



CMS: LiDAR Data for Forested Sites on Borneo Island, Kalimantan, Indonesia, 2014

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Data Set Version: 1

Summary

This dataset provides airborne LiDAR data collected over 90 sites totaling approximately 100,000 hectares of forested land in Kalimantan, Indonesia on the island of Borneo in late 2014. The data were collected as part of an effort to establish a national forest monitoring system for Indonesia that uses a combination of remote sensing and ground-based forest carbon inventory approaches.

This dataset contains 409 data files in LiDAR (*.laz) file format and one compressed shapefile (*.zip) providing the LiDAR file footprints. Note that derived data products including digital terrain models, digital surface models, and canopy height models are provided in a related dataset.

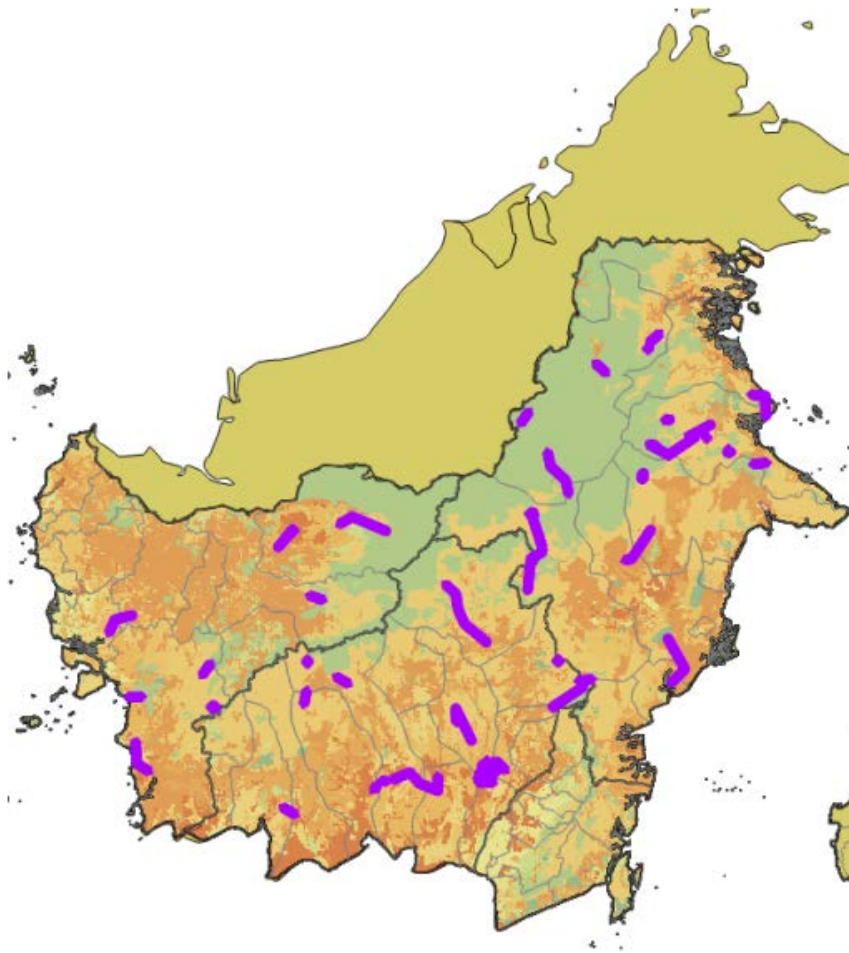


Figure 1. The 2014 LiDAR campaign covered 90 survey sites and approximately 100,000 hectares across the Indonesian portion of the island of Borneo (from Hagen 2015).

Citation

Melendy, L., S. Hagen, F.B. Sullivan, T. Pearson, S.M. Walker, P. Ellis, Kustiyo, K.A. Sambodo, O. Roswintarti, M. Hanson, A.W. Klassen, M.W. Palace, B.H. Braswell, G.M. Delgado, S.S. Saatchi, and A. Ferraz. 2017. CMS: LiDAR Data for Forested Sites on Borneo Island, Kalimantan, Indonesia, 2014. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1518>

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1. Data Set Overview

This dataset provides airborne LiDAR data collected over 90 sites totaling approximately 100,000 hectares of forested land in Kalimantan, Indonesia on the island of Borneo in late 2014. The data were collected as part of an effort to establish a national forest monitoring system for Indonesia that uses a combination of remote sensing and ground-based forest carbon inventory approaches.

Project: [Carbon Monitoring System \(CMS\)](#)

The NASA Carbon Monitoring System is designed to make significant contributions in characterizing, quantifying, understanding, and predicting the evolution of global carbon sources and sinks through improved monitoring of carbon stocks and fluxes. The System will use the full range of NASA satellite observations and modeling/analysis capabilities to establish the accuracy, quantitative uncertainties, and utility of products for supporting national and international policy, regulatory, and management activities. CMS will maintain a global emphasis while providing finer scale regional information, utilizing space-based and surface-based data and will rapidly initiate generation and distribution of products both for user evaluation and to inform near-

term policy development and planning.

Related Data Set:

Melendy, L., S. Hagen, F.B. Sullivan, T. Pearson, S.M. Walker, P. Ellis, Kustiyo, K.A. Sambodo, O. Roswintiarti, M. Hanson, A.W. Klassen, M.W. Palace, B.H. Braswell, G.M. Delgado, S.S. Saatchi, and A. Ferraz. 2017. CMS: LiDAR-derived Canopy and Elevation for Sites in Kalimantan, Indonesia, 2014. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1540>

Related Publication:

Melendy, L., S.C. Hagen, F.B. Sullivan, T.R.H. Pearson, S.M. Walker, P. Ellis, Kustiyo, Ari Katmoko Sambodo, O. Roswintiarti, M. Hanson, A.W. Klassen, M. Palace, R. Braswell, G. Delgado, S. Saatchi, and A. Ferraz. 2017. Automated method for measuring the extent of selective logging damage with airborne LiDAR data. *Remote Sensing of Environment*. In Review.

