

Interactive comment on “Spectral albedo of arctic snow during intensive melt period” by O. Meinander et al.

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The spectral albedos shown in Figure 3 of Meinander et al. (2010) for UV and visible wavelengths (300–560 nm) are all in the range 0.5–0.7. Prior published measurements of albedo for clean snow in this spectral range are 0.97–0.98 (Figure 4 of Grenfell et al., 1994) and 0.98–0.99 (Figure 6 of Hudson et al., 2006); consistent with the extremely small absorption coefficient of ice in this spectral region (Warren et al., 2006; Warren and Brandt, 2008). A UV-visible albedo as low as 0.6 can be explained if the snow is large-grained and extremely dirty, for example coarse-grained melting snow (optical grain radius 1000 microns) containing 2000 ppb of black carbon (Figure 7 and Footnote

C10240

3 of Warren and Wiscombe, 1980). Black carbon values measured elsewhere in Scandinavia are only ~20 ppb in April, although the surface concentration can increase to 60 ppb in late May because of concentration during melting (Table 8 of Doherty et al., 2010). It therefore seems unlikely that the snow at Sodankylä research station would be so grossly polluted as to be the cause of the astonishingly low albedos of Meinander et al. If their experimental results are to be believed, a plausible explanation is needed, which we did not find in the paper.

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C10241

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 10, 27075, 2010.

C10242