

Spectral Reflectance Signatures of Compacted Snow Surfaces

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ABSTRACT

Standoff assessment of snow physical properties is useful for making estimates of snow conditions that would be suitable for vehicle or aircraft operations prior to *in situ* strength measurements. Satellite or UAV is one method to obtain data, but to compare on-site with satellite data, a handheld field spectrometer was also used to collect data at a range of site conditions. The full spectral reflectance waveform was collected using an ASD Field-Spec4 Hi-Res spectroradiometer. Reflectance measurements from 350-2500nm with 3–8 nm of spectral resolution were collected at target locations including packed, groomed and natural snow, in addition to asphalt and ice surfaces in Montana and northern Michigan. At the same time, a suite of measurements was also collected to characterize the snow physical and mechanical properties, along with concurrent satellite imagery from the WorldView3 satellite. The aim was to determine if and how the snow physical properties could be inferred from these stand-off (non-tactile) measurement techniques. The spectra were compared to strength measurements taken at each location. While many show no correlation, two near surface measurements show promising trends. In addition, the spectral signatures characteristic of each type of snow surfaces is distinguishable and will be more fully explored.

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