Boreal Ecosystem Recovery & Assessment
An NSERC Collaborative Research & Development Program

REMOTE SENSING TEAM FALL 2017: *CHARACTERIZING VEGETATION STRUCTURE ON ANTHROPOGENIC DISTURBANCES FEATURES IN ALBERTA'S BOREAL FOREST WITH UAVS*

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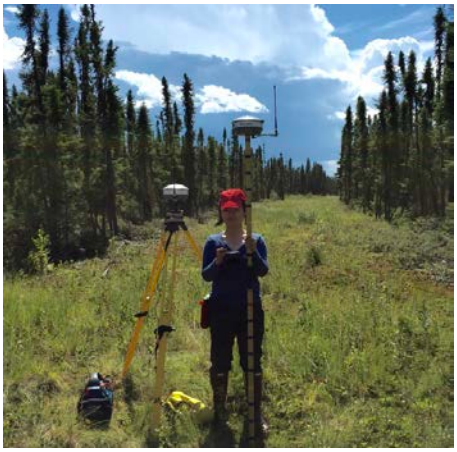

Project summary

Characterizing vegetation structure is an important component for understanding ecological recovery on non-permanent human footprint features in forests. However, current approaches to measuring vegetation structure rely on field protocols that are costly and difficult to scale. Compared to traditional field methods, UAV (unmanned aerial vehicle) photogrammetry has shown great promise in characterizing vegetation structure in a more cost-efficient way. In this research, we used a point-intercept sampling strategy to conduct a comparison of UAV-based estimates and field measurements at two scales: point level and site (plot) level. Three methods were used to estimate UAV-based vegetation height, where the differences among methods related to how terrain elevation was estimated at each point: (1) UAV_RTK: photogrammetric point clouds were supplemented with terrain measurements obtained from RTK GNSS surveys; (2) UAV_LiDAR: photogrammetric data were supplemented with LiDAR data; and (3) UAV_UAV: UAV photogrammetry data were used alone. We found that at the aggregated site level, UAV photogrammetry alone could replace traditional field-based vegetation surveys of mean vegetation height across the range of conditions assessed in this study, though significant differences remain between remote- and field-based vegetation surveys at point level. Cost analysis indicates that using UAV point clouds alone provides substantial cost-saving over traditional field vegetation surveys.

Progress to date

We submitted a manuscript titled "Measuring Vegetation Height on Linear Disturbances in the Boreal Forest with UAV Photogrammetry" to the journal – Remote Sensing in October, 2017. I have completed and defended my Master's thesis titled "Characterizing Vegetation Structure on Anthropogenic Disturbance Features in Alberta's Boreal Forest with Unmanned Aerial Vehicles" in June, 2017. We presented our findings about "Estimating Vegetation Parameters on Seismic Lines with UAV-based Point Clouds" at the Canadian Remote Sensing Society's Earth Observation Summit on June 2017 in Montreal. We also presented our research on "Characterizing Vegetation Structure on Seismic Lines Using UAV Point Clouds" as a talk on Unmanned Systems Canada Conference held on November, 2016 in Edmonton, Alberta, and as a poster at the Canadian Institute of Forestry Technical Conference on Seismic Line Restoration in Edmonton, Alberta in December, 2016.

Management implications

Our study suggested that UAVs are effective tools for rapid assessment of vegetation recovery of linear disturbance features, such as seismic lines. We found that UAV photogrammetry could provide accurate estimation of vegetation height at site level. Also, according to our cost analysis, UAV photogrammetry could save much cost compared to traditional vegetation survey. Therefore, we suggested the companies that are working on vegetation recovery on seismic lines could consider using UAV photogrammetry to replace tradition vegetation survey at some degree for the purpose of rapid assessment of vegetation status. The regulator could also consider UAV photogrammetry as an effective way of monitoring vegetation status at a small scale.

Geographic location

Fort MacKay, Anzac, Conklin and Lac La Biche.