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LiDAR and DTM Data from Tapajos National Forest in Para, Brazil, 2008

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Summary

This data set provides LiDAR point clouds and digital terrain models (DTM) from surveys over the Tapajos National Forest in Belterra municipality, Para, Brazil during late June and early July 2008. The surveys encompass the K67 and K83 eddy flux towers and a deforestation chronosequence managed through the Large-Scale Biosphere-Atmosphere Experiment in Amazonia providing long-term flux measurements of carbon dioxide. The LiDAR data was collected to measure forest canopy structure across Amazonian landscapes to monitor the effects of selective logging on forest biomass and carbon balance, and forest recovery over time.

This data set contains 10 data files in LiDAR (*.laz) file format, 4 DTMs in GeoTIFF (*.tif) format, and one shapefile (*.shp) providing the LiDAR file footprints.

Figure 1. Footprints from each of the surveyed areas within Tapajos National Forest in Para, Brazil are included in TAP_A_footprints.shp. The Km67 and Km83 eddy flux towers (AmeriFlux Sites BR-Sa1 and BR-Sa3) are within the surveyed areas.

Citation

Lefsky, M.A., S.R. Saleska, and Y.E. Shimabukuro. 2017. LiDAR and DTM Data from Tapajos National Forest in Para, Brazil, 2008. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1514

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1. Dataset Overview

This data set provides LiDAR point clouds and digital terrain models (DTM) from surveys over the Tapajos National Forest in Belterra municipality, Para, Brazil during late June and early July 2008. The surveys encompass two eddy flux towers managed through the Large-Scale Biosphere-Atmosphere Experiment in Amazonia providing long-term flux measurements of carbon dioxide. The LiDAR data was collected to measure forest canopy structure across Amazonian landscapes to monitor the effects of selective logging on forest biomass and carbon balance, and forest recovery over time.

Related Data Sets:

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Varner, R.K., and M.M. Keller. 2009. LBA-ECO TG-07 Soil CO2 Flux by Automated Chamber, Para, Brazil: 2001-2003. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/927

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Acknowledgements:

2. Data Characteristics

Spatial Coverage: Tapajós National Forest, Para, Brazil

Spatial Resolution: LiDAR: ~ 10 points per m^2; DTMs: 1-m

Temporal Coverage: 20080625 - 20080703

Temporal Resolution: One-time flights

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

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Tapajós National Forest, Para, Brazil	-54.978	-54.941	-2.848	-3.055

Data File Information

There are 10 LiDAR point cloud (*.laz) files and 4 digital terrain models (DTM; *.tif) included in this data set. The survey footprints are provided as an ESRI Shapefile (4 files in *TAP_A_footprints.zip*) with the footprint of each LAZ file as a feature record identified by the "FILE" attribute. The spatial reference properties for the data files are listed below and additional metadata for each of the survey areas is provided in Table 1.

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

Spatial Reference Properties

WGS_1984_UTM_zone_21S
WKID: 32721 Authority: EPSG

    Projection: Transverse_Mercator

```
false_easting: 500000.0
false_northing: 10000000.0
central_meridian: -57.0
scale_factor: 0.9996
latitude_of_origin: 0.0
Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_WGS_1984
 Spheroid: WGS_1984
   Semimajor Axis: 6378137.0
   Semiminor Axis: 6356752.314245179
   Inverse Flattening: 298.257223563
```

Table 1. Metadata for LiDAR survey areas

Survey Area	Date(s)	Number of tiles	Total area (ha)	Avg. point density (ppm^2)	Avg. first return density (ppm^2)	Avg. flight altitude (m)
TAP_A01	20080625, 20080626, 20080627, 20080628, 20080703	4	400	51.71	40.6	799
TAP_A04	20080625, 20080703	4	579.66	14.24	11	732
TAP_A05	20080625	1	53.14	13.04	10.41	725
TAP_A06	20080625	1	86.82	10.64	8.52	726

3. Application and Derivation

The LiDAR data was collected to measure forest canopy structure across Amazonian landscapes to monitor the effects of selective logging on forest biomass and carbon balance and forest recovery over time (Stark et al., 2012).

4. Quality Assessment

Checks for horizontal and vertical accuracy, and other standard quality control measures were performed by dataset vendors. Refer to http://mapas.cnpm.embrapa.br/paisagenssustentaveis/ for vendor information.

5. Data Acquisition, Materials, and Methods

Site

Tapajós National Forest (TNF), located in Para, Brazil, is in the Amazon biome and averages 1,820 mm of precipitation annually with temperatures ranging from 21 to 31 °C and averaging 26 °C. Forest coverage includes dense rainforest with emergent trees, alluvial rainforest flooded for part of the year, open tropical rainforest with palms and vines, and secondary forest along the borders and access routes. TNF was created in 1974 to promote sustainable use of forest resources and scientific research, with emphasis on methods for sustainable exploitation of native forests.

The surveys were flown over the Km67 (Ameriflux, BR-Sa1) and Km83 (Ameriflux, BR-Sa3) eddy flux tower sites, and over a nearby deforestation chronosequence, managed through the LBA project. The towers provide long-term flux measurements of carbon dioxide (Hutyra et al., 2007; Wu et al., 2017). The Km67 site is located on a flat plateau with mature forest cover and has been operational since 2002 aside from an outage in 2006-2008. The Km83 site is located in a logged area of forest and was operational from 2000 to 2004 (Miller et al., 2011).

Please visit the AmeriFlux website for additional information and access to the eddy flux tower data (http://ameriflux.lbl.gov/).

Data Acquisition

LiDAR surveys were flown over the survey sites in June and July 2008 with a Leica ALS-50 instrument LiDAR (Heerbrugg, Switzerland) funded by grants from NASA (#NNX09AI33G to M. Lefsky et al.) and NSF (#0721140 to S. Saleska, G.G. Parker, Y. Shimabukuro et al.). The data were collected and processed to point cloud and DTM files by commercial vendors under these grants, and incorporated into the broader integrated effort of the Sustainable Landscapes project. Sustainable Landscapes is supported by the United States Agency for International Development (USAID) and US Department of State. LiDAR surveys performed through the Sustainable Landscapes project were commissioned by the United States Forest Service in collaboration with the Brazilian Enterprise for Agricultural Research (EMBRAPA).

6. Data Access

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

LiDAR and DTM Data from Tapajos National Forest in Para, Brazil, 2008

Contact for Data Center Access Information:

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

7. References

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