

Interactive comment on “Using Snowfall Intensity to Improve the Correction of Wind-Induced Undercatch in Solid Precipitation Measurements” by Matteo Colli et al.

Anonymous Referee #2

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Undercatch in measurements of solid precipitation due to wind is a longstanding problem. To correct for undercatch, transfer function relationships have been established between Catch Efficiency (CE) and wind speed primarily, using either field experiments or numerical simulation. Temperature has recently been used as a supplementary explanatory variable in a transfer function. This paper demonstrates that a significant reduction in the root mean square error of residuals from that relationship can be achieved if snow intensity is used in place of temperature. The use of snow intensity as an explanatory variable is justified in physical terms through numerical CFD simulations. This is a significant finding which can lead to improved CE without the need for auxiliary measurements other than wind speed. The paper is well written

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and clear, and should therefore be published, subject to some clarifications and minor corrections.

The authors should justify the use of the same form of transfer function for wind speed and snow intensity as for a previously published transfer function for wind speed and temperature. Three of the four plots presented in Figure 3 relating CE to wind speed for different snow intensity categories show good agreement; the fourth (b) less so. Might a different functional form not have achieved better agreement? Did the authors explore this?

The details of the various data sets used are scattered throughout the paper, and are not always clear. They should be collected in a table which summarizes, for each dataset, the location, period of record (period should not be used interchangeably with interval throughout the paper), basic sampling time interval, total number of data values etc. Label the sets A, B,C,D etc.

Throughout the paper, CE is represented by different expressions (symbols and words) in labelling diagrams and tables. CE should be defined clearly in an equation early on as the ratio of observed precipitation to the reference precipitation for the Altar Shield (define the subscript SA), and the symbol CE then used throughout, avoiding the cumbersome labelling of figure axes and multiple definitions of CE in figure/table captions.

Specific Comments: P1,L17: Should the reference here be to Kochendorfer et al 2017c? The referencing of the three Kochendorfer papers should be checked throughout. P4,L15: Replace 'time period' by 'interval'. P4,L33: ...vary highly in time... P5,L29: Brandes et al (2006) reference missing. P6, eq(4): Does this gamma distribution have a probabilistic interpretation? If so, is N_0 defined so that it integrates to one? P8,L2: Kochendorfer et al (2017) – which one? Is this the data set summarized earlier – see comment above. P9, Figure 2 caption: No need for equation for CE – see earlier comment. P10, Figure 2: Please simplify labelling of axis – see

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earlier comment. P10,L11-12: Figure 4....scatter...There is no scatter of points in Figure 4 so rephrase to say that there is evidence of much stronger dependence on SI than T. P15,L9: ...time interval dependent. ... P16,L14:.....with increasing aggregation scale... P20,L11-12: 'The same figures....' This invites the question – why were time dependent simulations not carried out as in Colli et al (2016b)? But the main trend of the observation points is reproduced by the time averaged simulations, so it is not a major issue. P20,Figure 10: yet another variation on CE in labelling the axes – please see earlier comment. P18,Table 4 caption: Again, simplify/standardize on CE: 'Variation of CE with wind speed.....' P21,Figure 11 caption:(grey dotted lines in (a)).....

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