

Interactive comment on “The global land Cryosphere Radiative Effect during the MODIS era” by D. Singh et al.

Anonymous Referee #2

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Singh, Flanner, Perket: “The global land cryosphere radiative effect during the MODIS era.”

This is an interesting paper, suitable for publication in The Cryosphere. I have a few suggestions that the authors might consider.

Major comments

(1) The paper is titled “cryosphere radiative effect”, but it presents only the shortwave effect. There is a longwave effect as well; the presence of the cryosphere reduces both absorbed SW and emitted LW. If Antarctica and Greenland had no ice, those continents would be radiating longwave to space from lower elevation and therefore warmer temperatures. The authors may not want to quantify this LW effect, but they

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should at least mention it.

(2) The second paragraph of Section 3.1 gives some percentage contributions to the global LCrRE. I think Table 1 should be expanded to include these percentages for each of the four regions mentioned (glaciated and non-glaciated NH and SH). I would also like to see a separate table to show contributions to the global LCrRE from each continent (and Greenland). In this second table, one could read (for example) the small total contribution from South America, separated from Antarctica.

Minor comments

Abstract line 3. Change “Spectrometer” to “Spectroradiometer”.

p 3927 line 18. Change “much of the Antarctic continent” to “West Antarctica”.

p 3928 line 6. Flanner et al 2011 is missing from the reference list.

p 3929 line 24. “unfilled pixel”. Is this the same as “missing pixel”, or does it mean a pixel that is only partly snow-covered?

p 3930 line 14. Removal of the East Antarctic Ice Sheet would indeed expose barren land (albedo 0.26), but removal of the West Antarctic Ice Sheet would instead expose open ocean (albedo 0.07).

Table A1. Why do snow-covered open shrubland (albedo 0.54) and snow-covered grassland (albedo 0.48) have higher albedo than snow-covered barren land (0.37)? Is this because snow depth over barren land is small?

Figure 3. Extend the curves by one additional month, so that the complete seasonal cycle can be seen graphically (i.e. from January to January rather than January to December).

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