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LBA-ECO ND-02 Secondary Forest Tree Heights and Diameters, Para, Brazil: 1999-2005

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Revision date: December 14, 2009

Summary:

This data set provides tree diameters and heights measured from 1999 to 2005 in plots of a secondary-growth forest fertilization experiment located 6.5-km northwest of the town of Paragominas, Para, Brazil. In the 6-year old secondary-growth forest, all trees greater than 2-cm diameter at breast height (DBH) were tagged, identified, and measured for diameter and height in November 1999. Fertilizer was applied to selected plots in January 2000 and February 2001. Tree heights and diameters were remeasured in May 2000, June 2001, July 2002, July 2004, and July 2005. All data are provided in a single comma-separated file.

The site was divided into three blocks, with four treatment plots (each 20-m x 20-m) located in each block (3 reps x 4 treatments = 12 plots). Three of the twelve plots were fertilized with nitrogen (100 kg N/ha as urea); three were fertilized with phosphorus (50 kg P/ha as superphosphate); three were fertilized with both nitrogen and phosphorus. The remaining three plots were not fertilized and served as the experimental control.



Photographs of one of the control plots (left) and one of the plots fertilized with N and P (right) in the secondary forest in May 2002, two years after the first fertilization treatment. Photo from Davidson et al., 2004.

Data Citation:

Cite this data set as follows:

Davidson, E.A., C.J.R. de Carvalho, I.C.G. Vieira, R.O. Figueiredo, P.R. Moutinho, F.Y. Ishida, M.T.P. dos Santos, J.B. Guerrero, K. Kalif, R.T. Saba. 2009. LBA-ECO ND-02 Secondary Forest Tree Heights and Diameters, Para, Brazil: 1999-2005. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi: [10.3334/ORNLDAAC/951](https://doi.org/10.3334/ORNLDAAC/951)

Implementation of the LBA Data and Publication Policy by Data Users:

The LBA Data and Publication Policy [http://daac.ornl.gov/LBA/lba_data_policy.html] is in effect for a period of five (5) years from the date of archiving and should be followed by data users who have obtained LBA data sets from the ORNL DAAC. Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.

This data set was archived in December of 2009. Users who download the data between December 2009 and November 2014 must comply with the LBA Data and Publication Policy.

Data users should use the investigator contact information in this document to communicate with the data provider. Alternatively, the LBA Web Site [<http://lba.inpa.gov.br/lba/>] in Brazil will have current contact information.

Data users should use the Data Set Citation and other applicable references provided in this document to acknowledge use of the data.

Table of Contents:

- [1 Data Set Overview](#)
- [2 Data Characteristics](#)
- [3 Applications and Derivation](#)
- [4 Quality Assessment](#)
- [5 Acquisition Materials and Methods](#)
- [6 Data Access](#)
- [7 References](#)

1. Data Set Overview:

Project: LBA-ECO

Activity: Biogeochemical Cycles in Degraded Lands

LBA Science Component: Nutrient Dynamics

Team ID: ND-02 (Davidson / Carvalho / Dias-Filho / Moutinho / Sa / Vieira)

The investigators were Davidson, Eric A.; Carvalho, Claudio Jose Reis de; Moutinho, Paulo Roberto de Souza; Vieira, Ima Celia G.; Figueiredo, Ricardo de Oliveira and Ishida, Françoise Yoko . You may contact Davidson, Eric A. (edavidson@whrc.org) and Vieira, Ima (ima@museu-goeldi.br)

LBA Data Set Inventory ID: ND02_Tree_Heights_DBH

The objective of this study was to measure the effects of a nitrogen (N) and phosphorus (P) fertilization on biomass growth and species composition in a 6-yr-old secondary forest growing on an abandoned cattle pasture on a clayey Oxisol. Fertilizers were applied to triplicate 20 x 20-m plots per fertilizer treatment in 2000 and 2001. All stems >2cm diameter at breast height were tagged in 1999 and were annually remeasured through 2005, including recruitment of new stems into this diameter class.

