









Home ▶ All Journals ▶ Geography ▶ International Journal of Remote Sensing ▶ List of Issues ➤ Volume 32, Issue 2 ➤ Estimating above-ground biomass in young

International Journal of Remote Sensing >

Volume 32, 2011 - <u>Issue 2</u>

676 66 0 Views CrossRef citations to date Altmetric

Original Articles

Estimating above-ground biomass in young forests with airborne laser scanning

Erik Næsset

Pages 473-501 | Received 29 Apr 2009, Accepted 30 Sep 2009, Published online: 06 Feb 2011

66 Cite this article ▶ https://doi.org/10.1080/01431160903474970















Read this article



Abstract

Total above-ground biomass of spruce, pine and birch was estimated in three different field datasets collected in young forests in south-east Norway. The mean heights ranged from 1.77 to 9.66 m. These field data were regressed against metrics derived from canopy height distributions generated from airborne laser scanner (ALS) data with a point density of $0.9-1.2 \text{ m}^{-2}$. The field data consisted of 79 plots with size 200-232.9 m² and 20 stands with an average size of 3742 m². Total above-ground biomass ranged from 2.27 to 90.42 Mg ha⁻¹. The influences of (1) regression model form, (2) canopy threshold value and (3) tree species on the relationships between biomass and ALSderived metrics were assessed. The analysed model forms were multiple linear models, models with logarithmic transformation of the response and explanatory variables, and models with square root transformation of the response. The different canopy

thresholds considered were fixed values of 0.5, 1.3 and 2.0 m defining the limit between laser canopy echoes and below-canopy echoes. The proportion of explained variability of the estimated models ranged from 60% to 83%. Tree species had a significant influence on the models. For given values of the ALS-derived metrics related to canopy height and canopy density, spruce tended to have higher above-ground biomass values than pine and deciduous species. There were no clear effects of model form and canopy threshold on the accuracy of predictions produced by cross validation of the various models, but there is a risk of heteroskedasticity with linear models. Cross validation revealed an accuracy of the root mean square error (RMSE) ranging from 3.85 to 13.9 Mg ha $^{-1}$, corresponding to 22.6% to 48.1% of mean field-measured biomass. It was concluded that airborne laser scanning has a potential for predicting biomass in young forest stands (> 0.5 ha) with an accuracy of 20–30% of mean ground value.

Related Research Data

Airborne laser scanning as a method in operational forest inventory: Status of accuracy assessments accomplished in Scandinavia

Source: Scandinavian Journal of Forest Research

Assessing Point Accuracy of DGPS Under Forest Canopy Before Data Acquisition, in the

Field and After Postprocessing

Source: Scandinavian Journal of Forest Research

Estimating tree heights and number of stems in young forest stands using airborne

laser scanner data

Source: Remote Sensing of Environment

A Multiple Resource Inventory of Delaware Using Airborne Laser Data

Source: BioScience

Lidar remote sensing of above-ground biomass in three biomes

Source: Global Ecology and Biogeography

Estimation of above- and below-ground biomass across regions of the boreal forest

zone using airborne laser



People also read Recommended articles

Cited by 66

A survey of remote sensing-based aboveground biomass estimation methods in forest ecosystems >

Dengsheng Lu et al.

International Journal of Digital Earth

Published online: 18 Dec 2014

~

Measuring individual tree crown diameter with lidar and assessing its influence on estimating forest volume and biomass >

Sorin C Popescu et al.

Canadian Journal of Remote Sensing

Published online: 2 Jun 2014

Carbon sinks and tropical forest biomass estimation: a review on role of remote sensing in aboveground-biomass modelling >

Nurul Ain Mohd Zaki et al.

Geocarto International

Published online: 10 May 2016

Information for

Authors

R&D professionals

Editors

Librarians

Societies

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

Open Select

Dove Medical Press

F1000Research

Help and information

Help and contact

Newsroom

All journals

Books

Keep up to date

Register to receive personalised research and resources by email



Sign me up











Accessibility



Copyright © 2025 Informa UK Limited Privacy policy Cookies Terms & conditions



Registered in England & Wales No. 01072954 5 Howick Place | London | SW1P 1WG