

Interactive comment on “Accounting for the effects of Sastrugi in the CERES Clear-Sky Antarctic shortwave ADMs” by J. Corbett and W. Su

Anonymous Referee #2

Received and published: 27 March 2015

This paper describes new angular distribution models (ADMs) for snow over sea ice that is dominated by Sastrugi. ADMs are needed for converting CERES (Clouds and the Earth's Radiant Energy System) measured radiances to fluxes. The new ADMs are based on statistical analysis of Multi-Angle Imaging SpectroRadiometer (MISR) multi-angular measurements over permanent snow scenes over Antarctica and accounting for the effects of Sastrugi as a function of wind speed and direction. The new ADMs were reported to reduce the monthly regional biases to $\pm 5 \text{ Wm}^2$ and the monthly-mean biases by up to 50 % and used as part of the next edition of the CERES data.

Major Comments: 1. This study appears to be a part of a recently published paper

C449

by the same (first two) authors: Su, W., Corbett, J., Eitzen, Z., and Liang, L.: Next-generation angular distribution models for top-of-atmosphere radiative flux calculation from the CERES instruments: methodology, Atmos. Meas. Tech., 8, 611–632, 2015.

2. The study doesn't seem to offer new additional results that are significant compared to Su et al., 2015 paper. For example, Fig. 3 and 5 are reproduced from Figure 12 (Su et al. 2015). The only results that seem unique /interesting are shown in Figure 9 (and may be 8). Unfortunately, all the other figures need to be justified as new/important. Shouldn't Figure 1/diagram be a part of the methodology paper/Su et al. 2015? Why is this study restricted to only one polar region (Antarctic)? A logical extension should have been testing all the ADMS described in Su et al. paper, not just the Antarctic scenes.

3. If sastrugi height is about 1 m, how important are these dune-like features from a satellite altitude as a function of sensor spatial resolution?

4. Figure 2, shows MISR near-infrared reflectance over clear-sky Antarctica for different relative azimuthal angles (raa). The green line is not correct since MISR doesn't scan in the principal plane $raa=0$. Additionally, the plots show that MISR is looking both forward and back in the same relative azimuthal plane; this doesn't seem correct. The red curve is not labeled/identified in the legend. Can the authors explain the reflectance values >1 ?

5. The finding that “monthly regional biases as large as $\pm 15 \text{ Wm}^2$ in the inverted TOA SW flux” and that “ADMs reduce the monthly regional biases to $\pm 5 \text{ Wm}^2$ and the monthly-mean biases are reduced by up to 50 %” – cited in the abstract and conclusions, are not supported by results. The values cited are neither in the “Results” nor in the “Discussion” sections.

Minor comments: 1. pg 382, line 3 - misspelling of "sastrugi" 2. Pg. 389, line 20, weighted-area NOT weighted-area

C451