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The Cryosphere Discussions

Interactive comment on "Application of asymptotic radiative transfer theory for the retrievals of snow parameters using reflection and transmission observations" *by* H. S. Negi et al.

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I agree with Martin Schneebeli that this article is mainly a comparison of the simulation results of two models: AART and the model used by Perovich (2007). This is shown in Figures 1 to 3. The results agree well. I think this is not too surprising since the two models seem to be similar. The derivation of the AART model is close to e.g. the derivation of the 2-stream model which is explained in Bohren (1987) and used in Warren et al. (2006). Thus, AART should also be closely related to the "two-stream radiative transfer model formulation by Dunkle and Bevans (1956)" employed by Perovich (2007). As I can tell, one and probably the main difference between the two

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models which are compared is the assumption of isotropic scattering (g=0) in Perovich (2007) and the angular dependance of scattering with a constant asymmetry parameter g=0.76 here for the AART. So, the results in this article imply that for the calculation of the AFEC a detailed description of the angular dependance of scattering is not crucial.

A second point I would like to get some info on is the experimental setup. I do not quite understand the measuring technique. Was reflectance/transmittance always measured for a relatively homogeneous snow block (homogeneous in grain size and density)? E.g. in line 10 on p. 1249 the authors mention "1.5 cm new snow on (top of) old snow" to determine PPA if I understood correctly. A similar procedure to quantitatively retrieve grain size and density would only deliver some effective (average) optical parameters of a layered snow block.

Bohren, C. F., 1987: Multiple scattering of light and some of its observable consequences, Am. J. Phys. 55(6), 524-533.

Warren, S. G. et al., 2006: Visible and near-ultraviolet absorption spectrum of ice from transmission of solar radiation into snow, Appl. Opt. 45(21), 5320-5334.

Interactive comment on The Cryosphere Discuss., 5, 1239, 2011.