Data Paper

Ecology, 90(11), 2009, p. 3274

Canopy height and ground elevation in a mixed-land-use lowland Neotropical rain forest landscape

Ecological Archives **E090–233**

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Abstract. We obtained spatially extensive canopy height measurements using airborne remote sensing to characterize the structure and dynamics of a tropical rain forest landscape. Light detection and ranging (LiDAR) is a remote-sensing technology that acquires measurements of canopy height and ground elevation. By recording the return time of laser pulses emitted by aircraft-mounted sensors, LiDAR systems quantify the structure and geometry of individual trees and canopy height and enable estimation of the vertical and horizontal distribution of biomass using millions of accurate height measurements. This data set contains 127 849 839 records from 128 square kilometers of tropical wet forest in the Atlantic lowlands of Costa Rica (mean sampling density is 1.99 observations/m^2). The study area includes all 16 square kilometers of mixed-land-use forest at the La Selva Biological Station and the lower flanks of Braulio Carrillo National Park. It contains a mosaic of historical and contemporary land use that is representative of contemporary tropical forest landscapes. Field studies demonstrated that LiDAR measurements were precise and accurate throughout the topographic and structural conditions at the site. Each record includes: easting and northing mapped coordinates (UTM Zone 16 North), height above ground (m), interpolated ground elevation (m), and six remote-sensing descriptors (point classification, the return number, the number of returns for the given pulse, intensity, scan angle, and the time of emission of the laser pulse). The data can be applied to a wide range of questions in basic and applied science, and are a valuable resource from a well-studied tropical rain forest for teaching and education. They also provide a quantitative baseline against which future conditions can be assessed.

Key words: biomass; carbon; Costa Rica; forest structure; landscape; La Selva Biological Station; LiDAR; light detection and ranging; Neotropics; remote sensing; sustainability.

The complete data sets corresponding to abstracts published in the Data Papers section of the journal are published electronically in *Ecological Archives* at ⟨http://esapubs.org/archive⟩. (The accession number for each Data Paper is given directly beneath the title.)

Manuscript received 18 February 2009; revised 4 June 2009; accepted 17 June 2009. Corresponding Editor: W. K. Michener.
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