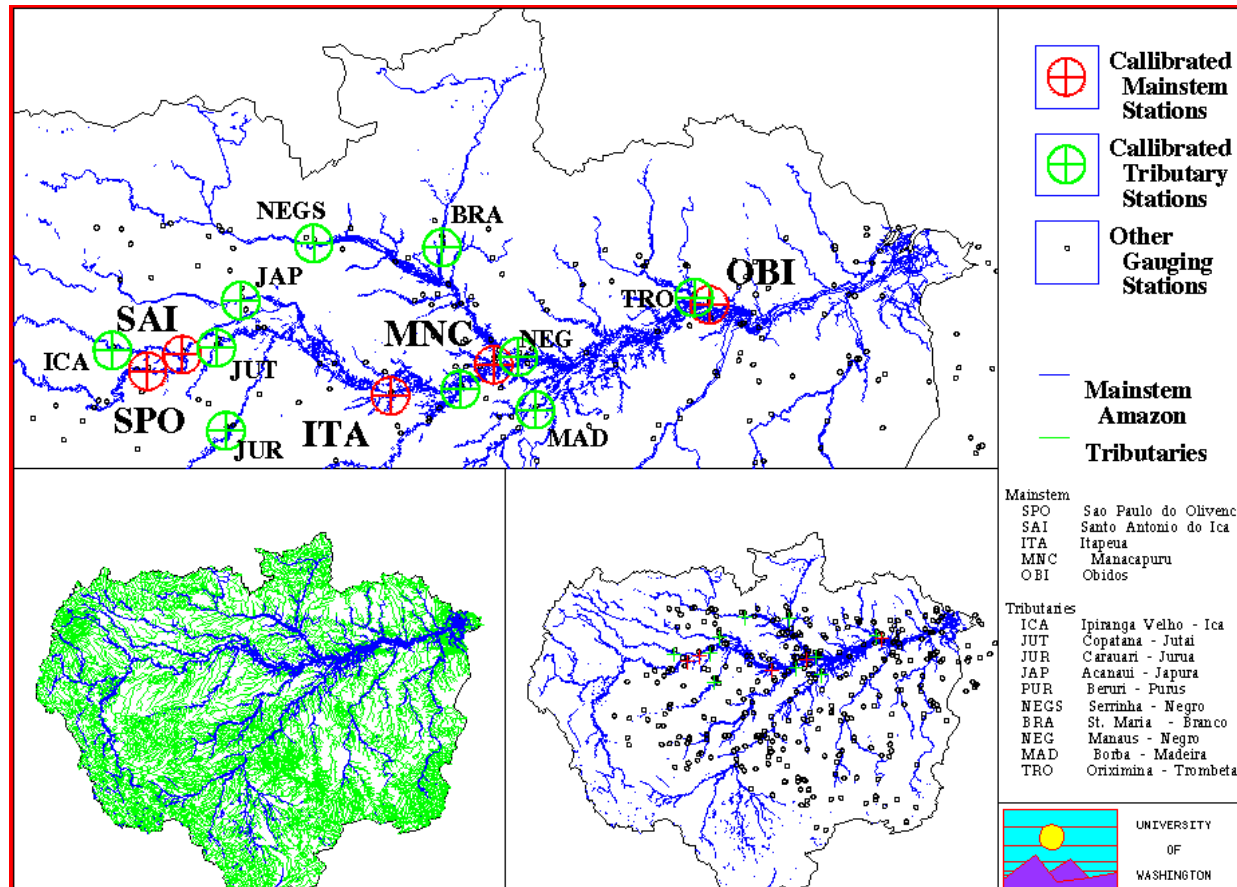


Pre-LBA Carbon in the Amazon River Experiment (CAMREX) Data

Summary

The objective of CAMREX (Carbon in the Amazon River Experiment) project which was conducted from 1982 through 1991, was been to define by mass balances and direct measurements those processes which control the distribution of bioactive elements (C, N, P and O) in the mainstem of the Amazon River in Brazil. The CAMREX dataset represents a time series unique in its length and detail for very large river systems. The central sampling strategy has been to obtain representative flux-weighted water samples for comprehensive chemical analysis and to make rate measurements over 18 different sites within a 2000 km reach of the Brazilian Amazon mainstem, including major intervening tributaries. Samples have now been collected on 13 different cruises (1982-1991) during contrasting hydrographic stages.

