Remote sensing of snow and atmosphere properties using Ocean and Land Colour Instrument on board Copernicus Sentinel-3 mission

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In this work we propose a simple technique to derive snow and atmosphere properties from satellite top-of-atmosphere spectral reflectance observations using asymptotic radiative transfer theory valid for the case of weakly absorbing and optically thick media. The following snow properties are derived and analyzed: ice grain size, snow specific surface area, snow pollution load, snow spectral and broadband albedo. The developed retrieval technique includes both atmospheric correction and cloud screening routines and is based on Ocean and Land Colour Instrument (OLCI) measurements on board Sentinel-3A, B. The spectral aerosol optical thickness, total ozone and water vapour column are derived fitting the measured and simulated OLCI-registered spectral reflectances at 21 OLCI channels.

The derived results are validated using ground-based observations. It follows that satellite observations can be used to study time series of spectral and broadband albedo over Greenland. The deviations of satellite and ground observations are due to problems with cloud screening over snow and also due to different spatial scale of satellite and ground observations (Kokhanovsky et al., 2020).

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References