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LBA-ECO CD-06 Biogeochemistry of Ji-Parana River and Tributaries, Brazil: 1999-2003

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Revision date: June 24, 2014

Summary:

This data set provides spatially extensive and temporally intensive surveys of the river biogeochemistry of the Ji-Parana River Basin in Western Amazonia, Rondonia, Brazil. The concentrations of major nutrient ions, dissolved organic and inorganic carbon, pH, temperature, dissolved oxygen, and conductivity were measured in Ji-Parana River and tributary samples at the defined seasonal or monthly intervals. Dominant landuse/landcover classes, slope, and soil cation exchange capacity are included for each of the extensive sampling locations derived from river basin and sub-basin characteristics.

Water samples were collected from 1999 to 2003 along the main stem of the Ji-Parana River as well as from the major tributaries including the Urupa. Shapefiles with the boundaries of the major sub-basins of the study area as well as the location of the sample collection points are included for the intensive and extensive sampling campaigns as well as the Urupa River campaign.

There are six comma-separated data files (.csv) and five compressed shapefiles (.zip) with this data set.
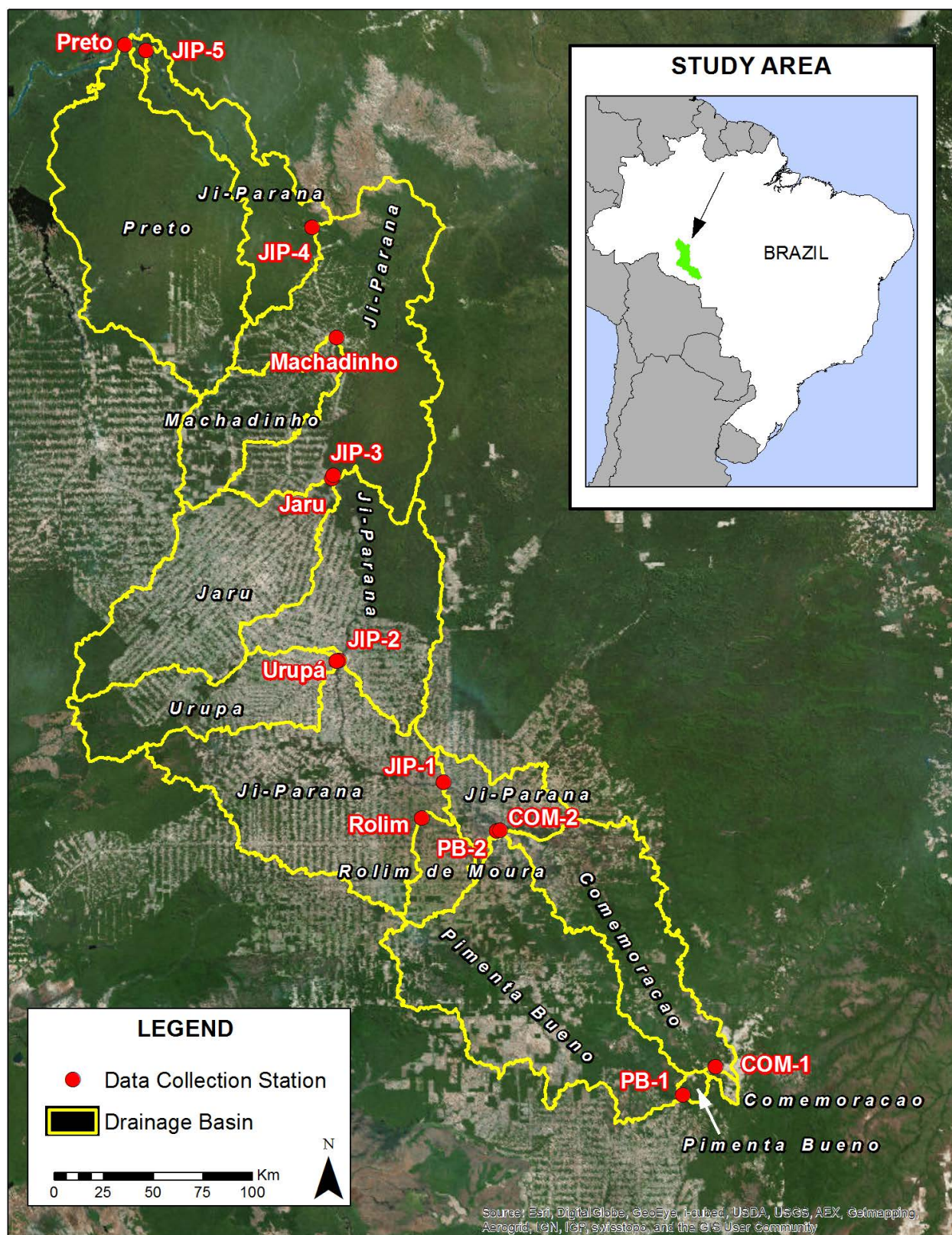
Figure 1. Map indicating the 14 sites for the intensive sampling campaign and river drainage basins.

