

Pre-LBA Amazonian Region Micrometeorological Experiment (ARME) Data

Summary

The Amazonian Region Micrometeorological Experiment (ARME) data contain micrometeorological data (climate, interception of precipitation, micrometeorology and soil moisture) on the elements of the energy balance and evapotranspiration for the Amazonian forest. ASCII text data files for each of the four data types have been zipped together. One of the many scientific findings of this experiment was that tropical forest does not experience water stress due to the lack of precipitation, during periods when evapotranspiration is at the potential rate (Shuttleworth, 1988).

ARME data types include climate (meteorological), interception of precipitation, micrometeorology, and soil moisture. These data are described in the Data Description section below.

Pre-LBA Data Set Collection Initiative

The Pre-LBA data set collection was dedicated to providing information to the LBA research community about existing data that have been collected in Amazonia during the 20 years prior to 1998. The main goal of this activity was to compile and document existing data sets in a consistent manner and make them available prior to the beginning of the LBA experiment.

The data sets compiled included satellite imagery, micrometeorological observations, near surface and upper-air atmospheric conditions, surface biophysical and hydrological measurements obtained from the 1970s to the 1990s in a number of field experiments. Data were collected for several intensive field campaigns, during the rainy and dry seasons, and other periods that vary from short intensive field campaigns to several years worth of observations, measured sometimes with a time resolution of 5 minutes and 1 hour.

Citation:

Cite this data set as follows:

Fisch, G., J.H.C. Gash, C.A. Nobre, J.W. Shuttleworth, and ARME Team Members. 2008. Pre-LBA Amazonian Region Micrometeorological Experiment (ARME) Data. 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/898.

The original CD-ROM citation is as follows:

Marengo, J.A., and R.L. Victoria. 1998. Pre-LBA Data Sets Initiative, 3 vols. [Pre-Large-Scale Biosphere-Atmosphere Experiment in Amazonia Data Sets Initiative, 3 vols.]. CD-ROM. Centro de Previsao de Tempo e Estudos Climaticos, Instituto Nacional de Pesquisas Espaciais (CPTEC/INPE) [Center for Weather Forecasting and Climate Study, National Institute for Space Research], Sao Paulo, Brazil.

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Start_Date: 1983-09-01
 Stop_Date: 1986-09-01

Coverage
 Southernmost_latitude: 2S
 Northernmost_latitude: 3S
 Westernmost_longitude: 59W
 Easternmost_longitude: 60W
 Maximum_altitude: 80 m
 Minimum_depth: Superface

Location: SOUTH AMERICA

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Data Description

ARME Data Types

Data files for each data type described below has been compiled and compressed in a separate file:

ARME_CLIMATE.zip

ARME_INTERCEPTION.zip

ARME_MICROMETEOROLOGY.zip

ARME_SOIL_MOISTURE.zip

Climate:

The climate data were recorded using an automatic weather station from September 1983 to August 1985. The data are continuous, and the format is "space delineated" with one line for each hour (4I3,7F6.) Columns 5 to 10 give an average for the variable, calculated over the hour which COMMENCES from the time given in column 4.

Description of Variables:

Ex.
Files: RD_yymmm.DAT e.g., AM_84MAY.DAT
Column No. Data

1	Year
2	Month
3	Day
4	Local time
5	Solar radiation, W/m ²
6	Net radiation, W/m ²
7	Wet bulb depression (aspirated), deg C
8	Air temperature, deg C
9	Windspeed, m/s
10	Wind direction, deg from North
11	Hourly Total Rainfall, mm

Example Data Records

(RD_83DEC.TXT)

```

83 12  1  0      0  -27  1.47  24.8  1.5   93  0.00
83 12  1  1      0  -29  1.18  24.6  1.1  143  0.00
83 12  1  2      0  -19  0.91  24.3  0.9  194  0.00
83 12  1  3      0   -7  0.69  24.0  1.0  209  0.00
83 12  1  4      0   -7  0.65  24.0  1.2  199  0.00
83 12  1  5      0   -7  0.71  24.0  1.1  225  0.00
83 12  1  6     78   54  0.70  24.3  1.0  200  0.00
83 12  1  7    214  163  1.14  25.6  0.6  190  0.00
83 12  1  8    252  186  1.48  26.4  0.7  155  0.00
83 12  1  9    565  402  2.75  28.0  1.6  117  0.00
83 12  1 10    548  422  3.81  29.3  1.3  123  0.00
83 12  1 11    617  462  4.64  30.1  1.3  104  0.00
83 12  1 12    378  289  4.72  30.2  1.4  104  0.00
...

