

Sub-Grid Scale Variability of Snow Grain Size in the ABoVE Region

SIDDHARTH SINGH¹ AND ANA P. BARROS¹

ABSTRACT

In this project we track the evolution of snow grain size and snow wetness in the top layers of the snowpack in the ABoVE domain at very high spatial resolution (e.g. 30 m) toward understanding the temporal evolution of the sub-grid scale variability and its scaling behaviour. Surface reflectance retrievals in near infrared channels from Landsat, MODIS, and VIIRS were used to estimate grain size at 30-m, 500-m, and 1-km resolution. The scaling analysis in the winter-spring transition and into the ablation season is further examined in the context of landform features, vegetation cover, and soil type. The spectral signature of different landcover features were identified and plotted simultaneously for three retrievals. The region is further subdivided in 5 study areas dominated by a particular landcover feature to carry out the study for multiple extents facilitating in bias removal. The scaling changes were studied for a particular temperature and snowfall occurrence in the region. For fresh snowfall events at high temperature the scaling is conserved across multiple support scales. However, the metamorphosized snow exhibited different scaling behaviour at high resolution. The threshold size for grain size retrieval is identified using the extreme value distribution.

¹ Duke University, Durham, NC, USA