Data Citation:

Cite this data set as follows:

Richey, J.E., A.V. Krusche, R.L. Victoria, M.V.R. Ballester, N.K. Leite, B.M. Gomes, M. Bolson, S.G. Neto, and A.A. Montebelo. 2014. LBA-ECO CD-06 Biogeochemistry of Ji-Parana River and Tributaries, Brazil: 1999-2003. Data set. Available on-line (http://daac.ornl.gov) from ORNL DAAC, Oak Ridge,

Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1227

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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 Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.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 June 2014. Users who download the data between June 2014 and July 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.

Table of Contents:

1. Data Set Overview

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

Activity: LBA-ECO

LBA Science Component: Land Surface Hydrology

Team ID: CD-06 (Richey / Victoria)

The investigators were Richey, Jeffrey E.; Victoria, Reynaldo Luiz; Aalto, Rolf Erhart; Abdo, Mara Silvia Aguiar; Alin, Simone Rebecca; Aufdenkampe, Anthony K.; Ballester, Maria Victoria Ramos; Barbosa, Roosevelt Passos; Bernardes, Marcelo Correa; Bolson, Marcos Alexandre; Bonelle, Nilton; Brito, David Silva; Cogo, Michelle Cristine; Cunha, Hillandia Brandao; Silva, Luis Vilmar Souza da; Deus, Fabiano Alves de; Devol, Allan H.; Ellis, Erin Elizabeth; Ferro, Jaderson Coradi; Filho, Walter Jorge do Nascimento; Frickmann, Fernando Cruz; Guandique, Manuel Enrique Gamero; Gomes, Beatriz M.; Neto, Sergio Candido Gouveia; Hanada, Lais de Carvalho; Holtgrieve, Gordon William; Krusche, Alex V.; Lacerda, Francisco A. Siebra; Leite, Nei Kavaguichi; Logsdon, Miles Grant; Macedo, Gelson de; Marcondes, Renata; McGeoch, Lauren; Melo, Emanuele Gurgel de Freitas; Mendes, Francisco de Assis; Moreira, Marcelo Zacharias; Neu, Vania; Oliveira, Carolina Barisson Marques; Ometto, Jean Pierre H.B.; Pimentel, Tania Pena; Filho, Nicolau Priante; Rasera, Maria de Fatima Fernandes Lamy; Remington, Sonya Marie; Rodda, Sarah; Salimon, Cleber Ibraim; Santiago, Alailson Venceslau; Santos, Arnoldo Marcilio dos; Silva, Cleoni Virginio da; Silva, Jonismar Souza; Silva, Simao Correa da; Souzapetro, Petronio Lopes de; Toledo, Andre Marcondes Andrade; Tumang, Cristiane Azevedo and Victoria, Daniel de Castro. You may contact Ballester, Maria Victoria Ramos (vicky@cena.usp.br) and Krusche, Alex V. (alex@cena.usp.br)

LBA Data Set Inventory ID: CD06_BGC_JiParana

This data set provides spatially extensive and temporally intensive surveys of the river biogeochemistry of the Ji-Parana River Basin (Rondonia State, Western Amazonia). The concentrations of major nutrient ions, dissolved organic and inorganic carbon, pH, temperature, dissolved oxygen, and conductivity were measured. Landcover data of dominant land use covers and soil cation exchange capacity are included for stations in the Ji Parana Basin corresponding to the extensive sampling locations.

