



Mapping snow grain size over Greenland from MODIS

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A new automated algorithm has been developed to derive snow grain size and albedo using MODIS measurements from visible to shortwave infra-red (SWIR) spectrum. It uses an analytical asymptotic model for snow reflectance obtained as a solution of Milne problem for semi-infinite media with fractal ice particles. The retrieval algorithm computes snow grain size from SWIR MODIS bands B6 (1.6 μm) and B7 (2.1 μm) and evaluates an imaginary part of refractive index associated with impurities from visible bands. Pre-processing includes data gridding, cloud masking (CM) and water vapor retrievals. A new CM algorithm, including a time series analysis and spatial analysis in addition to the spectral and brightness temperature tests, provides an improved discrimination of clouds over snow. Given that no method currently exists for aerosol retrievals over snow from MODIS, the atmospheric correction is done for Rayleigh atmosphere. A comparison between our retrievals and predictions of the energy balance model for the time series of the snow grain size demonstrated a good agreement. Results of comparisons and examples of evolution of the grain size and spectral albedo over the whole area of Greenland for the melting period of 2004 will be presented.