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Estimating Vertical Distribution of Vegetation Cover in Temperate Heterogeneous Forests Using Airborne Laser Scanning Data

PDF (Size: 2209KB) PP. 89-96 DOI: 10.4236/ojf.2012.23012

Author(s)

Keiko Ioki, Junichi Imanishi, Takeshi Sasaki, Youngkeun Song, Yukihiro Morimoto, Hisashi Hasegawa

ABSTRACT

Vertical structure is important for understanding forest environment, yet difficult to characterize, especially in temperate heterogeneous forests where the structure is complex. This study used data from a small-footprint airborne laser scanning (ALS) to estimate vegetation coverage in four stratum ranges in a warm temperate forest in Japan: >12 m, 8 - 12 m, 4 - 8 m, and 0 - 4 m in height. Field data were collected in 17 broad-leaved and 12 coniferous sample plots, consisting of the proportion of vegetation cover in each stratum range. The field and ALS measurements were conducted in summer, during leaf-on conditions. Using echo attributes (first, last, intermediate, and only), we calculated the vegetation coverage index (VCI) at 1-m height intervals. The cumulative sum of the VCI (CUMVCI) was then computed and compared with field observations. Linear regression analysis showed that the ALS data gave reasonable estimates of vegetation coverage in the upper two or three stratum ranges in broad-leaved stands, and in the upper two stratum ranges in coniferous stands. The model gave reproducible estimates until approximately 95% of the total returns had been applied. We conclude that ALS data can provide useful information on natural habitats in the management of warm temperate forest.

KEYWORDS

Forest Structure; Remote Sensing; Airborne Laser Scanning

Cite this paper

Ioki, K. , Imanishi, J. , Sasaki, T. , Song, Y. , Morimoto, Y. & Hasegawa, H. (2012). Estimating Vertical Distribution of Vegetation Cover in Temperate Heterogeneous Forests Using Airborne Laser Scanning Data. *Open Journal of Forestry*, 2, 89-96. doi: 10.4236/ojf.2012.23012.

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