Data or images are provided for (1) water chemistry, (2) daily river discharge, (3) images (.jpgs) of monthly estimates for 1989 of some model drivers and structure including NPP, Evapotranspiration, Precipitation, Temperature, and AVHRR data, (4) daily precipitation, and (5) air temperature anomalies.





The processed, quality controlled and integrated data in the documented Pre-LBA Data sets were originally published as a set of three CD_ROMs (Marengo and Vistoria, 1998) but are now archived individually.

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 set compilation efforts included satellite imagery, micrometeorological observations, near surface and upper-air atmospheric conditions, surface biophysical and hydrological measurements obtained from 1970's-1990's 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:

Richey, J.E., R L. Victoria, J.I. Hedges, T. Dunne, L.A. Martinelli, L. Mertes, and J. Adams. 2008. Pre-LBA Carbon in the Amazon River Experiment (CAMREX) 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/904.

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.

Pre-LBA Data Set Collection Metadata

Campaign: CAMREX > Carbon in the Amazon River Experiment

Parameter: HYDROLOGIC PARAMETERS > EVAPOTRANSPIRATION

Parameter: HYDROLOGIC PARAMETERS > OXYGEN DEMAND

Parameter: HYDROLOGIC PARAMETERS > PRECIPITATION

Parameter: HYDROLOGIC PARAMETERS > RIVERS

Parameter: HYDROLOGIC PARAMETERS > RUNOFF

Parameter: HYDROLOGIC PARAMETERS > SEDIMENTATION

Parameter: HYDROLOGIC PARAMETERS > SOIL MOISTURE

Parameter: HYDROLOGIC PARAMETERS > SOLIDS

Parameter: HYDROLOGIC PARAMETERS > SURFACE WATER

Parameter: HYDROLOGIC PARAMETERS > TEMPERATURE

Parameter: HYDROLOGIC PARAMETERS > WETLANDS

Discipline: LIFE SCIENCES > BIOCHEMISTRY

Keywords

Biogeochemistry

River chemistry

Ecological modeling

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Country: USA

Coverage

Southernmost_latitude: 4N

Northernmost_latitude: 20S

Westernmost_longitude: 50W

Easternmost_longitude: 80W

Latitude_Resolution: 5N to 18S

Longitude_Resolution: 44W to 74W

Temporal-Resolution: monthly means

Location: EQUATORIAL

Location: SOUTH AMERICA

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Country: Brazil

Data_Center

Data_Center_Name: UW, CENA

Data_Center_URL: <http://boto.ocean.washington.edu/eos>

Dataset_ID: CAMREX

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State_or_Province: WA 98195-7940
Country: USA

Originating_Center: UW, CENA

Constraints

Access: Data may not be used for commercial applications.
Use: Data may not be used for commercial applications.

Data Description

Data or images are provided for (1) water chemistry, (2) daily river discharge, (3) monthly estimates for 1989 of some model drivers and structure including NPP, Evapotranspiration, Precipitation, Temperature, and AVHRR data, (4) daily precipitation, and (5) air temperature anomalies.

RIVER WATER CHEMISTRY

The river water chemistry data assembled here were collected on a series of research cruise expeditions on the LM AMANAI (INPA, Manaus), between 1982 and 1991, as part of the "CAMREX" project. "CAMREX" is a joint project of the University of Washington (Seattle), CENA-USP (Piracicaba), and INPA, financed by Brazilian resources, the US National Science Foundation, and NASA.

The data reported here have been the basis for the papers cited under "Publications."