Understanding secondary successional processes in Amazonian terrestrial ecosystems is becoming increasingly important as continued deforestation expands the area that has become secondary forest, or at least has been through a recent phase of secondary forest growth. Most Amazonian soils are highly weathered and relatively nutrient poor, but the role of nutrients as a factor determining successional processes is unclear. Soils testing and chronosequence studies have yielded equivocal results regarding the possible role of nutrient limitation.

2. Data Characteristics:

These data are provided as a single comma-delimited ASCII file: **ParagominasTreeDiameterAndHeight_1999-2005.csv**

Each row contains all data measured for an individual tree over the course of the sampling period for a measurement event. See the notes below regarding data records for the recruitment of new stems into the >2cm diameter class and for tree mortality.

File Contents / Variable Descriptions:

Column Number	Heading	Description
1	Treatment	Fertilizer treatment: Control, Nitrogen, Phosphorus, Nitrogen+Phosphorus (designated as Nitr+Phos)
2	Block	Block number within Treatment (B1, B2, B3)
3	Plot	Plot number within Block (P1, P2, P3, P4)
4	Tree_ID	Individual tree ID number within each Plot
5	Species	Species name
6	Sample_ID	Sample ID: Treatment + Block + Plot + Tree_ID fields concatenated to create a unique sample identifier
7	Measurement_Period	Measurement Period (Mon-YY) Note that this field will not retain this format when opened by default in Excel. Excel will unsuccessfully try to interpret values as dates.
8	Year	Measurement Year (YYYY)
9	Month	Measurement Month (Month)
10	DBH	Tree diameter in centimeters (cm) measured at 1.3 meters above the soil surface.
11	Height	Tree height in meters (m)
12	Comments	Observations / comments

Missing values are represented as -9999.

Please note that for trees indicated as "Dead" in the Comments column, the records for that Tree_ID were retained for all years through 2005. DBH and Height values were set to -9999 for the year a tree was "Dead" and subsequent years.

New individuals that had grown into the >2cm diameter class were tagged and measured at each date. Records for previous dates were inserted for this Tree_ID and Comments of "<2cm" were added. DBH and Height values were set to -9999 for trees "<2cm".

Example data record:

Header records omitted.

Treatment,Block,Plot,Tree_ID,Species,Sample_ID,Measurement_Period,Year,Month,DBH,Height,Comments
 Control,B1,P3,i155,Rollinia exsucca,Control>B1>P3>i155>Rollinia exsucca,Nov-99,1999,November,4.9,3.3,
 Control,B1,P3,i155,Rollinia exsucca,Control>B1>P3>i155>Rollinia exsucca,May-00,2000,May,7.1,4.4,
 Control,B1,P3,i155,Rollinia exsucca,Control>B1>P3>i155>Rollinia exsucca,Jun-01,2001,June,7.6,5,
 Control,B1,P3,i155,Rollinia exsucca,Control>B1>P3>i155>Rollinia exsucca,Jul-02,2002,July,8.9,5.5,
 Control,B1,P3,i155,Rollinia exsucca,Control>B1>P3>i155>Rollinia exsucca,Jul-04,2004,July,10.6,7,
 ...
 Nitr+Phos,B3,P1,i198,Rollinia exsucca,Nitr+Phos>B3>P1>i198>Rollinia exsucca,May-00,2000,May,-9999,-9999,<2cm
 Nitr+Phos,B3,P1,i198,Rollinia exsucca,Nitr+Phos>B3>P1>i198>Rollinia exsucca,Jun-01,2001,June,-9999,-9999,<2cm
 Nitr+Phos,B3,P1,i198,Rollinia exsucca,Nitr+Phos>B3>P1>i198>Rollinia exsucca,Jul-02,2002,July,-9999,-9999,<2cm
 Nitr+Phos,B3,P1,i198,Rollinia exsucca,Nitr+Phos>B3>P1>i198>Rollinia exsucca,Jul-04,2004,July,5.4,3,
 Nitr+Phos,B3,P1,i198,Rollinia exsucca,Nitr+Phos>B3>P1>i198>Rollinia exsucca,Jul-05,2005,July,6,4,

