COMPARISON OF GRID-BASED AND SEGMENT-BASED ESTIMATION OF FOREST ATTRIBUTES USING AIRBORNE LASER SCANNING AND DIGITAL AERIAL IMAGERY

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ABSTRACT:

Forest management planning in Finland is currently adopting a new-generation forest inventory method, which is based on interpretation of airborne laser scanning data and digital aerial images. The inventory method is based on systematic grid, where the grid elements serve as inventory units, for which the laser and aerial image data are extracted and, for which the forest variables are estimated. As an alternative or a complement to the grid elements, image segments can be used as inventory units. The image segments are particularly useful as the basis for generating the silvicultural treatment and cutting units, since their borderlines should follow the actual stand borders, whereas the grid elements typically cover parts of several forest stands. In this study we carried out an automatic segmentation of two study areas on the basis of laser and aerial image data with a view to delineating ecologically homogeneous micro-stands. Further, we extracted laser and aerial image features both for systematic grid elements and segments. For both units, the set of features used for estimating the forest attributes were selected using a genetic algorithm, which aims at minimizing the estimation error of the forest variables. The estimation accuracy produced by both approaches will be assessed by comparing their estimation results. The preliminary results indicate that despite of the theoretical advantages of the image segments, the laser and aerial features extracted from grid elements seem to work better than features extracted from image segments in estimating forest attributes.

TOPIC: Lidar and laser scanning
ALTERNATIVE TOPIC: Remote sensing applications