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[DAAC Home](#) > [Get Data](#) > [NASA Projects](#) > [Carbon Monitoring System \(CMS\)](#) > [User guide](#)

Forest Inventory and Biophysical Measurements, Brazilian Amazon, 2009-2018

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Summary

This dataset provides the complete catalog of forest inventory and biophysical measurements collected over selected forest research sites across the Amazon rainforest in Brazil between 2009 and 2018 for the Sustainable Landscapes Brazil Project. This dataset includes measurements for diameter at breast height (DBH), commercial tree height, and total tree height for forest inventories. Also included for each tree are the family, common and scientific names, coordinates, canopy position, crown radius, and for dead trees, the decomposition status. Aboveground biomass estimate is available for selected sites. The data are provided in comma-separated values (CSV) and shapefile formats. Sampling methodology for each site and year is described in companion files.

This data set contains 62 files, 31 in comma separate (*.csv) format and 31 in shapefile (*.shp) format contained in compressed (*.zip) files.

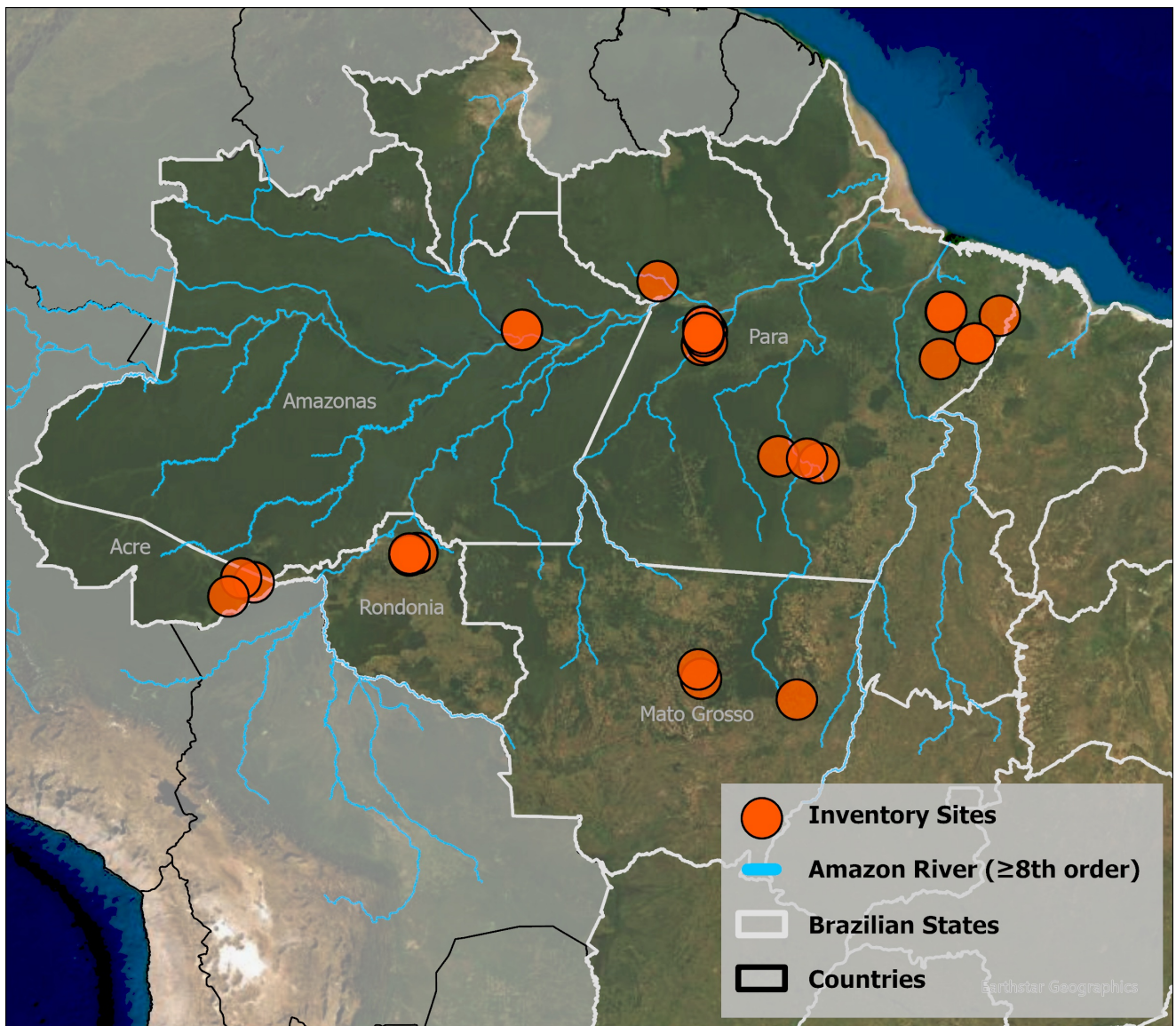


Figure 1. Locations in Brazil where forest inventory surveys were conducted.

Citation

dos-Santos, M.N., M.M. Keller, E.R. Pinage, and D.C. Morton. 2022. Forest Inventory and Biophysical Measurements, Brazilian Amazon, 2009-2018. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/2007>

Table of Contents

1. [Dataset Overview](#)
2. [Data Characteristics](#)
3. [Application and Derivation](#)
4. [Quality Assessment](#)
5. [Data Acquisition, Materials, and Methods](#)
6. [Data Access](#)
7. [References](#)

1. Dataset Overview

This dataset provides the complete catalog of forest inventory and biophysical measurements collected over selected forest research sites across the Amazon rainforest in Brazil between 2009 and 2018 for the Sustainable Landscapes Brazil Project. This dataset includes measurements for diameter at breast height (DBH), commercial tree height, and total tree height for forest inventories. Also included for each tree are the family, common and scientific names, coordinates, canopy position, crown radius, and for dead trees, the decomposition status. Sampling methodology for each site and year is described in companion files.

Project: Carbon Monitoring System (CMS)

The CMS 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.

Related Datasets:

