INTEGRATION OF LIDAR AND HIGH SPATIAL RESOLUTION AERIAL REMOTE SENSING DATA FOR MAPPING OF STONEWALLS

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ABSTRACT:

Abandoned stone walls are the signatures of rural New England region. Spatial pattern and distribution of stonewalls provide the evidence of past land use and witness the change of the landscape throughout the history. Stonewalls have been among factors of studies in different perspectives of social and natural sciences, such as in history of land use and land cover change, in landscape characterization and forest succession, among others. This paper reports a study that extracted stonewall information by integration of LIDAR and high spatial resolution aerial remote sensing data. The LIDAR data were collected in 2011 using an airborne laser scanner with 1-m spatial resolution. The modelling process were implemented to extract stonewall information from the LIDAR cloud point data. Modelling procedures included intensity screening, DSM slope analysis, smooth processing and comparison with bare ground reference within a 5x5 meter grid system. The established threshold at each step effectively isolated spatial features of stonewalls across the landscape, in particular in open fields of agriculture land use (Figure 1).

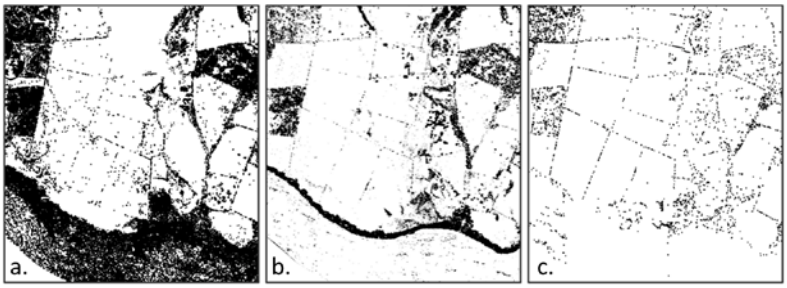

Figure 1. An example of LIDAR data and stonewall information extraction for a subsection of the study area: a. intensity of cloud point data; b. slope analysis; c. smooth processing and the extracted possible locations of stonewalls.

High spatial resolution orthorectified digital multispectral (4-band) aerial imageries were processed to team up with the LIDAR data. The aerial data possess 15.24 cm (6-inch) spatial resolution and collected between April and May of 2011. The high spatial resolution orthorectified aerial data were processed by imagery classification and multiple shape feature modelling for stonewall information extraction (Figure 2).

Figure 2. An example of high spatial resolution aerial imagery and stonewall information extraction for a subsection of the study area: a. high-resolution orthorectified digital multispectral aerial imagery; b. imagery classification; c. stonewall information extraction based on shape features of *area*, *complexity of patch shape*, *length-width ratio* and *fullness*.

The result demonstrated that high spatial resolution aerial multispectral imagery and LIDAR data are effective for extraction of man-made linear features of stonewalls across an extensive landscape. Details about the modelling procedures and result of analysis will be reported in the full paper.

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