Auxiliary material for

"Sensitivity of modeled far-IR radiation budgets in polar continents to treatments of snow surface and ice cloud radiative properties"

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Introduction

This supplemental material includes three figures and one table. Figure and table captions are given after each figure or table.

Figure S01 shows the modeled and measured directional spectral emissivity of snow at different viewing zenith angles. This complements the comparison of modeled and observed hemispheric-averaged spectral emissivity shown in Figure 2d.

Figure S02 shows geographic locations of 624,275 CloudSat profiles over Antarctic terrain with surface elevation above 2 km and collected during July 2008.

Figure S03 shows the band-by-band flux in all longwave bands of RRTM_LW for Case 0 defined in Table 1 of the text, as well as the changes of Cases 1-2 with respect to Case 0 as defined in the same table.

Table S01 gives the bandwidths defined in RRTM_LW and shown in Figure S03.

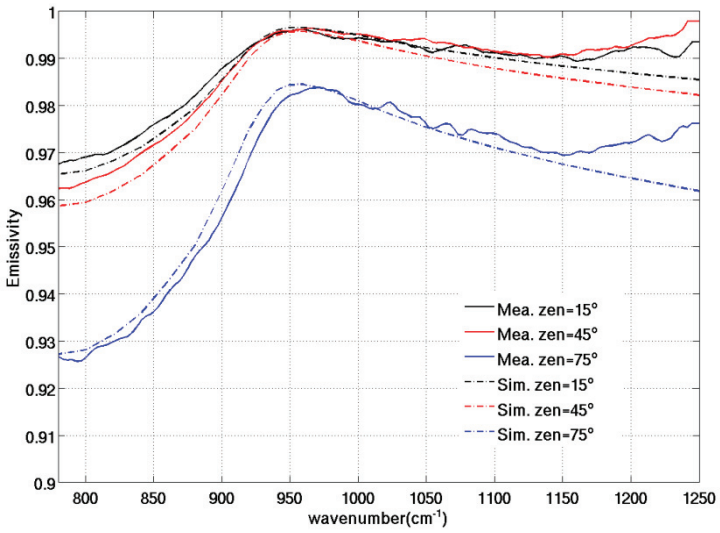

Figure S1. Comparison of simulated (dash-dotted lines) and measured (solid lines) directional snow emissivity at three viewing zenith angles (15°, 45°, 75°) for coarse snow defined in *Hori et al.* [2006]. Data at angle of 15°, 45° and 75° are in black, red and blue lines, respectively.

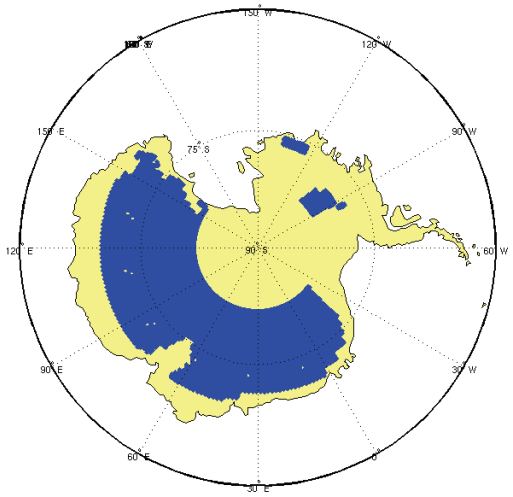

Figure S2. Blue dots are geographic locations of 624,275 CloudSat profiles over Antarctic terrain with surface elevation above 2 km, collected during July 2008. Profiles from these locations are used in our sensitivity study described in Section 3.

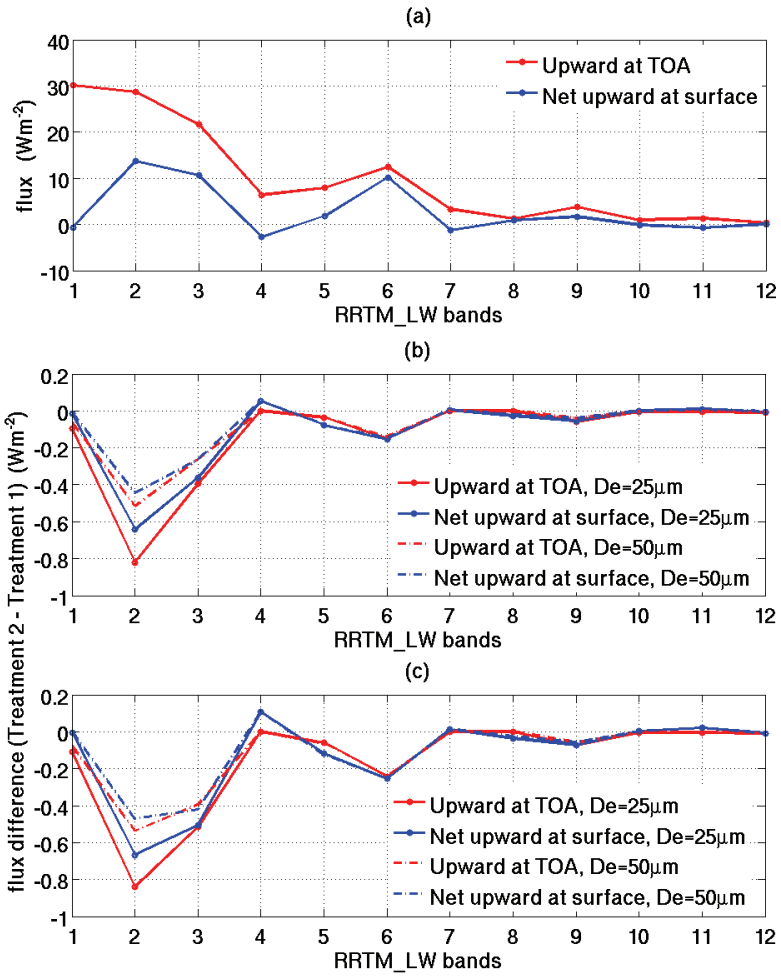

Figure S3. (a) The band-by-band net upward flux at the TOA (red) and at the surface (blue) as computed from the RRTM_LW for Case 0 defined in Table 1 of the text, cloud effective size De = 25 μm. Bands 1-3 are the far-IR bands used in the text. Results using De = 50 μm are nearly identical to those shown here. (b) The difference in band-by-band net upward flux at the TOA (red) and at the surface (blue) between Case 1 and Case 0. The solid lines are results using 25 μm effective particle size for the clouds and the dash lines are using results using 50 μm effective particle size. (c) Same as (b) except the difference is for Case 2 and Case 0. The bandwidths for 12 bands shown here can be find in Table S1.

RRTM_LW band as in Figure S3	Bandwidth
1	10 -350 cm^{-1}
2	350-500 cm^{-1}
3	500- 630 cm^{-1}
4	630- 700 cm^{-1}
5	700- 820 cm^{-1}
6	820- 980 cm^{-1}
7	980- 1080 cm^{-1}
8	1080-1180 cm^{-1}
9	1180- 1390 cm^{-1}
10	1390- 1480 cm^{-1}
11	1480-1800 cm^{-1}
12	1800- 2080 cm^{-1}

Table S1. The bandwidths as defined in the RRTM_LW.