- Table 1 identifies the parameters reported, and brief references for methodologies.
- Table 2 identifies the sampling stations, their respective coordinates, and (thalweg) distances between stations.
- Table 3 contains the basic data grouped by cruise number; "jd" is the julian date of the collection, dating from

Example records from the coma separated data file, CHEMDATA.csv:

Table 1. Chemical Parameters Measured and Data File Column Headings,,,

Missing values are represented as -999

Parameter,Abbreviation,Units,Reference #s

Sampling Station,Station,,

CAMREX Cruise,Cruise,,

"Julian day starting January 1, 1982. Missing values indicate that either no sample was collected at that station or the jd was not reported." ,jd,day,

Alkalinity ,Alk,uEq/l,1

Dissolved CO2 ,pCO2,uM(olar),1

Dissolved O2,O2,uM,1

Dissolved Organic Carbon,DOC,mg/l,1

Fine Particulate Organic Carbon,FPOC,mg/l,1

Coarse Particulate Organic Carbon,CPOC,mg/l,1

Nitrate,NO3,uM,3

Total Dissolved Nitrogen,TDN,uM,3

Fine Particulate Organic Nitrogen,FPON,uM,2

Coarse Particulate Organic Nitrogen,CPON,uM,2

Phosphate (soluble reactive P),PO4,uM,3

Total Dissolved Phosphorus,TDP,uM,3

Fine Suspended Sediments (<63 microns),FSS,mg/l,4

Coarse Suspended Sediments (>63 microns),CSS ,mg/l,4

pH ,pH,pH,1

delta O18 of water,O18,o/oo,6

delta C13 of DIC,DIC13,o/oo,5

delta C13 of CPOC,CPOC13,o/oo,5,,,,,,,,,,,,,

delta C13 of FPOC,FPOC13,o/oo,5,,,,,,,,,,,,,

Dissolved silica,Si,uM,3,,,,,,,,,,,,,

Dissolved calcium,Ca,uM,7,,,,,,,,,,,,,

Dissolved sodium,Na,uM,7,,,,,,,,,,,,,

Dissolved magnesium,Mg,uM,7,,,,,,,,,,,,,

Dissolved potassium,K,uM,7,,,,,,,,,,,,,

Dissolved chloride,Cl,uM,7,,,,,,,,,,,,,

Dissolved sulphate,S,uM,7,,,,,,,,,,,,,

Reference #s,Reference,,,,,,,,,,,,,

1,"Richey, J. E., J. I. Hedges, A. H. Devol, P. D. Quay, R. Victoria, L. Martinelli and B. R. Forsberg. 1990. Biogeochemistry of carbon in the Amazon River. *Limnology and Oceanography* 35:352-371.",,,,,,,,,,,,,

2,"Hedges, J. I., G. L. Cowie, J. E. Richey, P. D. Quay, R. Benner and M. Strom. 1994. Origins and processing of organic matter in the Amazon River as indicated by carbohydrates and amino acids. *Limnology and Oceanography* 39:743-761.",,,,,,,,,,,,,

3,"Forsberg, B. R., A. H. Devol, J. E. Richey, L. A. Martinelli and H. dos Santos. 1988. Factors controlling nutrient concentrations in Amazon floodplain lakes. *Limnology and Oceanography* 33:41-56",,,,,,,,,,,,,

4,"Meade, R. H., T. Dunne, J. E. Richey, U. M. Santos and E. Salati. 1985. Storage and remobilization of sediment in the lower Amazon River of Brazil. *Science* 228:488-490.",,,,,,,,,,,,,

5,"Quay, P. D., D. O. Wilbur, J. E. Richey, J. I. Hedges, A. H. Devol and R. L. Victoria. 1992. Carbon cycling in the Amazon River: Implications from the 13C composition of particles and solutes. *Limnology and Oceanography* 37:857-871.",,,,,,,,,,,,,

6,"Victoria, R. L., L. A. Martinelli, J. Mortatti and J. Richey. 1991. Mechanisms of water recycling in the Amazon Basin: Isotopic insights. *Ambio* 20:384-387.",,,,,

7,"Martinelli, L. A., R. L. Victoria, J. L. I. Dematte, J. E. Richey and A. H. Devol. 1993. Chemical and mineralogical composition of Amazon River floodplain sediments, Brazil. *Applied Geochemistry* 8:391-402.",,,,,