Acknowledgements:

This study was funded by NASA Carbon Monitoring System (Grant number: NNX13AP88G) under the title of “Operational multi-sensor design for national scale forest carbon monitoring to support REDD+ MRV systems” (Project Lead: Stephen Hagen).

2. Data Characteristics

Spatial Coverage: Sites in Kalimantan province, Indonesia

Spatial Resolution: Sub-meter

Temporal Coverage: 20141018 - 20141130

Temporal Resolution: Each study site was surveyed once

Study Area (These coordinates encompass the approximate locations of the study sites and may not match the extents of the data files. All latitude and longitude given in decimal degrees.)

Feedback

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Kalimantan, Indonesia	109.816	117.987	3.211	-2.758

Data File Information

There are 409 data files in LiDAR (*.laz) format included in this dataset. Spatial reference properties for the data files are listed below. Data files are named as follows:

Polygon_<siteid>_utm_<zone>_<section>.laz where:

siteid = three-digit site identifier (corresponds to siteID attribute in *indonesia_lidar_footprints.shp*)

zone = UTM Zone

section = Number differentiating sub-unit within each survey site

Spatial Reference Properties

Geographic Coordinate System: GCS_DGN95

Angular Unit: Degree (0.0174532925199433)

Prime Meridian: Greenwich (0.0)

Datum: D_Datum_Geodesi_Nasional_1995

Spheroid: WGS_1984

Semimajor Axis: 6378137.0

Semiminor Axis: 6356752.314245179

Inverse Flattening: 298.257223563

UTM Zones 49N, 49S, 50N, 50S

The survey footprints are provided as a shapefile (contained in *indonesia_lidar_footprints.zip*) and identified by the “siteID” attribute. Shapefile attribute names and descriptions are given in Table 1.

The shapefile is also provided as a companion file in KMZ (*.kmz) format for viewing in Google Earth.

Table 1. Shapefile (*indonesia_lidar_footprints.shp*) attribute names, units, and descriptions.

Attribute Name	Units	Descriptions
sitelD		three-digit site identifier
sid_int		sitelD converted to integer format
Specs	ppm ²	LiDAR data were collected according to five different sets of specifications, primary focused on point density: 1) 4.03 points per square meter (ppm ²) excluding overlap; 2) 5.75 ppm ² ; 3) 6.02 ppm ² ; 4) 10.05 ppm ² ; 5) no specification
area_ha	hectare	Approximate site area
LiDAR_Line	YYMMDD	Survey date; YY = 2014

3. Application and Derivation

The data were collected as part of an effort to establish a national forest monitoring system for Indonesia. Future goals of the project include mapping forest carbon stocks across Kalimantan and estimating forest carbon flux associated with logging.

4. Quality Assessment

Uncertainty associated with this data has not been analyzed.

5. Data Acquisition, Materials, and Methods

This dataset was produced as part of an effort to establish a national forest monitoring system for Indonesia that uses a combination of remote sensing and ground-based forest carbon inventory approaches. The effort was led by Applied GeoSolutions (<http://www.appliedgeosolutions.com/>) and funded through NASA's Carbon Monitoring System project with support from Winrock (<https://www.winrock.org/>), NASA's Jet Propulsion Laboratory, the University of New Hampshire, Wageningen University, and the University of Virginia.

Data Acquisition

Airborne LiDAR observations were collected over 104,000 hectares of forest across Kalimantan, Indonesia on the island of Borneo between 18 October and 30 November 2014 by Jakarta-based company Surtech (<http://www.surtech-group.com/>). The data were collected at point densities ranging between 4- and 10-ppm.

The raw LiDAR observations were used to generate additional data products including digital terrain models, digital surface models, and canopy height models for each of the 90 survey sites. These data are provided in a related dataset:

Melendy, L., S. Hagen, F.B. Sullivan, T. Pearson, S.M. Walker, P. Ellis, Kustiyo, K.A. Sambodo, O. Roswintarti, M. Hanson, A.W. Klassen, M.W. Palace, B.H. Braswell, G.M. Delgado, S.S. Saatchi, and A. Ferraz. 2017. CMS: LiDAR-derived Canopy and Elevation for Sites in Kalimantan, Indonesia, 2014. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1540>

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[CMS: LiDAR Data for Forested Sites on Borneo Island, Kalimantan, Indonesia, 2014](https://daac.ornl.gov/CMS/guides/CMS_LiDAR_Indonesia.html)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Hagen, S., F.B. Sullivan, S. Saatchi, T. Pearson, M. Palace, B.H. Braswell, S. Brown, W.A. Salas, M. Hanson. 2015. Forest Monitoring in Indonesia: Using an extensive LiDAR data set to map forest carbon stock and logging impacts. Poster for the American Geophysical Union 2015 conference. Included as a companion file: Hagen_2015_AGU_poster.pdf

Melendy, L., S.C. Hagen, F.B. Sullivan, T.R.H. Pearson, S.M. Walker, P. Ellis, Kustiyo, Ari Katmoko Sambodo, O. Roswintarti, M. Hanson, A.W. Klassen, M. Palace, R. Braswell, G. Delgado, S. Saatchi, and A. Feraz. 2017. Automated method for measuring the extent of selective logging damage with airborne LiDAR data. *Remote Sensing of Environment*. In Review.



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