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LBA-ECO LC-14 Root Biomass and Phenology, km 67 Site, Para, Brazil: 2001

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Revision date: January 20, 2015

Summary:

This data set contains biomass estimates for coarse roots measured on the forest floor and measurements of fine root growth down to 2-m depth at the km 67 Rainfall Exclusion Experiment site, Tapajos National Forest, Brazil. The rainfall exclusion experiment was conducted from 1999-2006 to develop an understanding of the physical processes driving the observed soil water dynamics at the site.

All surface roots intersected along three 1000-m long x 1-m wide transects were identified to species, measured, and biomass calculated. The collections were made on January 26, 2001 during the experimental rain exclusion period.

The fine root growth was measured from 0.5-m to 2-m depth with a rhizotron. The rhizotron tubes were inserted into deep soil pits in the control and treatment plots. Average root growth measurements are provided by depth interval on a monthly basis from July 25, 2000 to December 14, 2003.

There are two data files in comma-delimited (.csv) format with this data set.

DATA QUALITY STATEMENT: The Data Center has determined that there are questions about the quality of the data reported in this data set. The data set has missing or incomplete data, metadata, or other documentation that diminishes the usability of the products.

KNOWN PROBLEMS: There are discrepancies with the documentation, collection dates reported and collection method for fine roots utilizing rhizotrons.

Data Citation:

Cite this data set as follows:

Nepstad, D.C., and P.R. Moutinho. 2015. LBA-ECO LC-14 Surface Root Biomass and Root Phenology, km 67 Site, Para, Brazil: 2001. Data set. Available online [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/1268>

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 Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.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 January 2015. Users who download the data between January 2015 and December 2019 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.

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

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1. Data Set Overview:

Project: LBA (Large-Scale Biosphere-Atmosphere Experiment in the Amazon)

Activity: LBA-ECO

LBA Science Component: Land Use and Land Cover

Team ID: LC-14 (Nepstad / Moutinho)

The investigators were Nepstad, Daniel Curtis; Moutinho, Paulo Roberto de Souza; Andrade, Sergio Viana de; Arce, Javier Alberto; Asner, Gregory Paul; Bamberger, Barbara; Belk, Elizabeth Leslie; Bishop, Joshua Thomas; Breyer, Lacey Medeiros; Cardinot, Gina Knust; Carvalho, Oswaldo de; Chermont, Larissa Steiner; Dias-Filho, Moacyr Bernardino; Diaz, Maria del Carmen Vera; Figueiredo, Ricardo de Oliveira; Guerrero, Jose Benito; Holbrook, Noel Michele; Kinglerlee, Wendy; Klink, Carlos Augusto; Lefebvre, Paul A.; Maklouf, Eduardo Jorge; Markewitz, Daniel; Merry, Frank David; Miranda, Antonio C.; Miranda, Heloisa S.; Monaco, Luciana; Morton, Douglas Christopher; Oliveira, Rafael Silva; Peters, Charles Merideth; Pinto, Flavia dos Santos; Quesada, Carlos Alberto Nobre; Ray, David Graham; Rivero, Sergio; Santos, Alexandre J. B.; Schwalbe, Karen R.; Silva, Dulce Alves da; Solorzano Cardenas, Luis Anibal; Sternberg, Leonel and da Silva, Wanderley Rocha. You may contact Nepstad, Daniel C. (dnepstad@whrc.org); Moutinho, Paulo Roberto de Souza (moutinho@amazon.com.br) and Ray, David G. (dray@whrc.org).

LBA Data Set Inventory ID: LC14_Surface_Roots_Phenology

This data set contains biomass estimates for coarse roots measured on the forest floor and measurements of fine root growth down to 2-m depth at the km 67 Rainfall Exclusion Experiment site, Tapajos National Forest, Brazil. The rainfall exclusion experiment that was conducted from 1999-2006 to develop an understanding of the physical processes driving the observed soil water dynamics at the site.

All surface roots intersected along three 1000-m long x 1-m wide transects were identified to species, measured, and biomass calculated. The collections were made on January 26, 2001 during the experimental rain exclusion period.

The fine root growth was measured from 0.5-m to 2-m depth with a rhizotron. The rhizotron tubes were inserted into deep soil pits in the control and treatment plots. Average root growth measurements are provided by depth interval on a monthly basis from July 25, 2000 to December 14, 2003.

2. Data Characteristics:

Data are provided in two comma-delimited (.csv) files: **LC14_Surface_Roots.csv** and **LC14_Root_Phenology.csv**

File 1. LC14_Surface_Roots.csv: This file provides biomass estimates for coarse roots visible at the soil surface that intersected the measurement transects. All collections were made on January 26, 2001.

Column	Column Heading	Units/format	Description
1	Date	YYYYMMDD	Sample date (YYYY/MM/DD)
2	Common_name		Vegetation species common name
3	Transect		Transect ID
4	Root biomass	g	Biomass in grams (g) of the root intersecting the defined transect. An average dry wood density of 0.7 g cm ⁻³ was assumed for making biomass conversions.

Example Data Records:

```
Date,Common_name,Transect,Root_biomass
20010126,Cupiuba,1,17812.8
20010126,Cupiuba,1,7696.9
20010126,Maparana,1,2190.5
```

File 2. LC14_Root_Phenology.csv: This file provides the average root growth per meter of rhizotron tube length by depth interval on a monthly basis, from 0.5 - 2-m depth. Measurements were made from July 25, 2000 to December 14, 2003.