```

Interception

All the rainfall, throughfall, and stemflow data are contained in the RD_INT.DAT file. The data are reported in mm, for periods varying in length from 4-32 days. The majority of the periods are 7 days in duration. The variable values in the file records are 'space delimited' and were written with the FORTRAN format of (3I3,F7.,I5,2F8.,F7.,2F6.).

After 27-July-1984, the time at which the measurement commences is given. Before this date, the time is not available and the most likely time is given, (i.e. 11 AM). The throughfall data given for periods between 01-June-1984 and 29-June-1984, and all stemflow data

before

23-August-1984, have been synthesized to allow a continuous record of interception.

The

synthesized values are proportionally related to gross rainfall. Full details are given by

Lloyd et al. (1988) and Lloyd and Marques (1988).

Description of Variables:

```
Column No. Data
1 Year
2 Month
3 Start day for period
4 Start time (decimal) for period
5 Number days duration of period
6 Gross Rainfall
7 Throughfall
8 Standard error of throughfall
9 Stemflow
10 Standard error of stemflow
```

Example Data Records

```
(RD_INT.TXT)

83 9 1 11 32 260 202.79 68.95 4.23 2.35
83 10 3 11 11 38.5 28.4 7.78 0.69 0.39
83 10 14 11 17 92.5 101.96 25.88 1.67 0.93
83 10 31 11 4 1.5 0.39 0.28 0.03 0.02
83 11 4 11 7 20.25 17.26 6.05 0.36 0.2
83 11 11 11 7 20.25 18.07 6.6 0.36 0.2
83 11 18 11 7 0 0 0 0 0
83 11 25 11 7 36.75 36.29 14.93 0.66 0.37
83 12 2 11 5 160.46 140.08 53.65 2.89 1.6
83 12 7 11 9 31.75 26.74 9.41 0.57 0.32
```

```
83 12 16 11 8 142.7 112.95 24.36 2.57 1.43
83 12 22 11 7 44.25 41.5 10.68 0.8 0.44
83 12 29 11 8 188 185.69 68.88 3.38 1.88
84 1 6 11 7 58.5 52.87 13.52 1.05 0.59
...
```

Micrometeorology

The file `rd_flux.txt` contains the micrometeorological data from 03-Sep-1983 to 28-Sep-1985.

Data are not included from periods when the wind direction was unfavorable or the canopy was

wet. Only data from periods when the canopy was dry are included. Full details are given in

the papers by Shuttleworth et al (1984a) and Shuttleworth (1988). The variables in the file

records are 'space delimited' and were written with the FORTRAN format (4I3,9F6.).

Columns 5

to 13 contain mean values for the variable, calculated over the hour which COMMENCES from the

time given in column 4.

Description of Variables:

Column No.	Description
1	Year
2	Month
3	Day
4	Hour (Local time)
5	Mean Dry bulb temperature, deg C
6	Mean Specific humidity, g/kg
7	Mean Specific humidity deficit, g/kg
8	Mean Solar radiation, W/m ²
9	Mean Net radiation, W/m ²
10	Mean Evaporation, W/m ²
11	Mean Sensible heat flux, W/m ²
12	Mean Aerodynamic resistance, s/m
13	Mean Surface resistance, s/m

1 Year

2 Month

3 Day

4 Hour (Local time)

5 Mean Dry bulb temperature, deg C

6 Mean Specific humidity, g/kg

7 Mean Specific humidity deficit, g/kg

8 Mean Solar radiation, W/m²9 Mean Net radiation, W/m²10 Mean Evaporation, W/m²11 Mean Sensible heat flux, W/m²

12 Mean Aerodynamic resistance, s/m

13 Mean Surface resistance, s/m

Example Data Records

(RD_FLUX.TXT)

```

83 9 3 7 27.4 17.5 5.6 261 242 95 45 56 196
83 9 3 8 29.4 17.9 8 461 414 151 90 38.1 193
83 9 3 11 30.7 17.6 10.4 645 516 189 101 13.3 168
83 9 3 12 30.9 17.5 10.7 587 481 229 103 14.6 142
83 9 3 13 31.9 17.1 12.9 682 557 232 118 12.7 168
83 9 3 14 31.5 17.9 11.2 630 519 210 81 18.7 159
83 9 4 11 30.9 18.1 10.1 778 617 312 250 29.6 153
83 9 4 12 30.9 17.6 10.7 510 431 318 151 23.7 114
83 9 4 13 31.6 17 12.4 666 540 372 113 24.2 99
83 9 4 14 32.2 16.3 14.2 602 508 301 75 20.9 131
83 9 4 15 31.9 16 14 443 368 228 58 15.2 172
83 9 4 16 31.4 16.1 13 189 148 83 12 25.4 425
83 9 5 6 23.5 16.9 1.3 25 16 18 6 44.7 198
83 9 5 15 30.1 17.8 9.1 244 197 175 41 29.7 142

