

Interactive comment on “Retrieval of snow albedo and grain size using reflectance measurements in Himalayan basin” by H. S. Negi and A. Kokhanovsky

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Reply to Referee 2:

General comments: The theoretical and method sections in this article could be much conciser.

Reply: The article will be made concise in the final revised paper.

Specific comments:

1. Table 1. Type I snow grain size from 9:30 to 12:20, the snow thickness decrease from 27 to 22 cm. (Qus. a) What is the major reason for snow depth decrease, snow
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melting or snow metamorphism? snow surface T increase from -2.0, -1.5, to 0.0 dgr, and the Grain size also increases from 0.0- 0.5, 0.5-1.0, to 1.0-2.0; (Qus. b) in the afternoon and even in evening, when the snow T decreases to -2, what snow grain size will be?

Reply:(a) The Type I data shown was just after the fresh snowfall, where the study area received dendrite snow crystals, which changes to felt like and subsequently round grains due to equi-temperature (ET) thermal metamorphism and this process took place fast as snow was close to 0 deg.C and therefore snow started settling down. After the snow temperature reaches 0 deg.C, moisture started appearing and by mid of the day around 1200noon, snow started melting. The density observed in the beginning of experiment was 0.15g/cc at 09:30(LT) and it reached 0.35g/cc around 12:20(LT). Hence, the decrease in snow depth is due to both the processes. (b) By the evening in these areas melted grains starts freezing and we get large melt-freeze (MF) grains (as 1-2mm in the present case). The Type-II snow in the table is MF snow only.

2. P.5 L.8-10, why did not you list the broadband albedo measurements on Feb 27-28,2006, in Table 1?

Reply: Since the broadband albedo could not be collected on the dates and locations as shown in Table 1, due to instrument unavailability. Therefore broadband albedo measurements on Feb 27-28, 2006 were carried out with spectroradiometer experiments and comparison shown separately by Fig.6.

3. In the article, you talk about the ART retrieved abedo, which also confused me with the field measured albedo (spectal and broadband). Sugget changing "retrieved albedo" as "simulated albedo" or changing to "ART retrieved albedo".

Reply: Suggested change will be carried out in final revised paper.

4. Figure 4: Retrieved plane albedo vs field measured spectral albedo, what are their differences? Clarified in the figure caption, which make your figure stand alone and

easily read.

Reply: Figure caption will be modified in revised paper.

5. Figure 6, I do love figure 6, which shows the dependence of snow albedo on solar zenith angle, please add references: 1. Liu et al. , 2009, J. Geophys. Res., 114, D01106, doi:10.1029/2008JD009969. 2. Wang, X. and C. Zender. 2010, Remote Sensing of Environment, doi:10.1016/j.rse.2009.10.014.

Reply: Suggested references will be added in final version of the paper.

6. Figure 7. What is difference of (a): integrated albedo using field measured spectral albedo; (b) integrated albedo using plane albedo retrieved from reflectance measurement data? Change the figure caption to clarify it.

Reply: Figure caption will be modified in revised paper as: Comparison between (a) broadband albedo and integrated albedo observed using spectroradiometer; (b) broadband albedo and integrated albedo retrieved using ART theory from reflectance measurement.

7. P16, L.18-19: "The retrieved integrated albedo was found within $\pm 6\%$ difference error from ground observed broadband albedo". I do not like the word "error" because it is just the difference of two methods. Similar at other places, I would like to remove the "error" and use "differences". e.g., "standard error (RMSE)", -> "standard difference (RMSD)".

Reply: Suggested change will be made in final revised paper.

Interactive comment on The Cryosphere Discuss., 4, 2337, 2010.