Water samples were collected from 1999 to 2003 along the main stem of the Ji-Parana river as well as from the major tributaries including the Urupa. Shapefiles with the boundaries of the major sub-basins of the study area as well as the location of the sample collection points are included for the intensive and extensive sampling campaigns as well as the Urupa river campaign.

Related Data Sets

- LBA-ECO CD-06 Ji-Parana River Basin Land Use and Land Cover Map, Brazil: 1999 (Land use and land cover map for the study region)
- LBA-ECO CD-06 Physical, Political, and Hydrologic Maps, Ji-Parana River Basin, Brazil (Hydrologic, physical and political maps of the study area)
- LBA-ECO CD-06 Soil Classification Map, Ji-Parana River Basin, Rondonia, Brazil (Soils classification map of the study area)
- LBA-ECO CD-06 Water Balance of the Ji-Parana River Basin, Brazil: 1995-1996 (Water balance calculated for the study area)
- LBA-ECO CD-06 Land Use/Land Cover Time Series, Ji-Parana Basin, Brazil: 1986-2001 (Land Use and Land cover time series for the study area)

2. Data Characteristics:

There are six comma-separated (.csv) data files and five compressed shapefiles (.zip) with this data set.

Data File Descriptions:

Ji_Parana_Intensive_bgc.csv and **Ji_Parana_Org_matter_chemistry.csv**
Basic riverwater chemistry and organic matter chemistry were measured nine times over a three year period at 14 sites.
- **Extensive_sites_bgc_wet_season.csv** and **Extensive_sites_bgc_dry_season.csv**
A more spatially extensive sampling of riverwater with the same chemistry measurements was done once in the dry season and once in the wet season at a larger set of sampling points (38 and 33 sites, respectively) within the Ji Parana Basin.
- **Urupa_bgc.csv**
Weekly collections of river water between Nov 2001 and May 2003 were done at six stations on the Urupa River for the same basic chemistry measurements.
- **Ji_Parana_Extensive_landcover_soils.csv**
An analysis of dominant land use classes is provided for stations in the Ji Parana Basin corresponding to the extensive sampling locations.
- **ext_sampling_sites.zip**, **ext_sub-basins.zip**, **int_sites.zip**, **int_sub_basins.zip**, and **urupa_basin.zip**
Five shape files with the boundaries of the major sub-basins of the study area as well as the location of the sample collection points available for the intensive and extensive sampling campaigns as well as the Urupa river campaign.

There is also a companion file, **CD06_BGC_JP_sites_coordinates.csv** which contains the site coordinates, names, and site codes of the sampling sites. Note that this information is also provided in the individual data files.

The comma-separated (.csv) data files are organized as follows:

File #1: Ji_Parana_Intensive_bgc.csv

Sampling dates: 1999-05 to 2002-04 (no sampling day provided).