```

```
83 9 5 16 29.1 18.1 7.3 176 132 76 9 24.3 256
```

```
...
```

Soil Moisture

The file RD_SOIL.DAT contains soil tension data from September 1983 to October 1985. The file records contain values of smoothed daily soil tensions described on page 327 of Shuttleworth (1988) and are a useful relative index of seasonal changes in soil water status. The data are continuous with one estimate of soil tension, in kPa, for each day. The values in the file records are "space delimited" and were written with the FORTRAN format of (2I3,28-31F7.) with one line of data for each month.

Description of Variables:

Column No.	Description
1	Year
2	Month
3	Tension for 1st day of month (kPa)
4	Tension for 2nd day of month (kPa)
-	-
-	-
28	Tension for 28th day of month (kPa)
29	Tension for 29th day of month (kPa) (only if needed)
30	Tension for 30th day of month (kPa) (only if needed)
31	Tension for 31st day of month (kPa) (only if needed)

Example Data Records

```
(RD_SOIL.TXT)
```

```
83 9 -59.2 -72.3 -76.4 -80.5 -84.6 -84.4 -84.3 -84.2 -84.1 -83.8 -83.7 -83.6 -83.4 -77.4 -
28.1 -17.9 -15.2 -12.3 -9.5 -10.2 -8.6 -5.2 -5.3 -6.1 -6.8 -7.5 -9.3 -8.9 -6.7 -6.9
83 10 -6.4 -6 -5.5 -6 -6.4 -6.8 -7.3 -7.8 -8.2 -8.7 -9.1 -9.5 -10 -10.5 -10.9 -11.3 -11.8 -11 -
10.3 -9.5 -8.8 -8 -7.3 -6.5 -6.6 -6.5 -6.6 -6.6 -6.7 -6.6 -6.7
83 11 -6.7 -6.7 -6.7 -6.8 -6.8 -6.8 -6.8 -7.5 -8.1 -8.7 -9.2 -9.9 -10.5 -11.1 -11.8 -12.3 -13 -
13.5 -14.2 -14.8 -15.4 -14.7 -14.1 -13.5 -12.8 -12.2 -11.5 -10.8 -10.2 -9.6
83 12 -8.9 -8.3 -7.6 -7 -6.3 -5.7 -5.7 -5.7 -5.7 -5.7 -5.7 -5.7 -5.8 -5.8 -5.8 -5.8 -5.8 -5.8 -5.8 -
-5.8 -5.8 -5.9 -5.9 -5.9 -5.9 -5.9 -6 -6 -6 -6 -6
84 1 -6 -6 -6 -6 -6.1 -6.1 -6.1 -6.1 -6.1 -6.2 -6.2 -6.2 -6.2 -6.2 -6.2 -6.2 -6.2 -6.2 -6.3 -6.3 -
6.3 -6.3 -6.3 -6.3 -6.3 -6.3 -6.4 -6.4 -6.4 -6.4
84 2 -6.5 -6.5 -6.5 -6.5 -6.5 -6.5 -6.5 -6.5 -6.5 -6.6 -6.6 -6.6 -6.6 -6.6 -6.6 -6.6 -6.6 -6.6 -6.7 -
-6.7 -6.7 -6.7 -6.7 -6.7 -6.7 -6.7 -6.7 -6.8 -6.8
84 3 -6.8 -6.8 -6.8 -6.9 -6.9 -6.9 -6.9 -6.9 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7.1 -7.1 -7.1 -7.1 -7.1 -
7.1 -7.1 -7.1 -7.1 -7.2 -7.2 -7.2 -7.2 -7.2
84 4 -7.2 -7.2 -8.9 -10.4 -12 -11.2 -10.5 -9.7 -9 -8.7 -8.5 -8.2 -8 -7.8 -7.6 -7.3 -7.1 -6.9 -6.8 -
6.7 -6.6 -6.5 -6.5 -6.4 -6.3 -6.2 -6.1 -6 -6.1 -6.1
...
```

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Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) [<http://daac.ornl.gov>].

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