

Interactive comment on “Technical note: A low-cost albedometer for snow and ice measurements – Theoretical results and application on a tropical mountain in Bolivia” by Thomas Condom et al.

Anonymous Referee #2

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General Comments:

The need for sub-pixel scale measurements of albedo is clear and the authors demonstrate a cost effective approach to albedo measurements with some limitations, but broader potential for applications over snow, ice and other surfaces. The article provides a theoretical synopsis to compare spectral response of the HOBO Pendant Light logger and typical response of various snow and ice surfaces. There is acknowledgement of the limited field of view and hence restricting the measurements to times of day when the solar elevation angle is relatively high (perhaps 55 degrees or higher between

11am and 3pm). Results of the measurements at 15 locations along an elevation transect over the glacier reveal interesting and valuable results along with comparison to satellite imagery of ice-snow surface character. Onset Computer has a good reputation for cost-effective sensors and loggers and the Pendant loggers are easily/quickly obtained from various Internet vendors.

Specific Comments:

The article would benefit from more background evidence of in situ snow and ice albedo measurement studies in the past, such as P. 4 L74-76 needs expanded. Maybe elaborate on previous techniques: Brock, B., Willis, I., & Sharp, M. (2000). Measurement and parameterization of albedo variations at Haut Glacier d'Arolla, Switzerland. *Journal of Glaciology*, 46(155), 675-688. doi:10.3189/172756500781832675.

The authors provide a comparison between semi-infinite diffuse albedo and the albedo index computed with the LCA for 10 different surface conditions, but it must be made clear that Figure 4 is comparing theory to theory, not theory to measurements by the LCA, rather it is a comparison to the expected albedo index based on the spectral response of the surface and the LCA.

If the authors had the means and resources, it would be much more convincing and valuable to compare the theoretical semi-infinite diffuse beam broadband albedo to actual measurements by the LCA over the 10 surface types in a controlled lab environment.

Nevertheless, HOBO Pendant Loggers are robust, reliable and easily installed parallel to the horizon, so this technique is accessible to a broad audience for embedded field observations. At less than \$70. USD each, it's very cost effective.

Technical Corrections Suggestions:

Hobo should be all upper case HOBO.

P2, L26: please describe the "classical" albedometer; it would be good if you could

demonstrate that this is a secondary standard for albedo measurement or solar irradiance measurement, as this makes your comparison study more reliable.

P2, L29: remove "right-hand side" and be more descriptive in terms of slope and azimuth direction of this location

P9, L158: for _longer_ wavelengths

P10, L171: Is there a formula to illustrate the calculation of the theoretical LCA albedo that clarifies the method?

P11, L 193: calculated with the LCA is vague. Do you mean theoretically estimated based on spectral response of the LCA?

P12, L205: What two sensors? There are no sensors involved (now direct measurements) in the theoretical estimations. Sensors are used in section 3.

P14, L247: dividing the _sum_ of reflected by _sum_ of incident?

P18, L309: numbers for the X axis, not Y axis?

P21, L379: be a little more explicit about the precautions that we need to consider when applying the Hobo albedometer

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss.,
<https://doi.org/10.5194/gi-2017-55, 2018.>

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Discussion paper

