Error estimation and validation of global tree-cover continuous fields using lidar remote sensing

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INTRODUCTION

Validating tree cover estimates is limited by scale and cost. With increasing coverage worldwide, light detection and ranging (lidar) sensors now offer an additional and potentially superior means of reference data collection. We created a global, Landsat-based tree cover dataset for circa 2000 and 2005 and assessed its accuracy relative to lidar measurements and the MODIS Vegetation Continuous Fields (VCF) tree cover layer in a sample of biomes.

METHODS

- Global, 30-m estimates of tree cover in 2000 and 2005 were generated by a scale-free model of cover as a function of surface reflectance. The model was fit locally to cover estimates from the 250-m Moderate-resolution Imaging Spectroradiometer (MODIS) Vegetation Continuous Fields (VCF) tree cover layer and ancillary information from the MODIS Cropland Layer and Training Data Automation-Support Vector Machines (TDA-SVM).
- Lidar measurements of tree cover were calculated by dividing the number of returns > 5 m in height by the total number of returns within a 10-m radius.
- Overall accuracy of GLS estimates is comparable to that of the MODIS VCF (RMSE = 17%).
- GLS estimates exhibit improved accuracy in difficult agricultural regions, with an RMSE of 20% in GLS vs. 23% RMSE in MODIS VCF.
- GLS has improved potential for calibration to lidar, with post-calibration RMSE = 9% vs. 14% in the MODIS VCF.

REFERENCES


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