Column	Column Heading	Units/format	Description
1	Year	YYYY	Year of sampling (YYYY)
2	Month	M	Month of sampling (M)
3	Long	decimal degrees	Location of the sampling site in decimal degrees of longitude; negative values indicate west of the Prime Meridian
4	Lat	decimal degrees	Location of the sampling site in decimal degrees of latitude; negative values indicate south of the Equator
5	Site_Name		Sampling site name or description
6	Site_Code		Sampling site location code
6	Temp	degrees C	Water temperature reported in degrees Celsius (degrees C)
7	pH		pH of water sample
8	Cond	uS/cm	Conductivity of sample in microSiemens per centimeter (uS/cm)
9	OD_conc	ppm	Concentration of dissolved oxygen reported in parts per million (ppm)
10	OD_sat	% sat	Concentration of dissolved oxygen reported in percent saturation (%sat)
11	AOU	uM	Apparent oxygen utilization defined as the deviation of the concentration expected if dissolved O2 was in equilibrium with atmosphere reported in micromoles of oxygen per liter (uM)
12	Resp	uM/h	Respiration reported in micromoles of CO2 per hour (uM/h)
13	DOC_wt	ppm	Concentration of dissolved organic carbon reported in parts per million (ppm)
14	DIC_mol	uM	Concentration of dissolved inorganic carbon reported in micromoles of carbon per liter (uM)
15	CO2_excess	uM	Excess CO2 defined as the deviation of the concentration expected if dissolved CO2 was in equilibrium with atmosphere reported in micromoles of CO2 per liter (uM)
16	HCO3	uM	Concentration of bicarbonate reported in micromoles of HCO3 per liter (uM)
17	CO3	uM	Concentration of carbonate reported in micromoles of CO3 per liter (uM)

18	Cl	uM	Chloride ion concentration reported in micromoles per liter (uM)
19	NO2	uM	Nitrite ion concentration reported in micromoles per liter (uM)
20	NO3	uM	Nitrate ion concentration reported in micromoles per liter (uM)
21	PO4	uM	Phosphate ion concentration reported in micromoles per liter (uM)
22	SO4	uM	Sulfate ion concentration reported in micromoles per liter (uM)
23	Na	uM	Sodium ion concentration reported in micromoles per liter (uM)
24	NH4	uM	Ammonium ion concentration reported in micromoles per liter (uM)
25	K	uM	Potassium ion concentration reported in micromoles per liter (uM)
26	Mg	uM	Magnesium ion concentration reported in micromoles per liter (uM)
27	Ca	uM	Calcium ion concentration reported in micromoles per liter (uM)
28	TZ_HCO3	ueq/L	Sum of negative charges calculated using the concentrations reported in columns 16 through 22 reported in microequivalents per liter (ueq/L)
29	TZ_DIC	ueq/L	Sum of negative charges calculated as for the previous column but using the concentration of DIC reported in column 14 instead of the HCO3 concentration reported in microequivalents per liter (ueq/L)
30	TZ_pos	ueq/L	Sum of positive charges calculated using the concentrations reported in columns 23 through 27 reported in microequivalents per liter (ueq/L)
31	TZ_neg_TZ_pos		Ratio of negative to positive charges calculated as column 29 divided by column 30
32	CSS	mg sed/L	Coarse suspended sediments reported in milligrams of sediment per liter (mg sed/L)
33	FSS	mg sed/L	Fine suspended sediments reported in milligrams of sediment per liter (mg sed/L)
34	TSS	mg sed/L	Total suspended sediments reported in milligrams of sediment per liter (mg sed/L)
Missing data are represented by -9999 and values below detection limits are represented by zeros			

