UAV-derived Estimates of Vertical and Horizontal Structure across Forest Density Gradients

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Research Objective and Methods

• Perform fixed-wing UAV flights over 80 ha forests

• Generate thermal and multispectral images

• Generate Structure-from-Motion data

• Evaluate accuracies in estimates of forest canopy cover, density, temperature, and height
Results: Canopy Cover Estimates

Results: Structure-from-Motion Data for Tree Height

Results: Tree Height Estimates

- Height estimate accuracies vary by forest density conditions
- Height estimates are much more accurate in low and medium density forests

Results: Tree Density Estimates

- Accuracies in tree density estimates also vary with forest density conditions.

Results: Tree Canopy Temperature Estimates

• UAV thermal data can be used to estimate mean canopy temperature across a density gradient.

• UAV-derived mean canopy temperatures are significantly different among populations and genotypes.

Sankey et al. (In Review) Remote Sensing in Ecology and Conservation
Results are consistent with our previous UAV studies

- UAV lidar data accurately estimates individual tree height

Results are consistent with our previous UAV studies

- UAV Structure-from-Motion data can be used to accurately estimate individual tree height and forest canopy cover

Results are consistent with our previous UAV studies

- UAV-derived height estimates also allow accurate classification of shrub species and change detection over many decades.

Results are consistent with our previous UAV studies

UAV lidar and Structure-from-Motion data can generate accurate DEM


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