**Optimization of Optical Fractional Snow Cover Algorithms**

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Snow fraction is an important component of land surface models and hydrological models. Information on snow fraction improves the quality of other remote sensing products: vertical atmosphere profiles, soil moisture, etc.

The reflectances of snow and non-snow are characterized by a very significant local variability and also change from one scene to another. The variability in local snow and non-snow endmembers is approximated by the Normalized Difference Snow Index (NDSI) with a high accuracy. The magnitudes of snow and non-snow NDSI are scene-specific and calculated on the fly to retrieve snow fraction.

The development of a scene-specific approach taking local reflective snow and non-snow properties into account is considered as a promising way to improve fractional snow retrieval from moderate resolution satellite observations. The optimal approach to optical remote sensing of snow fraction will allow for the variability of snow and non-snow properties within a scene-specific snow algorithm.

The Landsat reference data in the vicinity of a snow line separating snow covered areas from snow free regions are used to estimate the performance of fractional snow cover algorithms and compare the quality of alternative algorithms. The opportunity of utilizing Landsat data not only as a source of ground truth, but also for investigation of reflectances, applicable to moderate resolution optical remote sensing, presents obvious advantage of choosing Landsat reference data. The validation results demonstrate that on the whole the performance of the algorithms using the Normalized Difference Snow Index (NDSI) is significantly better in comparison with the algorithms utilizing individual reflective band. The retrieval based on the visible reflectance provides much poorer quality of snow fraction than the NDSI approach. The scene-specific realization of the NDSI algorithm is close to its optimal version and therefore could be preferable for snow fraction retrieval.

The optimal approach to improve moderate resolution remote sensing information on snow cover combines allowing for the variability of snow and non-snow properties with snow fraction retrieval within a scene-specific snow algorithm to create unbiased and consistent information on snow cover distribution required for global studies, regional and local scale hydrological applications.

**References**

Appel, I., 2014. Retrieval and Validation of VIIRS Snow Cover Information for Terrestrial Water Cycle Applications, in: Lakshmi, V. (Ed.), Remote Sensing of the Terrestrial Water Cycle. John Wiley & Sons Inc., Hoboken, NJ, pp. 175-198.