Table 2. Chemistry Sampling Stations				
Station Name	abbreviation	long	lat	km
Vargem Grande	VGr	-67.8524	-3.2839	0
Rio Ica	RIca	-68.2089	-3.0356	16
Santo Antonio do Ica	SAI	-67.8904	-3.0188	20
Xibeco	Xib	-67.1972	-2.5855	184
Rio Jutai	RJut	-67.0204	-2.8033	195
Tupe	Tup	-65.868	-2.5055	384
Rio Jurua	RJur	-65.8056	-2.7206	402
Rio Japura	RJap	-65.6901	-1.8161	543
Jutica	Jutc	-64.2385	-3.6404	692
Itapeua	Ita	-63.0171	-4.0491	869
Anori	Ano	-61.6169	-3.8189	1063
Rio Purus	RPur	-61.433	-3.7455	1073
Manacapuru	Man	-60.5677	-3.3303	1203
Rio Negro	RNeg	-60.3031	-3.0632	1289
Sao Jose do Amatari	SJA	-58.9882	-3.2402	1411
Rio Madeira	RMad	-58.7951	-3.4494	1439
Paura	Pau	-57.4402	-2.3962	1661
Obidos	Obi	-55.52	-1.9359	1946

Table 3. Chemical data,,,,,,,,,,,,,,,,,,,,,

Station,Cruise,,jd,,Alk,pCO2,O2,DOC,FPOC,CPOC,NO3,TDN,FPON,CPON,PO4,TDP,FSS,CSS,pH,O18,DIC13,CPOC13,FPOC13,
Si,Ca,Na,Mg,K,Cl,S
VGr,Cruise 1,,121,,1095,133,177,4.7,3.4,1.1,7.4,24.8,23.7,4.7,0.8,0.9,282,205,7.26,-8.9,-999,-999,-
999,-999,482,150,78,36,279,-999
RIca,Cruise 1,,121,,183,55,186,5.9,1,0.1,5.8,28.7,8.9,0.3,0.5,1.4,42,4,6.87,-8.9,-999,-999,-999,-999,42,25,13,14,59,7
SAI,Cruise 1,,122,,1072,231,176,4.3,2.6,1,5.8,22.4,17.2,3.9,1,1.2,236,148,7.01,-8.8,-999,-999,-
999,-999,418,141,70,35,208,42
...
RMad,Cruise 13,,3532,,490,60,-999,2.9,-999,-999,11.6,-999,-999,-999,0.8,-999,30,-999,7.26,-999,-999,-999,-999,168,-
999,-999,-999,-999,-999,-999
Pau,Cruise 13,,999,,284,142,-999,6.4,-999,-999,7.1,-999,-999,-999,0.6,-999,-999,-999,6.65,-999,-999,-999,-999,134,-
999,-999,-999,-999,-999,-999,-999
Obi,Cruise 13,,3539,,293,142,-999,6.1,-999,-999,8.5,-999,-999,-999,0.5,-999,119,-999,6.66,-999,-999,-999,-999,130,-
999,-999,-999,-999,-999,-999

This data set includes calculations of daily discharge (cubic meters per second; m³/s) at the stations indicated, derived from the stage data of DNAEE. The calculations are based on rating curves (conversions of stage-river- height to river flow) derived from specific CAMREX measurements combined with DNAEE rating data. The methods are described in Richey et al. (1989).

