

Using TLS-measured Tree Attributes to Model Above Ground Biomass of Small Black Spruce Trees in Peatland Environments

SM Wagers^{a, b}, A Sanchez-Azofeifa^a, G Castilla^b, and M Filiatrault^b

^a *Earth and Atmospheric Sciences, University of Alberta, AB, Canada*

^b *Northern Forestry Centre, Natural Resources Canada, AB, Canada*

Terrestrial laser scanning (TLS) has become a useful tool in the scientific community for modelling forest structure and estimating tree parameters. One of the most important pieces of information we can obtain about a forest ecosystem is the above ground biomass (AGB) of its trees, due to its link with the amount of carbon being stored in its vegetation. Allometric equations are often used to estimate AGB, but they vary between species and environment, not to mention that the variables used for these equations can often be laborious to measure.

Our study focused on small black spruce trees (1.3 – 7 m tall) located in peatland ecosystems in the Northwest Territories. We fit models to predict AGB using tree attributes measured using TLS such as crown diameter, crown area, height, and bounding box volume. Our best models were comparable in accuracy to results obtained from equations that rely on attributes that are more labor-intensive to obtain. Our equations lay the groundwork for AGB estimation of a prominent tree species in a common ecosystem (peatlands) of the boreal forest, as well as providing the potential framework for using other methods, such as airborne lidar, to obtain tree attributes and predict AGB in the future.

Corresponding author: wagers.ualberta.ca