Sample data from File #1:

```
Year,Month,Long,Lat,Site_Name,Site_Code,Temp,pH,Cond,OD_conc,OD_sat,AOU,Resp,DOC_wt,DIC_mol,
CO2_excess, HCO3,CO3,Cl,NO2,NO3,PO4,SO4,Na,NH4,K,Mg,Ca,TZ_HCO3,TZ_DIC,TZ_pos,TZ_neg_TZ_pos,CSS,FSS,TSS
1999,5,1,COM-1,May-99,24.7,4.26,7.46,7.38,89.2,29.38,0.23,1.53,58.64,47.84, 0.44,
-9999,7.36,-9999,9.25,-9999,1.3,5.18,-9999,2.84,1.88,1.83,19.64,77.84, 15.45,5.04,-6.23,-40.17,1.98,1.41,3.39
1999,5,2,COM-2,May-99,25.9,6.29,17.9,8.03,99.1,3.44,0.42,4.29,114.32,50.78, 53.22,-9999,10.04,-9999,8.02,-
9999,2.52,20.5,4.51,25.03,18.51,21.75,76.32, 137.42,126.05,1.09,-6.49,-38.25,6.04,26.83,32.87
....
2000,9,-60.3703,-12.8674,Pimenta Bueno 1,PB-1,25.5,5.83,6.5,7.82,95.8,11.88,0.2,1.36,182.27,129.67,42.28,-9999,
4.71,1.44,13.9,-9999,0.2,6.23,5,13.33,4.52,3.84,61.29,201.28,36.28,5.55,3.36,6.27,9.64
2000,9,-61.1945,-11.6831,Pimenta Bueno 2 ,PB - 2,28.9,7.12,28.9,7.32,95.3,12.81,0.16,4.02,440.91,53.87,376.7,
0.23,10.08,10.13,10.24,-9999,2.5,45.51,4.84,42.56,52.4,63.89,402.02,466.23,320.66,1.45,1.26,13.99,15.25
...
2002,4,-61.9608,-9.4254,Machadinho River,MAC,27.3,6.21,16.1,6.04,76.4,242.09,0.14,2.85,133.14,0,55.93,-9999,7.1,-9999,4.42,-
9999,0.78,28.59,4,31.84,15.68,14.63,69,146.21,121.06,1.21,11.13,0.34,11.47
2002,4,-62.928291,-8.091527,Preto River,PRETO,26.7,5.45,7.5,4.66,58.4,246.28,0.12,2.54,93.14,0,10.41,-9999,7.48,-9999,2.54,-
9999,0.73,11.69,1.55,7.8,2.54,3.68,21.89,104.62,31.93,3.28,5.84,0.52,6.36
```

File #2: Ji_Parana_Org_matter_chemistry.csv

Sampling dates: 1999-05 to 2001-05 (no sampling day provided).

Column	Column Heading	Units/format	Description
1	Year	YYYY	Year in which samples were collected and measurements made (YYYY)
2	Month	M	Month in which samples were collected and measurements made (M)
3	Long	decimal degrees	Location of the sampling site in decimal degrees of longitude; negative values indicate west of the Prime Meridian
4	Lat	decimal degrees	Location of the sampling site in decimal degrees of latitude; negative values indicate south of the Equator
5	Site_Name		Sampling site name or description
6	Site_Code		Sampling site location code
7	Size_fraction		Measurements were made on three distinct components: coarse suspended solids (CSS: greater than 63 um diameter); fine suspended solids (FSS; greater than 0.1 and less than or equal to 63 um diameter); and ultrafine dissolved organic matter (UDOM)
8	delta_13C	per mil	delta 13C defined as the ratio of 13C to 12C in the sample relative to the Pee Dee Belemnite standard (PDB)
9	Org_C_conc	percent	Concentration of organic C in the organic matter sample
10	delta_15N	per mil	delta 15N defined as the ratio of 15N to 14N in the sample relative to atmospheric nitrogen
11	N_conc	percent	Concentration of total N in the organic matter sample
12	NtoC		Ratio of nitrogen to carbon calculated from the measured carbon and nitrogen concentrations and reported on a mass basis
13	Lambda	mg per 100 g Corg	Total yield of lignin-derived phenols normalized to 100 mg of organic carbon in the sample
14	Acid_Ald		Acid-to-aldehyde ratio of vanillyl phenol
15	Cin_to Van		The ratio of the sum of cinnamyl phenols to vanillyl phenol
16	Syr_to_Van		The ratio of the sum of syringyl phenols to vanillyl phenol
17	Q	m3 per s	Annual mean discharge based on measured rates between 1999 and 2001 and reported in cubic meters per second
	missing data are represented by -9999		

