ABSTRACT: Aerial LiDAR data have been used extensively for quantifying canopy cover and forest structure because they provide a scale-invariant estimation of forest biomass, and visualizations from LiDAR data can illustrate forest structure and composition. However, validating remotely-sensed LiDAR metrics against ground-truthed measurements and developing better analytical tools and visualizations is critical for both research and management.

We analyzed tree height and stand composition on long-term plots on a small watershed in the Oregon Cascades. We identified individual trees and tree heights using a LiDAR tree-identification approach (TreeVw). We compared our results with LiDAR data from a nearby stand. Our findings might be relevant to other stands.

We observed that TreeVw identified more trees and predicted heights more accurately where the overstory is homogeneous. Where canopy gaps are present, than where a thick overstory of taller trees is present.

RESULTS OF HEIGHT CATEGORIZATION: We compared heights (m) of identified individual trees with automated LiDAR TreeVw predictions across several plots. In general, tall trees were identified more readily than shorter ones. In plot P11009, TreeVw identified 17 (the tallest in the plot) of 23 live trees (73.91%). We observed 3 categories and believe that complex stand structure and age-dynamics are responsible for these categories: 1) trees were either well-predicted or 2) over-estimated, and/or 3) systematic gaps in the height range were observed. For example, TreeVw identified:

- In P11205 - 100% of live trees; heights identified by TreeVw were very similar to measured tree heights.
- In P11211 - 15 of 38 live trees (39.47%); those 15 were the tallest, and estimated heights were consistently 7.6 m taller than measured heights.
- Plot P11211 is interesting because a mortality event occurred on the plot P11212 above it.
- In P11110 - 18 of 23 live trees (78.26%), not trees in the middle of the height range.

CONCLUSION: Using TreeVw data and Processing visualizations, LiDAR forest data can be categorized into meaningful and structurally representative categories. Simplified visualizations provide a basis for easier visual interpretation of LiDAR returns than viewing point clouds.