

## ***Interactive comment on “Estimation of superficial snow specific surface area from spectral albedo time-series at Dome C, Antarctica” by G. Picard et al.***

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This paper presents a method to retrieve the specific surface area (SSA) of snow from spectral albedo measured at Dome-C, Antarctica with an automatic spectrometer “Autosolex”. To measure the spectral radiant solar flux with Autosolex many correction procedures are discussed in which error analyses for spectral albedo and SSA were conducted. The diurnal cycle and seasonal variation of SSA are also discussed with possible reasons of these variations.

This manuscript is well-written and addresses the issues on the possible error of SSA in case of SSA retrieval from spectral albedo measurements on the Antarctic Plateau. The descriptions of the instrument are careful and the error analyses are appropriate.

C1

The observed SSA variation is informative and this kind of continuous measurement under such hard circumstance is important to monitor the climate change in Antarctica. I recommend this paper to be published after technical and minor revisions of the following issues.

Specific comments:

p. 3, L19: Typo “cop” -> “cope”

p. 4, L2: “The spectral albedo of the surface is measured” should be preterit.

p. 4, L2-5: The terms of “section” appear here. Do these “sections” differ from sections mentioned at the end of 1. Introduction? The term “subsection” is better.

p.4, L22: Does the sentence “the second one is dedicated to the ultraviolet” explain the right-hand side spectrometer in Fig.2? It is written as “Spectrometer 700-900 nm” in the figure.

p.5, L16-17: “This arises because both the light collector materials and the sky depend on scattering intensity which usually decreases with longer wavelengths.” This sentence is a bit difficult to understand particular for “sky”. What is it about the sky depend on scattering intensity?

p.7, L10-13: “To estimate the stray light, we assume it affects all the pixels equally ...” Stray light could sometimes cause large error for this kind of instrument. Please show the fraction of contribution from the stray light to “dark and stray light” here or at Fig. 7.

p.8, L17: Equation (6) differs from that of Grenfell et al. (1994) in which the correction for diffuse component is applied. I believe this correction would improve the accuracy of the measured diffuse component.

p.11, L1: “the small peaks due to damaged pixels like at 862 nm and 1069 nm.” The small peak can be seen around 862 nm but not at 1069 nm in Fig. 7.

p.11 and Figure 7: The graph names “graph b)” (L11), “graphs (c)” (L17), “graph b”

C2

(L2), and “graph (c)” (L24) are used in the document. However, in Fig. 7 “a)” and “b)” are shown above the top panels, and “(c)” is not indicated. The “graph b)” in L13 seems to discuss on the middle panels.

p.12, L13: The left term of Equation (11) is better “ $\alpha(\text{wavelength})$ ” (as a function of wavelength).

p.14, L19: Equation (16) is not shown.

p.15, L25: “is shown in gray in the background” It is written as “blue dots” in the caption of Fig. 13.

p.15, L27: “the geophysical features to (Libois et al., 2015).” Some terms may disappear before “(Libois et al., 2015)”?

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