

Polarimetric retrievals of snow properties

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The overwhelming brightness of snow plagues aerosol and cloud retrievals based on air- and space-borne total reflection measurements. We present an analysis of polarimetric observations of snow surfaces, obtained with the Research Scanning Polarimeter onboard the NASA ER-2 high-altitude aircraft. The analysis of the spectral signatures of the polarized reflectance of snow can guide toward the adaptation of algorithms currently employed for the retrieval of atmospheric particulates over soil and vegetated surfaces. Also, the higher information content of polarimetric measurements, compared to measurements of total reflectance only, allows for a meaningful characterization of the snow medium. In our model, the crystals are represented by hexagonal prisms of variable aspect ratios and microscale roughness. Retrievals include crystals' scattering asymmetry parameter, shape and size. The results confirm our preliminary findings based on a very limited dataset, with the majority of retrievals indicating moderately rough crystals of extreme aspect ratios.