dos-Santos, M.N., M.M. Keller, and D.C. Morton. 2019. LiDAR Surveys over Selected Forest Research Sites, Brazilian Amazon, 2008-2018. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1644>

- LiDAR point cloud data collected across the many of the same forest research sites as this dataset from 2008-2018

dos-Santos, M.N., and M.M. Keller. 2016. CMS: Forest Inventory and Biophysical Measurements, Para, Brazil, 2012-2014. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1301>

- Forest inventory measurements collected from forest research sites in Para, Brazil from 2012-2014

dos-Santos, M.N., and M.M. Keller. 2016. CMS: LiDAR Data for Forested Areas in Paragominas, Para, Brazil, 2012-2014. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1302>

- LiDAR data collected from forest research sites in Para, Brazil from 2012-2014

Keller, M.M., P. Duffy, and W. Barnett. 2019. LiDAR and PALSAR-Derived Forest Aboveground Biomass, Paragominas, Para, Brazil, 2012. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1648>

- LiDAR point clouds and aboveground biomass estimates from Para, Brazil in 2012.

Acknowledgements:

Forest inventory measurements performed through the Sustainable Landscapes project were commissioned by the United States Forest Service in collaboration with the Brazilian Enterprise for Agricultural Research (EMBRAPA) (<https://www.paisagenslidar.cnptia.embrapa.br/geonetwork/srv/por/catalog.search#/home>) and are archived through the Carbon Monitoring System project funded by NASA.

2. Data Characteristics

Spatial Coverage: Selected areas of the Amazon Basin and other regions in Brazil

Spatial Resolution: Point data

Temporal Coverage: 2009-01-01 to 2018-12-31

Temporal Resolution: Varies by site. Some sites were sampled once, and others were resampled in following years.

Study Area: (all latitude and longitudes given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Brazil	-67.982	-46.829	-1.50	-13.093

Data File Information

This data set contains 62 files, 31 in comma separate (*.csv) format and 31 in shapefile (*.shp) format contained in compressed (*.zip) files. CSV files contain forest inventory measurements, and shapefiles contain plot locations.

Files are named *Site_Subsite_Year_inventory.csv* or *Site_Subsite_Year_inventory_plots.shp* where *Site* and *Subsite* identify the forest inventory location and *Year* is the year sampling occurred. Please refer to the companion PDF metadata files for the definitions of the 3-character site codes and additional site descriptions.

No data values are indicated by 'NA'.

