Examples of High-resolution LIDAR Elevation Maps from Three Different Geological Environments in Nova Scotia

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High-resolution laser altimetry (LIDAR) is applied to bedrock and surficial mapping and local surface processes in different terrain types in Nova Scotia. LIDAR map derivatives have been interpreted for these different geological environments to demonstrate the utility of LIDAR for geoscience applications. All of the areas investigated are covered with dense vegetation that obscures the geological features on aerial photographs.

One terrain type represents folded Paleozoic metasedimentary rocks in contact with ca. 370 Ma granite. Contrasting resistance to erosion of beds in folded Ordovician rocks results in subtle ridges visible on the LIDAR digital elevation model (DEM). Contacts between the units and information on structural deformation can be inferred directly from LIDAR maps. A fold axis is visible and a fault has been interpreted from these data. The morphology of Devonian granite in the area differs significantly from that of the folded metasedimentary rocks, allowing the contact between them to be defined based on their topographic expression visible on the LIDAR maps.

Individual flow units within the basalt of the Mesozoic Fundy Basin have been mapped using LIDAR. Subtle topographic differences among three flow units of the Jurassic North Mountain Basalt (NMB) are clearly visible on a LIDAR DEM for the Fundy Basin. Boundaries between flow units extracted from the DEM were verified by field mapping. Several ring structures in the lower flow unit, distinguishable only in the LIDAR data, are interpreted to be the remnants of rootless phreatomagmatic cones. Several surficial landforms have been identified that indicate ice was directed northwestward into the Bay of Fundy during the late stages of glaciation.

LIDAR has been used in the Cumberland Basin to map Carboniferous rocks. Karst topography is evident on the LIDAR maps over of the Windsor Group units, as are folds and faults.

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