Sample data from File #2:

```
Year,Month,Long,Lat,Site_Name,Site_Code,Size_fraction,delta_13C,Org_C_conc,delta_15N,N_conc,NtoC,
Lambda,Acid_Ald,Cin_to Van,Syr_to_Van,Q
1999,9,COM-1,FSS,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999 1999,9,-60.1906,-
12.7333,Comemoracao 1 ,COM-1,FSS,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999 1999,9,-
60.3703,-12.8674,Pimenta Bueno 1 ,PB-1,FSS,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999
...
2000,2,-60.1906,-12.7333,Comemoracao 1 ,COM-1,FSS,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-
9999
```

```
2000,2,-60.3703,-12.8674,Pimenta Bueno 1 ,PB-1,FSS,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-
9999
...
2001,3,-62.0564,-8.93097,Ji-Parana River 4 ,JIP-4,UDOM,-26.87,23.4,4.74,0.9,0.039,-9999,-9999,-9999,-9999,-
9999
2001,3,-62.7342,-8.32701,Ji-Parana River 5 ,JIP-5,UDOM,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-9999,-
9999,-9999
```

File #3: Extensive_sites_bgc_wet_season.csv

No sampling dates provided.

Column	Column Heading	Units/format	Description
1	Long	decimal degrees	Location of the sampling site in decimal degrees of longitude; negative values indicate west of the Prime Meridian
2	Lat	decimal degrees	Location of the sampling site in decimal degrees of latitude negative values indicate south of the Equator
3	Site_Code		Site alphanumeric codes
4	Site_Name		Sampling site name or description
5	Cond	uS/cm	Conductivity of the water sample reported in microSiemens per centimeter (uS/cm)
6	OD_sat	% sat	Concentration of dissolved oxygen reported in percent saturation (%sat)
7	AOU	uM	Apparent oxygen utilization defined as the deviation of the concentration expected if dissolved O2 was in equilibrium with atmosphere reported in micromoles of oxygen per liter (uM)
8	Resp	uM/h	Respiration reported in micromoles of CO2 per hour (uM/h)
9	DOC_mol	uM	Concentration of dissolved organic carbon reported in micromoles of carbon per liter (uM)
10	DIC_mol	uM	Concentration of dissolved inorganic carbon reported in micromoles of carbon per liter (uM)
11	CO2_excess	uM	Excess CO2 defined as the deviation of the concentration expected if dissolved CO2 was in equilibrium with atmosphere reported in micromoles of CO2 per liter (uM)
12	CO2_free	uM	Concentration of free CO2 (also called hydrated CO2) reported in micromoles of CO2 per liter (uM)
13	pCO2	uM	Partial pressure of CO2 reported in micromoles of CO2 per liter (uM)
14	HCO3	uM	Concentration of bicarbonate reported in micromoles of HCO3 per liter (uM)
15	CO3	uM	Concentration of carbonate reported in micromoles of CO3 per liter (uM)
16	Cl	uM	Chloride ion concentration reported in micromoles per liter (uM)
17	NO2	uM	Nitrite ion concentration reported in micromoles per liter (uM)
18	SO4	uM	Sulfate ion concentration reported in micromoles per liter (uM)
19	NO3	uM	Nitrate ion concentration reported in micromoles per liter (uM)

20	PO4	uM	Phosphate ion concentration reported in micromoles per liter (uM)
21	Na	uM	Sodium ion concentration reported in micromoles per liter (uM)
22	NH4	uM	Ammonium ion concentration reported in micromoles per liter (uM)
23	K	uM	Potassium ion concentration reported in micromoles per liter (uM)
24	Mg	uM	Magnesium ion concentration reported in micromoles per liter (uM)
25	Ca	uM	Calcium ion concentration reported in micromoles per liter (uM)
26	FSS	mg sed/L	Fine suspended sediments reported in milligrams of sediment per liter (mg sed/L)
27	CSS	mg sed/L	Coarse suspended sediments reported in milligrams of sediment per liter (mg sed/L)
27	TSS	mg sed/L	Total suspended sediments reported in milligrams of sediment per liter (mg sed/L)
missing data are represented by -9999			