Survey techniques differed by site. Table 1 provides a summary of survey methodologies for each forest inventory site. Survey techniques (e.g. plot size, minimum recorded DBH, whether the plots were resampled the following year) were highly variable between locations, and in many cases, multiple survey techniques were employed at a given location. Please see the PDF companion files for detailed descriptions of sampling techniques.

Table 1. Forest inventory survey methodologies for each location and whether aboveground biomass (AGB) was estimated.

File Name (<i>Site_Subsite_Year</i>)	Survey Type	Plot/Transect Size	n	Resampled	Minimum DBH	Subplot Size	Subplot Minimum DBH	AGB
ANA_A01_2015_2018	Plot	50 m x 50 m	32	Yes	10 cm	20 m x 50 m (2018)	10 cm	No
AND_A01_2013_2018	Plot	50 m x 50 m	20	Yes	35 cm	5 m x 50 m (2013); 20 m x 50 m (2018)	10 cm	No
BON_A01_2014	Plot	50 m x 50 m	10	No	35 cm	10 m x 50 m	10 cm	No
CAU_A01_2014_2018	Plot	50 m x 50 m	88	Yes	35 cm	5 m x 50 m (2014); 20 m x 50 m (2018)	10 cm	No
DUC_A01_2009_2011	Transect	500 m	5	Yes	5 cm	NA	NA	No
DUC_A01_2016	Plot	50 m x 50 m	17	No	35 cm	20 m x 50 m	10 cm	No
FN_A01_2015	Plot	50 m x 50 m	36	No	35 cm	5 m x 50 m	10 cm	Yes
FNA_A01_2013	Plot	50 m x 50 m	20	No	5 cm	NA	NA	Yes
FST_A01_2013	Plot	50 m x 50 m	20	No	35 cm	5 m x 50 m	10 cm	No
HUM_A01_2014	Plot	50 m x 50 m	10	No	35 cm	20 m x 50 m	10 cm	No

JAM_A01_2011	Transect	500 m	2	No	5 cm	NA	NA	No
JAM_A02_2011	Transect	500 m	6	No	5 cm	NA	NA	No
JAM_A02_2013	Plot	50 m x 50 m	24	No	35 cm	5 m x 50 m	10 cm	Yes
JAM_A03_2013	Plot	50 m x 50 m	4	No	35 cm	5 m x 50 m	10 cm	Yes
PAR_A01_2013_2018	Plot	20 m x 500 m	10	Yes	35 cm	2m x 500 m	10 cm	No
PAR_A01_2018	Plot	50 m x 50 m	40	No	35 cm	20 m x 50 m	10 cm	No
SAN_A01_2014_2016	Plot	50 m x 50 m	8	Yes	35 m	5 m x 50 m	10 cm	No
SAN_A01b_2016_2018	Plot	50 m x 50 m	7	Yes	35 cm	5 m x 50 m (2016); 20 m x 50 m (2018)	10 cm	No
SAN_A02_2014	Plot	50 m x 50 m	8	No	35 cm	5 m x 50 m	10 cm	No
SFX_A01_2011	Plot	40 m x 40 m	9	No	10 cm	NA	NA	Yes
SFX_A02_2012	Plot	40 m x 40 m	22	No	10 cm	NA	NA	Yes
SFX_A03_2012	Plot	40 m x 40 m	8	No	10 cm	NA	NA	Yes
TAC_A01_2014	Plot	30 m x 30 m	14	No	5 cm	NA	NA	No
TAC_A01_2015	Plot	50 m x 50 m	13	No	10 cm	5 m x 50 m	5 cm	No
TAL_A01_2014	Plot	50 m x 50 m	5	No	35 cm	10 m x 50 m	10 cm	No
TAN_A01_2012	Plot	20 m x 500 m	10	No	35 cm	2 m x 500 m	10 cm	Yes
TAP_A01_2009_2011	Transect	500 m	5	Yes	5 cm	NA	NA	No
TAP_A01_2015_2018	Plot	50 m x 50 m	9	Yes	10 cm	20 m x 50 m	10 cm	No
TAP_A03_2015_2018	Plot	50 m x 50 m	10	Yes	10 cm	20 m x 50 m	10 cm	No
TAP_A04_2010_2011	Transect	500 m	4	Yes	5 cm	NA	NA	No
TAP_A05_2010_2011	Transect	500 m	2	Yes	5 cm	NA	NA	No

