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Retrieval of snow grain size and impurities from remotely sensed data

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Snow represents a fundamental element of the cryosphere, influencing the Earth's hydrological and climatological cycles. In many areas, especially at high latitudes and altitudes, an important part of the water supply is derived from runoff fed by mountain snowmelt. Beside, climatologically snow influences the surface radiation balance through its albedo.

Grain size is among the factors that mostly influence the evolution and the state of the snowpack. New fresh snow is generally characterized by small non-spherical particles whereas old or metamorphosed snow is characterized by large rounded particles. In this study, we propose a technique for the retrieval of snow mean grain size from space-borne optical data. To our aim, we use the MODerate-resolution Imaging Spectroradiometer (MODIS) Surface Reflectance products. They are computed from bands 1 to 7 to provide an estimate of the surface spectral reflectance for each band as it would be measured at ground level in the absence of atmospheric scattering or absorption. A correction scheme identifies atmospheric gases, aerosols, and thin cirrus clouds. The retrieved values of the grain size are compared with values of particle size measured on ground during experimental filed campaigns.

The concentration of impurities (soot/dust) in snow changes is an important factor because it changes albedo in the visible region. The presence of impurities in snow

is evaluated using optical and infrared data. Preliminary results are reported although further investigation is required.