Example records from the discharge data file, DISCHARGE.csv.

```
,Stations:,,,,,,,,,
,,Vargem Grande,Santo Antonio do Ica,Itapeua,Manacapuru,Obidos,R Ica,R Jutai,R Jurua,R Japura,R Purus,
R Negro,R Madeira
,longitude:,-67.8524,-67.8904,-63.0171,-60.5677,-55.5200,-68.2089,-67.0204,-65.8056,-65.6901,-
6.1433,-60.3031,-58.7951
,latitude:,-3.2839,-3.0188,-4.0491,-3.3303,-1.9359,-3.0356,-2.8033,-2.7206,-1.8161,-3.7455,-3.0632,-3.4494
,,,,,,,,,
Missing values are reported as -999999,,,,,,,,,
Units cubic meters per second (m3/s),,,,,,,,,,
,,,,,,,,,
Provided date,yyyy/mm/dd,Vargem Grande,Santo Antonio do Ica,Itapeua,Manacapuru,Obidos,R Ica,R Jutai,R
Jurua,R Japura,R Purus,R Negro,R Madeira
01-Jan-74,1974/01/01,46315,56465,85531,91756,137327,-999999,5014,6540,10209,-999999,15566,32823
2,1974/01/02,46702,56789,85595,91389,137092,-999999,5032,6571,10019,-999999,16159,33468
3,1974/01/03,47331,57263,86174,92940,137587,-999999,5034,6603,9875,-999999,16578,33850
...
30,1990/12/30,52635,68716,87360,91584,116512,-999999,-999999,-999999,-999999,-999999,-999999,-999999
31,1990/12/31,53124,69355,87752,92045,117703,-999999,-999999,-999999,-999999,-999999,-999999,-999999
```

MODELING ESTIMATES

The overall objective of the modeling component of CAMREX group work is to examine seasonal and interannual changes in regional-scale patterns of Potential net primary productivity (NPP) in the Amazon. Ideally, such an analysis would rely on long-term, extensive field networks. In practice, it is necessary to use models and remote sensing with only sparse field information. We have adapted a global-scale model of biogeochemistry, CASA (Potter et al. 1993), to the Amazon as a regional case study.

CASA calculates net primary production as a function of:

- net radiation,
- the fraction of PAR intercepted by the green vegetation,
- air temperature, and
- calculated moisture stress.

To assess these variables, we have accumulated in a GIS environment high-resolution gridded data sets of the variables required to apply CASA to the Amazon Basin at a resolution of 0.05 degrees. The model was driven with standard monthly data sets of precipitation, air temperature and calculated evapotranspiration and with NDVI obtained from the Pathfinder 5 km AVHRR data set as a scalar for LAI assigned by broad vegetation classes.

The group has explored the potential seasonality of net primary production in the Amazon Basin over the last decade. This period was chosen because of data availability, occurrence of different annual climatic regimes, and because it covers a period of basin change. If verified, this model run would constitute a baseline against which to monitor future change. This work is being undertaken with the expectation that the upcoming LBA Study will provide an unparalleled opportunity for field verification, while the modeling activity in turn would be a useful synthesis tool and a means to identify key problems and regions for the study.

In this data set are provided .jpg images of the monthly estimates for 1989 of some of the model drivers and structure. All images are contained in the single compressed file, MODEL_IMAGES.zip.

- Evapotranspiration: monthly estimates for 1989 of evapotranspiration (mm)
- Temperature: monthly estimates for 1989 of temperature (Celsius degrees)
- Precipitation: monthly estimates for 1989 of precipitation (mm)
- NPP: monthly estimates for 1989 of Net Primary Production (gC/month)
- AVHRR: Cloud free monthly composites of calibrated spectral measurements of AVHRR channels 1, 2 and 3 (Blue, Green and Red)

RAIN

Daily precipitation values in mm are provided for selected sites across the LBA study area over the period 1970-1992.

The data file names contain a code given by the national water agency from Brazil's Agencia Nacional de Aguas (ANA) for each long term monitoring site. Coordinates and additional site information are available at on the ANA's web site (www.ana.gov.br) through the Sistema de Informacoes Hidrologicas.

Files of daily precipitation data in mm are provided for the selected stations for the indicated years. All data files are contained in the single compressed file, RAIN.zip.

File name syntax:

For example, d00048000.70, where

d = daily data

00048000 = 8 character site code. Use in ANA's Sistema de Informacoes Hidrologicas to search for site information.

.70 = year

Example data records from data file, d00048000.70.

0.0
 0.1
 0.0
 0.0
 0.3
 0.0
 0.0
 0.0
 0.0
 ...

TEMPERATURE

The anomalies data assembled here are the monthly average surface air temperature anomalies records from 17 stations in the Brazilian Amazon from 1913 to 1995, converted into temperature anomalies, as the differences between annual mean temperatures and the mean temperature of a reference period (1958-1985) (Victoria et al., 1998).