Sample data from File #3:

```
Long,Lat,Site_Code,Site_Name,Cond,OD_sat,AOU,Resp,DOC_mol,DIC_mol,CO2_excess,CO2_free,pCO2,
HCO3,CO3,Cl,NO2,SO4,NO3,PO4,Na,NH4,K,Mg,Ca,FSS,CSS,TSS
-60.19064,-12.73326,COM-1,Comemoracao 1,12.1,91.5,23.125,0.08,177.25,32.02,19,29.4,0.1,2.7,0,8.5,-
9999,0.4,10.1,-9999,12.2,0.3,3,1.9,4.9,9.6,0.4,10
-60.26182,-12.61035,C-2,Second Station on Comemoracao,8.2,87.8,32.5,0.13,133.89,36.64,19.9,30.3,0.1,6.3,0,21.1,-
9999,0.3,17,-9999,23.3,1.2,4.5,2.4,5,2.2,3.8,6
...
-61.64514,-11.72705,R-3,Bamburro
Stream,67.1,80.7,49.0625,0.29,391.53,745.68,165.7,176,0.6,569.5,0.2,20.9,4.9,0.9,-9999,-9999,175,-
9999,79.4,91,111,42.4,2,42.6
-61.7145,-11.90544,R-2,Bamburro Stream at Santa
Luzia,118.7,81.1,50,0.23,369.64,1375.68,159.8,170.2,0.5,1204.6,0.9,22.1,7,1.4,-9999,-9999,294.3,-
9999,70.2,175.6,237,51.2,10.4,61.6
...
-62.83156,-10.81348,JA-4,Jaru River at
Tarilandia,45.1,85.2,38.75,0.15,303.64,403.64,97.2,107.5,0.3,296.1,0.1,10.4,3.1,1.5,1.2,-9999,110.2,-
9999,62.7,43.4,73,16.1,3.3,19.4
-62.61016,-11.08211,U-4,Urupa River at Mirante da
Serra,22.9,82.7,44.6875,0.13,250.75,207.59,62.2,72.5,0.2,135,0,7.8,8.1,2.9,4.4,-9999,54.7,0.3,34.7,27,30.3,-9999,-
9999,-9999
```

File #4: Extensive_sites_bgc_dry_season.csv

Sampling dates: 2001-07-02 to 2001-07-19

Column	Column Heading	Units/format	Description
1	Long	decimal degrees	Location of the sampling site in decimal degrees of longitude: negative values indicate west of the Prime Meridian
2	Lat	decimal degrees	Location of the sampling site in decimal degrees of latitude negative values indicate south of the Equator
3	Site_Code		Site code for site name or "None" if none provided
4	Site Name		Sampling site name or description
5	Date	YYYYMMDD	Sampling date
6	Time	HH:MM	Sampling time in local time reported using a 24 hour clock
			Water temperature reported in degrees

7	Temp	degrees C	Celsius (degrees C)
8	pH		pH of the water sample reported in pH units
9	Cond	uS/cm	Conductivity of the water sample reported in microSiemens per centimeter (uS/cm)
10	OD_conc	ppm	Concentration of dissolved oxygen reported in parts per million (ppm)
11	OD_sat	% sat	Concentration of dissolved oxygen reported in percent saturation (% sat)
12	AOU	uM	Apparent oxygen utilization defined as the deviation of the concentration expected if dissolved O2 was in equilibrium with atmosphere reported in micromoles of oxygen per liter (uM)
13	Resp	uM/h	Respiration reported in micromoles of CO2 per hour (uM/h)
14	DOC_wt	mg/L	Concentration of dissolved organic carbon reported in milligrams of carbon per liter (mg/L)
15	DOC_mol	uM	Concentration of dissolved organic carbon reported in micromoles of carbon per liter (uM)
16	DIC_wt	mg/L	Concentration of dissolved inorganic carbon reported in milligrams of carbon per liter (mg/L)
17	DIC_mol	uM	Concentration of dissolved inorganic carbon reported in micromoles of carbon per liter (uM)
18	CO2_excess	uM	Excess CO2 defined as the deviation of the concentration expected if dissolved CO2 was in equilibrium with atmosphere reported in micromoles of CO2 per liter (uM)
19	CO2_free	uM	Concentration of free CO2 (also called hydrated CO2) reported in micromoles of CO2 per liter (uM)
20	pCO2	uM	Partial pressure of CO2 reported in micromoles of CO2 per liter (uM)
21	HCO3	uM	Concentration of bicarbonate reported in micromoles of HCO3 per liter (uM)
22	CO3	uM	Concentration of carbonate reported in micromoles of CO3 per liter (uM)
23	Cl	uM	Chloride ion concentration reported in micromoles per liter (uM)
24	NO2	uM	Nitrite ion concentration reported in micromoles per liter (uM)
25	NO3	uM	Nitrate ion concentration reported in micromoles per liter (uM)
26	PO4	uM	Phosphate ion concentration reported in micromoles per liter (uM)
27	SO4	uM	Sulfate ion concentration reported in micromoles per liter (uM)
28	Na	uM	Sodium ion concentration reported in micromoles per liter (uM)
29	NH4	uM	Ammonium ion concentration reported in micromoles per liter (uM)
30	K	uM	Potassium ion concentration reported in micromoles per liter (uM)
31	Mg	uM	Magnesium ion concentration reported in micromoles per liter (uM)

