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Grain size retrieval from MODIS data using a semi-analytical retrieval algorithm (SARA) and a fractal snow grain model.

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The sensitivity in the near-infrared band to grain size provides the basis for the retrieval of grain size from MODIS measurements. In this talk we present results regarding a new snow retrieval algorithm that makes use of near-infrared measurements in which snow is modeled as a semi-infinite, weakly absorbing medium. It is assumed that the dense packing effects can be neglected and the radiative transport in snow can be studied using the standard radiative transfer equation extensively used, e.g., in cloud optics. The shape of grains is accounted for by means of a fractal snow grain model. The performance of the algorithm is evaluated using ground-based measurements of snow albedo and results from a different retrieval algorithm. The technique is applied to study the changes of snow properties before and just after snow fall as seen by two MODIS sensors on TERRA and AQUA satellites. These satellites fly approximately 3 hours and half apart (10:30 a.m. and 1:30.p.m. equator crossing time). The values of grain size retrieved from MODIS are also compared with values of grain size collected on ground. However, the area observed by MODIS including the locations of ground measurements was completely covered by clouds on the date of the measurements and the comparison could be performed only for the two previous days. A sensitivity analysis of the retrieval error due to atmospheric correction is also performed. Results show that the error on grain size retrieval induced by atmospheric correction ranges between $\pm$ 5 % and $\pm$ 40 %, depending on the grain size.