Air temperature anomaly data for equatorial and nonequatorial stations are in separate .csv files, anom-eq.csv and anom-noneq.csv, respectively.

Stations, location, period covered by the data set, and interruptions in the records of air surface temperature measuring stations.

Station	Latitude	Longitude	BQCC	GHCN	INEMET	Interrup.
Belém ^a	01°27'S	48°29'W	1961–91	1949–91	1923–95*	No
Brasília ^a	15°47'S	47°55'W	1963–88	1963–87	1963–95*	No
Cáceres ^a	16°04'S	57°41'W			1913–95*	1966–69
Catalão ^a	18°10'S	47°57'W			1913–95*	1921
Cruzeiro do Sul ^a	07°38'S	72°36'W			1933–95*	1963–69
Cuiabá ^a	15°35'S	56°05'W	1910–91		1910–95*	No
Góias ^a	15°56'S	50°08'W			1913–85*	1937–46
Goiânia ^a	16°40'S	49°16'W	1961–86		1961–95*	No
Manaus ^a	03°08'S	60°01'W	1931–88		1918–95*	No
S. G. da Cachoeira ^a	00°08'S	67°05'W	1931–81	1931–79	1922–95*	No
São Luís ^a	02°31'S	44°16'W	1914–70		1911–95*	1959–69
Taperinha ^a	02°42'S	54°70'W	1975–92		1914–86*	No
St. George ^b	03°54'N	51°48'W		1961–80*		No
St. Laurent ^b	05°30'N	54°02'W		1961–80*		No
Nickerie ^c	05°38'N	57°03'W		1931–91*		1981
S. Fernando ^d	07°54'N	67°28'W		1951–76*		1973
Sta. Cruz de la Sierra ^e	17°48'S	63°10'		1943–87*		1975–76

^a Brazil; ^b French Guyana; ^c Suriname; ^d Venezuela; ^e Bolivia.

Example data records for equatorial stations, anon-eq.csv. Units are degrees C. Missing values are -9.99999.

```

Ano,Belem,Sao Lu@s,Manaus,Taperinha,SGCach,Cruz_Sul,SFernando,Nickerie,St_Laurent,St__George
1911,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999
1912,-9.99999,-0.424153298,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999
1913,-9.99999,-0.107486631,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999
...
1993,0.098136117,0.542513369,0.155342713,-9.99999,0.328372721,1.060277778,-9.99999,-9.99999,-
9.99999,-9.99999
1994,0.314802784,0.342513369,0.505342713,-9.99999,0.411706054,2.360277778,-9.99999,-9.99999,-
9.99999,-9.99999
1995,0.45646945,0.342513369,0.72200938,-9.99999,1.278372721,2.576944444,-9.99999,-9.99999,-
9.99999,-9.99999

```

Example data records for non-equatorial stations, anom-noneq.csv. Units are degrees C. Missing values are -9.99999.

```

Ano,Cui-Homo,Caceres,Catalao,Bras•lia ,Goiania,Sta Cr. Sierra
1911,-1.751323052,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999
1912,-1.551323052,-9.99999,-9.99999,-9.99999,-9.99999,-9.99999
1913,-0.926323052,-9.99999,-0.351866883,-9.99999,-9.99999,-9.99999
...
1993,-0.656323052,-0.083044444,1.05646645,-9.99999,-9.99999,-9.99999
1994,0.168676948,0.325288889,-9.99999,-9.99999,-9.99999,-9.99999
1995,-0.481323052,-0.108044444,1.108739177,-9.99999,-9.99999,-9.99999

```

CAMREX Background

The objective of our **CAMREX** (Carbon in the **A**mazon **R**iver **E**xperiment) project for two decades has been to determine the sequence of processes that controls the distributions and transformations of water and bioactive elements (C, N, P, and O) in the Amazon River system. The basic questions we are addressing are:

- *How are biogeochemical signatures of the river system imparted by aggregated land surfaces, and at what rates and scales?*
- *How are the signatures of land-derived and in-situ processes modified during transit through the river system?*
- *What role does the evasion (outgassing) of CO₂ from the river system to the atmosphere play in the carbon cycle of moist tropical forests?*

Our overall perspective in CAMREX is that the Amazon is a test case for developing extendable models of how hydrologic and biogeochemical cycles are coupled at regional to continental scales in the humid tropics. Our studies serve the dual purposes of gaining a broad mechanistic understanding, and of establishing data baselines needed to assess anthropogenic perturbations to these globally critical and ecologically complex systems. As documented in over 100 publications, the resulting CAMREX dataset represents a time series unique in its length and detail for very large river systems. Our studies serve the dual purposes of gaining a broad mechanistic understanding of large river networks, and of establishing data baselines needed to assess future anthropogenic perturbations to these globally critical and ecologically complex systems.

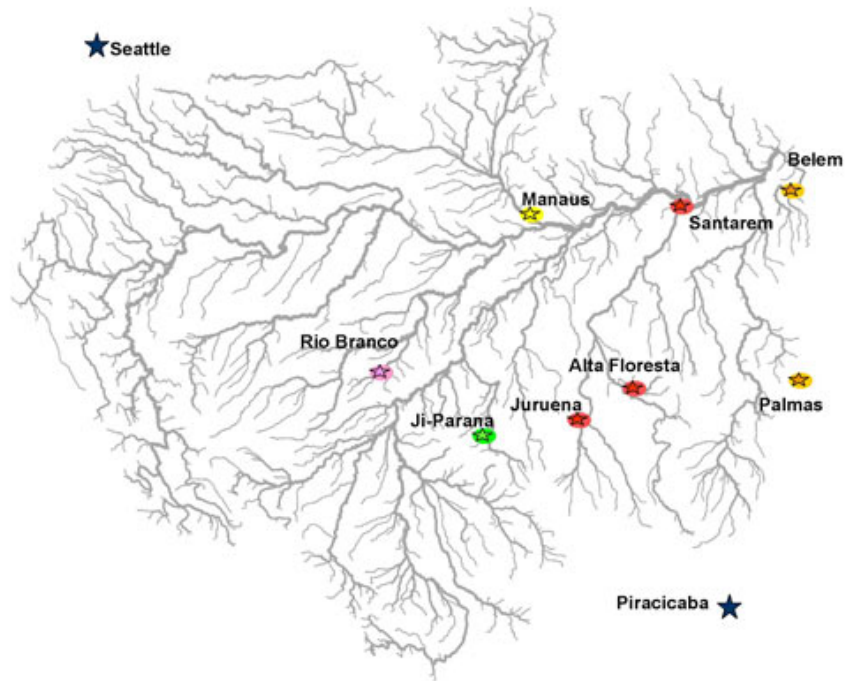
Funded primarily by the US NSF and NASA and Brazilian FAPESP, **CAMREX** is a joint project of the [University of Washington](#) (UW, Seattle) and the [Centro de Energia Nuclear na Agricultura](#) (CENA, Piracicaba), with colleagues at the Instituto Nacional de Pesquisas da Amazonia and other Brazilian and U.S. institutions.

The Sampling Network "Rede Beija Rio"

Our experimental plan is predicated on a systematic collection of a common set of parameters across representative environments in the Amazon. Because of the far-flung and remote nature of the Amazon, the logistics of establishing an encompassing sampling network are considerable. It is simply not feasible to send out a team from a central university or laboratory, and expect it to collect data with sufficient resolution.

Rather, our strategy has been to develop a network we call "*Rede Beija-Rio*" ("The Network of Kiss-the-River,") a play on words of the Portuguese word for hummingbird, *Beija-Flor*). The objective is to establish a set of sites across the basin, organized as transects based out of specific locations (nodes). A key element in our strategy is that each node is occupied by a researcher or a team of researchers, from that site. Typically these will be undergraduate and/or graduate students from local institutions (usually regional universities). This serves the dual purpose of being able to conduct much higher frequency (and much less expensive) sampling than sending teams from Sao Paulo or Seattle), and it provides training and capacity building. Implicit in this strategy is that each node has at least some degree of logistical support and access. Resulting of this sampling network are then integrated with modeling to produce the spatially-explicit and dynamical understanding needed to answer our lead questions.

