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Interactive comment on "Correction of albedo measurements due to unknown geometry" *by* U. Weiser et al.

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Although I feel this contribution is very useful for correcting instrument orientation anomalies in ground-based measurements of albedo and global radiation, I advise minor grammatical and technical revisions throughout the manuscript prior to publication. In addition, I urge the authors to include a few examples of applications for polar and alpine studies that would benefit from the albedo measurement correction. Suggested edits below:

pages. throughout [consider changing "directions" to azimuths, the more commonly accepted terminology]

p. 2710 line 17, rephrase sentence: Once the underlying snow/ice is isothermal, the

energy balance of a glacier surface defines the amount of .... line 23, "physical conditions" is very broad => environmental or meteorological line 23, "snow cover" is too specific => glacial surface or glacial morphology

p. 2711 line 3, be several 100% is odd and difficult to read, try Many publications...can (more than double) when... line 5, define what you mean by diurnal albedo, as diurnal commonly refers to daylight and nocturnal conditions. line 15, underestimation of "global radiation", define this clearly as the sum of incoming direct and diffuse shortwave (solar) radiation. line 19, small "opening angle", this is not a common term used in optics, better to use "field of view", such as narrow field of view replace throughout line 22, add sentence stating it is nearly impossible to maintain a constant sensor orientation (tilt) on snow and ice surfaces because of metamorphism and hence changes in micro topography.

p. 2712 line 19, on "a" preceding overcast day. change clouded to overcast (a more common term) line 27, albedo measurement is fitted to contrast, (eliminate "developed and" since your intent is to focus on measured data)

p. 2713 line 10 and throughout your manuscript You must always define the units of variables as they are defined for equations. Fup, reflected and Fdown, global radiation (W m-2 or W/m2)), This helps the reader and author recreate the experiment or derivation of equations. line 22, both the "slope" and the sensor, (replace slope by glacier surface to be more explicit)

p. 2714 line 6, within two opposite ... (replace opposite with opposing) line 17, again, replace all occurrences of "opening angle" with "field of view" line 23, A solar panel alone does not serve as the power source, so add A solar panel "and battery" serve as a power supply.. line 25, use of an inclinometer should be highlighted earlier in this section since it is a critical measurement in your approach

p. 2715 line 3, awkward sentence starting with Due to...eliminate this and state, (The orientation of the AWS on the glacier changes continuously and is therefore estimated

with an uncertainty . . .) since the sensor is fixed to the AWS support hardware. line 6, cannot have just a sentence sitting alone like this, please add your reasoning for choosing one, ten, and sixty minute averages to expand. line 8, this sentence is difficult to read, use active voice instead of “is used”. . .rewrite as, We used data from Suntracker, which is .. Network (BSRN) to determine the optical properties of the . . . radiation. line 12, opening angle => field of view line 14, eliminate the word employed, not needed

p. 2716 all equations should have units [W m-2] either in the previous definition of variables on simply after your equations line 22, parameters e and V are non-dimensional, right, since S is [W m-2]

p. 2717 equation 7, cos thetatilt = Fdownbold * n, you need to clearly define Fdownbold as a vector direction, not Fdown magnitude [W m-2], otherwise your equation does not make sense as non-dimensiona. Maybe state that the bold version of variables is the direction component only, not the magnitude. This is just to be clear for some readers of your paper.

You may consider a table to clarify your parameters, variables and units/vectors . . .an Appendix of Parameters and Variables at the end?

p. 2719 Maybe after equation 17, add a sentence stating that the previous derivation assumes a constant azimuth angle of theta tilt (south).

p. 2720 line 4, . . .the incoming irradiance “hitting”, change to orthogonal or perpendicular to the up-facing. . . equation 19, because Fup/Fdown appears to only multiply Pdiff, you need to add ( ) to indicate it multiplies both terms.

p. 2723 equation 24, units W m-2, and the < > brackets indicate the average of daylight reflected solar radiation equation at bottom needs parentheses around the numerator and denominator to clarify

p. 2724 line 6, remove “as well as” replace by and line 10, The shortwave “radiative balance” . . . is more specifically called the net shortwave radiation, SW [W m-2] Also, I

suggest the symbol change to SWnet rather than SW.

p. 2725 line 9, the lower (down-facing) pyrometer is 180 degrees in the opposite direction of the up-facing, so the direction is 90 degrees or easterly line 13, this should not be a new paragraph, since there is only one sentence above, combine

p. 2726 line 24, smaller than in winter months due to a (lower) zenith angle in summer, rather than “different."

p. 2727 This discussion is too brief, should add a couple examples of where your approach could help increase accuracy of albedo measurements. Reference studies of albedo in high latitudes over snow and ice, or instances where high zenith angles occur. line 25, change “flat” to greatest

p. 2728 line 12, “cut-offs” is not specific enough, try “extreme climates and time constraints” line 19, this sentence would read better if your remove “, which”

p. 2729 line 10, replace the word “flat” with high or “close to the horizon” line 20, same thing You need to make it clear that your approach to correcting albedo, equation 20, requires that AWS units incorporate 2-axis inclinometers to obtain tilt and azimuth of the pyronometer

Figure 2. angle sigma should be sigmat for the tilt angle and vector Fdown from the solar beam appears almost parallel to the tilted surface. . .you might consider decreasing thetaS so the solar beam zenith is different than the tilted surface

Figure 10. It is confusing when you use SW to represent what you call the radiative balance (net solar radiation is better), you might consider representing the net radiation as SWnetmeas and SWnetcorr.

I think this manuscript should be published, but with minor changes. Your approach could be applied to improve full energy budget modeling and hence mass balance of glaciers.