Companion File Information

The dataset contains three types of companion files:

- **Site_Subsite_Year_inventory.pdf**
 - 31 files with specific survey methodology for a given site.
- **Site_Subsite_Year_inventory.kmz**
 - 31 files holding plot locations from the shapefiles in KMZ format
- **Brazil_forest_inventory_data_dictionary.csv**
 - The data dictionary for the *Site_Subsite_Year_inventory.csv* files

3. Application and Derivation

These forest inventory measurements characterize forest canopy structure across Amazonian landscapes to monitor the effects of selective logging on forest biomass, carbon balance, and forest recovery over time.

4. Quality Assessment

Uncertainty analysis was performed to height measurements only as described in Hunter et al. (2013). Field-measured tree height was compared to lidar-derived tree heights. The authors found that the precision of individual tree height measurements ranged from 3% to 20% of total height.

5. Data Acquisition, Materials, and Methods

Project Overview

Brazilian tropical forests contain approximately one-third of the global carbon stock in above-ground tropical forest biomass. Deforestation has cleared about 15% of the extensive forest on the Brazilian Amazon frontier. Logging and understory forest fires may have degraded a similar area of forest. In response to the potential climatic effects of deforestation, policy makers have suggested reductions in emissions due to deforestation and forest degradation and recommended increases in carbon sequestration by enhancing forest carbon stocks. Carbon accounting requires knowledge of deforestation, degradation, and associated changes in forest carbon stocks.

Forest Inventory Measurements

Forest inventory surveys were conducted between 2009 and 2018 as part of the Sustainable Landscapes program. Sustainable Landscapes is supported by the United States Agency for International Development (USAID) and US Department of State. Surveys performed through the Sustainable Landscapes program were commissioned by the United States Forest Service in collaboration with the Brazilian Enterprise for Agricultural Research (EMBRAPA) and are archived through the Carbon Monitoring System project funded by NASA.

Forest surveys were employed across five Brazilian states (Table 2). Survey techniques (e.g. plot size, minimum recorded DBH, whether plots were resampled the following year) were highly variable between locations, and in many cases, multiple survey techniques were employed at a given location.

Please see the PDF companion files for detailed descriptions of sampling techniques.

EMBRAPA maintains a metadata portal for the Sustainable Landscapes project at: <https://www.paisagenslidar.cnptia.embrapa.br/webgis/>.

Table 2. Brazilian states where forest inventory sites are located.

File Name (Site_Subsite_Year)	State
ANA_A01_2015_2018	Para
AND_A01_2013_2018	Para
BON_A01_2014	Acre
CAU_A01_2014_2018	Para
DUC_A01_2009_2011	Amazonas
DUC_A01_2016	Amazonas
FN_A01_2015	Mato Grosso
FNA_A01_2013	Mato Grosso
FST_A01_2013	Para
HUM_A01_2014	Acre
JAM_A01_2011	Rondonia
JAM_A02_2011	Rondonia
JAM_A02_2013	Rondonia
JAM_A03_2013	Rondonia
PAR_A01_2013_2018	Para
PAR_A01_2018	Para
SAN_A01_2014_2016	Para
SAN_A01b_2016_2018	Para
SAN_A02_2014	Para
SFX_A01_2011	Para
SFX_A02_2012	Para
SFX_A03_2012	Para
TAC_A01_2014	Para
TAC_A01_2015	Para
TAL_A01_2014	Acre
TAN_A01_2012	Mato Grosso
TAP_A01_2009_2011	Para
TAP_A01_2015_2018	Para
TAP_A03_2015_2018	Para
TAP_A04_2010_2011	Para
TAP_A05_2010_2011	Para

6. Data Access

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

[Forest Inventory and Biophysical Measurements, Brazilian Amazon, 2009-2018](#)

Contact for Data Center Access Information:

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- Telephone: +1 (865) 241-3952

7. References

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- Mission
- Data Use and Citation Policy
- User Working Group
- Partners

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- Science Themes
- NASA Projects
- All Datasets

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- Submit Data Form
- Data Scope and Acceptance
- Data Authorship Policy
- Data Publication Timeline
- Detailed Submission Guidelines

Tools

- MODIS
- THREDDS
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