiments conducted, giving consideration to the particular conditions (e.g. wind direction, proximity of gauges) and their impact on the quality of datasets. To fully enable other fellow scientists to replicate the work, the site description, Section 2, should include references to all instruments that are contributing to the creation of the precipitation events datasets; specifically, the precipitation detector, present weather sensor and/or disdrometer. The data of these instruments are referenced in Section 3.1.1, p. 10051, ln 17, and on page 10055, ln 4 to 8.

The manuscript presents the context of the work, with appropriate credit given to related work and clearly identifying their new work, following a logical structure. The details of Section 1, Introduction, and Section 2, Measurement Site, should be restructured and streamlined (reduce in length and details), allowing for an increased focus on the methodology proposed and the results.

The mathematical formulae and symbols are well described and the development of concepts is presented in a clear and logical sequence, in spite of their complexity. The

approach in developing the new concepts using Bayesian statistics is clearly outlined in the manuscript, thus lending credibility to the proposed method.

It is recommended that Section 3.1.1, Precipitation events, is reviewed, to more clearly describe the derivation of the event datasets. Specifically, ln 10-12, p 10051, reference is made to the derivation of 10 min events, while the analysis was conducted on 10 min and 60 min events. The authors should clarify whether the same thresholds have been applied for both event intervals.

Ln 23-24, p 10051, indicate that qualitative analysis was performed for 10 min, as well as 60 min events, with no significant differences. It would be helpful to graphically illustrate these results, to strengthen the statements made.

The plots in figures 3, 7, 8 present valuable results, and are critical to the understanding of the concepts presented. For this reason, it is recommended that they are presented in a larger size, or structured in a manner that would allow to more thoroughly understanding the results presented.

In section 3.4.1, p 10057, ln 1-5, and section 3.4.2, p 10058, ln 24-26, reference is made to the potential impact of intensity on the catch ratio. Ln 26, p 10058 indicates that "As this study focusses on winter precipitation only, intensity is assumed to be negligible." Additional clarification should be provided to support this statement. It is recommended that Section 6, Conclusions, is simplified and streamlined, avoiding repetition.

Overall, the language is fluent. It is recommended that a thorough linguistic and grammar review is undertaken, to improve the clarity of the text. Additionally, simplicity of expression and avoiding frequent qualifiers would further help in communicating the scientific message.

Examples of Suggested Technical Corrections:

In addition to suggestions made by the other referees, here are a few additional exam-

ples of language and grammar aspects of the manuscript, which should be considered before making it final.

Section 1, Introduction, p 10045, ln 2: "water and the availability to water" is recommended to be changed to "water and the access to water"

Section 1, Introduction, ln 2, p 10046, ln 12/13, "Temperatures are significantly rising in the Arctic and already today falls a larger fraction of the annual precipitation as rain than earlier." Recommend to change to "More recently, temperatures are significantly rising in the Arctic, and an increasing proportion of the annual precipitation falls as rain, rather than snow." If available, a reference source for the statement would be recommended.

Section 3.1.1 p 10051, ln 1, ". . .to guarantee an objective and comparable method", is recommended to be changed to "to guarantee a consistent method"

Section 3.1.2 Wind measurements in 10m height and gauge height, p 10052, ln 8, states that "Wind directions between 0 and 240 [degrees] were affected". Section 3.2, Data filtering, p 10053, ln 6, states that " Geonor X2 will be mostly affected by shadowing for wind directions between 355 and 55 [degrees]" It is recommended that the information in the two statements is correlated.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 10043, 2014.