Measurements of Snow Depth and Structure via Terrestrial LIDAR during SNOWEX

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ABSTRACT

The 2017 SNOWEX campaign, conducted on Grand Mesa, CO, combined aerial and terrestrial remote sensing measurements with extensive ground truthing in an effort to improve retrievals of snow water equivalent (SWE). Terrestrial LIDAR was deployed by researchers from the Cold Regions Research and Engineering Laboratory (CRREL) to scan multiple plots across the study area. These plots encompassed a variety of land cover types present including open grassland and forests of varying canopy density. Scans were initially conducted during snow free conditions and then again during the period of near peak snow depth. Snow depth analysis from the terrestrial LIDAR for four of the study areas shows spatial distributions correlated with the presence of vegetation and tree cover. Depth measurements in the forested areas were generally lower than the snow depths in adjacent open areas. Using the SNOWEX ground truth measurements to verify the LIDAR snow depth has proven problematic due to the low GPS positional accuracy (meters to tens of meters) for snow depth transects. However, the LIDAR datasets have centimeter level positional accuracy. Snow survey depth measurements in locations with high spatial variability of depth in snow depth have been found to vary substantially from the LIDAR measurements.

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