Site boundaries: (All latitude and longitude given in degrees and fractions)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Para Eastern (Belem) - Paragominas (Para Eastern (Belem))	-47.516	-47.516	-2.983	-2.983	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 1999/11/01 to 2005/07/31.
- Temporal Resolution: Annual

Platform/Sensor/Parameters measured include:

- VEGETATION SURVEY / HUMAN OBSERVER / FOREST COMPOSITION/VEGETATION STRUCTURE
- VEGETATION SURVEY / STEEL MEASURING TAPE / BIOMASS

3. Data Application and Derivation:

Understanding secondary successional processes in Amazonian terrestrial ecosystems is becoming increasingly important as continued deforestation expands the area that has become secondary forest, or at least has been through a recent phase of secondary forest growth. Most Amazonian soils are highly weathered and relatively nutrient poor, but the role of nutrients as a factor determining successional processes is unclear. Soils testing and chronosequence studies have yielded equivocal results regarding the possible role of nutrient limitation. See Davidson et al. (2004) for the allometric equation that may be used to convert these data into biomass estimates.

4. Quality Assessment:

The data set was examined for outlier measurements that may have been due to clerical errors in data entry.

Data values for some trees may show values of -9999 with an accompanying Comment of "Dead" for a year, though the previous year and following year show values indicating life / growth. This may be due to any of these possible causes:

- the tree had lost its leaves and appeared to be dead one year, but was not actually dead
- the tree was misidentified and the data collectors identified the wrong tree as dead or measured the wrong tree as alive or
- a data entry error.

However, given the small number of data values of this nature, these values were not removed from the data file.

5. Data Acquisition Materials and Methods:

All trees >2-cm diameter at breast height were tagged, identified, and measured for diameter and height in November 1999. Fertilizer was applied to the plots, as described below, in January 2000 and February 2001. Tree heights and diameters were remeasured in May 2000, June 2001, July 2002, July 2004, and July 2005. New individuals that had grown into the >2-cm diameter class were tagged and measured at each date. Mortality was noted in the Comments column for each sampling date.

The study site was a 6-year old secondary forest when the experiment began in 1999. The site was divided into 3 blocks, with four treatment plots (each 20-m x 20-m) located in each block (3 reps x 4 treatments = 12 plots). Three of the twelve plots were fertilized with nitrogen (100 kg N/ha as

urea); three were fertilized with phosphorus (50 kg P/ha as superphosphate); three were fertilized with both nitrogen and phosphorus. The remaining three plots were not fertilized and served as the experimental control.

6. Data Access:

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

Data Archive Center:

Contact for Data Center Access Information:

E-mail: uso@daac.ornl.gov

Telephone: +1 (865) 241-3952

7. References:

Davidson, E.A., C.J.R. de Carvalho, I.C.G. Vieira, R.D. Figueiredo, P. Moutinho, F.Y. Ishida, M.T.P. dos Santos, J.B. Guerrero, K. Kalif, and R.T. Saba. 2004. Nitrogen and phosphorus limitation of biomass growth in a tropical secondary forest. *Ecological Applications*, Vol. 14: S150-S163. [doi:10.1890/01-6006](https://doi.org/10.1890/01-6006)

Related Publications

- Siddique, I., I.C.G. Viera, S. Schmidt, D. Lamb, C.J.R. de Carvalho, R.D.O. Figueiredo, S. Blomberg, E.A. Davidson. In press. Nitrogen and phosphorus additions negatively affect tree species diversity in tropical forest regrowth trajectories. *Ecology*, in press.



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