At this point, we have established a set of sampling sites, operating out of bases (nodes) in Manaus, Belem, Palmas, Santarem, Rio Branco, Ji-Parana, Alta Floresta, and Juruena (and we are working to establish several more). The primary nodes, or bases, that form the *Rede* are shown. Each node is staffed by individuals from local institutions, and/or by colleagues from CENA, the UW, or other institutions. Each node then is responsible for a regional sampling (click on each, for detail).



The Sampling Network "Rede Beija Rio"

Each site is equipped with a project-provided "kit" (filtration supplies, pH meter, DO meter, glassware, and in some cases a portable IRGA). Two types of sampling strategies are used:

- Extensive surveys (bi-weekly sampling): involving the identification of the spatial p CO₂ variability by habitat type, in the largest possible range of environments. This sites were chosen in areas already studied within the Large Scale Biosphere-Atmosphere Experiment in the Amazon (LBA Project), based on ongoing or under implementation cooperation with local scientific and/or educational institutions.
- Intensive studies (sampling of rainfall events on time-scales as detailed as minutes): involving detailed studies of patterns and processes at the micro and meso-scale, at a selected smaller number of sites, as a function of the proximity to laboratories and existence of specialized personnel.

The list of stations is given in the following table:

Bases (sites)	Latitude	Longitude
Ji-Parana (UNIR)		
Ji-Parana	10° 53'S	61 ° 57'W
Urupa e tribs		
Paired Igarapes		
R. Madeira /Porto Velho	8 ° 46'S	63 ° 55'W
Foz de Madeira	3 ° 22' S	58 ° 45'W
Alto Madeira(s)	17 ° 48'S	63 ° 13'W

Rancho Grande		
Nova Vida		
Rio Branco (UFAC)	9 ° 0 57'S	67 ° 50'W
Rio Branco/Alto Purus	8 ° 44'S	67 ° 24'W
Foz Purus	3 ° 41'S	61 ° 27' W
Cruzeiro do Sul	7 ° 38'S	72 ° 40'W
Foz Juruá (Tamaniqua)	2 ° 37'S	65 ° 44'W
Tefe/Mamiura	3 ° 21'S	64 ° 41'
Manaus (INPA)	3 ° 07' S	60 ° 00'W
<i>Horizontal Manaus Transect:</i>		
Cuieras/ZF2		
Lower R Negro		
Reserva Ducke		
<i>Vertical Negro Transect</i>		
Sao Gabriel de la Cahoeira	0 ° 08' S	67 ° 02' W
Alto Negro		
Barcelos		
<i>Upper Solimoes Transect</i>		
Mamirauá		
Ica, Japura, Jutai and Solimoes		
Santarem (LBA-ECO Escritorio)	2 ° 25'S,	54 ° 43' W
Rio Amazonas		
Rio Tapajós		
Rio Moju		
L Cuieasssss		
Alta Floresta (Q)	9 ° 54'S,	55 ° 54'W
Teles Pires		
Cristalino, and Igarapés		
Juruena (UFMT)	10 ° 25'S,	58 ° 31'W
Bacia Rohden		
Rio Juruena		
Belem (EMBRAPA/MPEG)		
Para, Guama Igarapés of Igarapé-Açu	1 ° 26' S	48 ° 30' W
Caxiuana Igarapés of Caxiuana	1 ° 46'S	51 ° 37'W
Paragominas	2 ° 58' S	47 ° 29' W
Palmas (UNITINS)		
Ilha do Bananal/Circuito Javaes		
R Tocantins		
Alto Solimoes		

Upper Napo/Quito	0 ° 11'S	78 ° 31'W
Pachitea	8 ° 45'S	74 ° 32'W
Iquitos	3 ° 44'S	73 ° 12'W
Puerto Maldonado	12 ° 34'S	69 ° 12'W
Xingu	3 ° 12'S	52 ° 12'W
Altimra		
Upper Xingu		

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