Column	Column Heading	Units/format	Description
1	Plot		Plot: CONTROL or TREATMENT
2	Mid_Date	mm/dd/yy	Sampling date (mm/dd/yy)
3	Depth	cm	Depth of rhizotron tube in centimeters (cm)
4	Sample_N		Sample number
5	Root_M_Tube	mm	Average millimeters of roots per meter of rhizotron tube (N size not provided.)
6	SE		Standard error

Example Data Records:

```
Plot,Mid_Date,Depth,Sample_N,Root_M_Tube,SE
CONTROL,7/27/00,50,6,539.13599,146.7040639
CONTROL,8/30/00,50,6,749.7540412,171.9007081
CONTROL,9/27/00,50,6,787.9719682,255.5365175
...
TREATMENT,12/14/03,200,4,621.5412414,80.12638482
TREATMENT,1/26/04,200,4,469.7151251,116.3890677
TREATMENT,2/16/04,200,4,341.7832914,80.65422609
```

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

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Para Western (Santarem) - km 67 Seca-Floresta Site (Para Western (Santarem))	-54.959	-54.959	-2.857	-2.857	World Geodetic System, 1984 (WGS-84)

Time period: The data set covers the period 2000/07/25 to 2004/02/29.

- Temporal Resolution: One time

Platform/Sensor/Parameters measured include:

- FIELD INVESTIGATION / ANALYSIS / BIOMASS
- FIELD INVESTIGATION / ANALYSIS / VEGETATION CHARACTERISTICS

3. Data Application and Derivation:

The data would be useful in comparing or determining the potential effects of tropical forest drying on root growth. While there is little documentation for these data, they are being archived for potential use in future tropical root studies.

4. Quality Assessment:

DATA QUALITY STATEMENT: The Data Center has determined that there are questions about the quality of the data reported in this data set. The data set has missing or incomplete data, metadata, or other documentation that diminishes the usability of the products.

There are few samples provided. The number of samples may be low for comparisons of control and treatment plots.

There are discrepancies with the documentation and measurement units, collection dates reported, and collection methods for fine roots utilizing rhizotrons. Note that an alternative description of the rhizotron results was provided in documentation but was discounted (Average numbers of root contacts per 100 cm of rhizotron tube) in favor of the description provide in the data file (Millimeters of roots per m of rhizotron tube).

5. Data Acquisition Materials and Methods:

Site description:

The research was located in the Tapajos National Forest, in east-central Amazonia. This forest receives between 600 and 3,000 mm of rain each year, with a mean of 2,000 mm; severe drought is experienced during El Nino events. The forest is situated on a flat terrace of Tertiary sediments capped by the Belterra Clay Formation (Clapperton, 1993), and is approximately 90 m above the water level of the Tapajos River, located 10 km to the west. The Oxisol soil (Haplustox) is dominated by kaolinite clay minerals and is free of hardpan or iron oxide concretions in the upper 12 m.

Drought effects on forest processes were studied by comparing a 1-ha forest plot from which a portion of throughfall was excluded with a nearby 1-ha control plot. Two floristically and structurally similar, 1-ha (100 by 100-m) plots were selected for the experiment from an initial survey of 20 ha of forest (Nepstad et al., 2002). The forest surrounding the plots had emergent trees up to 55 m in height, with continuous canopy varying in height from 18 to 40 m. The study plots were placed in areas where most of the canopy was less than 30-m high to facilitate access to the tree crowns. The plots also had similar physiognomy, with the exception of a 600-m² treefall gap on the edge of the control plot.

A one to 1.7-m deep trench was excavated around the treatment plot to reduce the potential for lateral movement of soil water from the surrounding forest into the plot, and to provide a conduit for water excluded from the plot. A similar trench was excavated around the control plot to avoid the confounding of throughfall exclusion and trenching effects. Following an intercalibration period of approximately one-year starting in November of 1998, throughfall was partially excluded during the rainy seasons of 2000 through 2006 using plastic panels and wooden gutters installed in the understory.



Figure 2. Throughfall exclusion panels, Tapajos National Forest. The throughfall exclusion panels drain into wooden gutters constructed in the forest understory. Photos from Nepstad et al., 2002.

Root biomass estimates:

All surface roots intersected along three 1000-m long x 1-m wide transects were measured, and in most cases identified by species. An average dry wood density of 0.7 g cm⁻³ was assumed for making biomass conversions. All collections were made on January 26, 2001 during the rain exclusion period.

Fine root measurements:

Fine root growth was measured from 0.5-m to 2-meters depth with rhizotrons. The rhizotrons were inserted into deep soil pits in the control and treatment plots. The average root growth (mm) per meter of rhizotron tube length is reported by depth interval on a monthly basis from July 25, 2000 to December 14, 2003.

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:

Clapperton, C., 1993. Quaternary Geology of South America, Elsevier Sci., New York.

Nepstad, D.C., P. Moutinho, M.B. Dias, E. Davidson, G. Cardinot, D. Markewitz, R. Figueiredo, N. Vianna, J. Chambers, D. Ray, J.B. Guerreiros, P. Lefebvre, L. Sternberg, M. Moreira, L. Barros, F.Y. Ishida, I. Tohlver, E. Belk, K. Kalif, and K. Schwalbe. 2002. The Effects of Partial Throughfall Exclusion on Canopy Processes, Aboveground Production, and Biogeochemistry of an Amazon Forest. *Journal of Geophysical Research-Atmospheres* 107(D20).



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