32	Ca	uM	Calcium ion concentration reported in micromoles per liter (uM)
33	FSS	mg sed/L	Fine suspended sediments reported in milligrams of sediment per liter (mg sed/L)
34	CSS	mg sed/L	Coarse suspended sediments reported in milligrams of sediment per liter (mg sed/L)
35	TSS	mg sed/L	Total suspended sediments reported in milligrams of sediment per liter (mg sed/L)
missing data are represented by -9999			

Sample data from File #4:

```
Long,Lat,Site_Code,Site_Name,Date,Time,Temp,pH,Cond,OD_conc,OD_sat,AOU,Resp,DOC_wt,DOC_mol,
DIC_wt,DIC_mol,CO2_excess,CO2_free,pCO2,HCO3,CO3,Cl,NO2,NO3,PO4,SO4,Na,NH4,K,Mg,Ca,FSS,
CSS,TSS
 -60.11478,-12.87033,None,Headwaters of Piracolino Stream,20010702,15:20,-9999,5.58,-9999,7.55,91.8,-9999,-9999,-9999,-
9999,1.72,39.11,-9999,35.56,0.11,3.56,0,11.87,-9999,0.64,0.46,0.59,12.95,30.89,11.66,2.96,2.59,-9999,-9999,-9999
-60.19064,-12.73326,COM-1,Comemoracao 1 (COM-
1),20010703,7:45,21.7,5.05,5.53,7.9,90.2,27.81,0.09,0.91,76.08,1.17,26.55,14.88,25.36,0.08,1.19,0,3.62,0.12,
9.23,0.09,0.25,6.51,18.81,3.54,1.23,1.38,5.5,0.64,6.14
...
-61.08051,-12.29893,P-2,Pimenta Bueno River at Boa
Esperanca,20010705,11:00,26,7.07,34.1,7.37,91.4,23.75,0.09,1.59,132.63,13.75,312.5,39.69,49.99,0.16,
262.36,0.14,4.73,9.74,9.87,0.25,0.36,45.13,11.79,22.64,59.15,75.18,22.77,1.71,24.48 -61.19186,-11.66643,COM-2,Comemoracao 2 (COM-
2)20010705,16:00,26,6.29,9.86,7.91,98,6.88,0.09,1.52,127,2.44,55.52,19.37,29.67,0.09,25.85,0,6.66,-
9999,8.96,0.01,2.13,15.74,27.21,17.15,8.24,11.78,10.06,0.84,10.9
...
-62.83156,-10.81348,JA-4,Jaru River at Tarilandia,20010718,14:45,27.5,6.89,54.6,7.13,90.7,24.69,
-9999,2.18,181.42,23.89,542.95,111.37,121.5,0.39,421.3,0.15,12.86,14.13,8.83,0.01,3.08,157.22,
-9999,88.59,68.43,134.79,10.7,0.59,11.29
-62.61016,-11.08211,U-4,Urupa River at Mirante da Serra,20010719,9:15,26,6.9,37.9,6.06,74.9,64.69,-
9999,2.61,217.44,16.26,369.55,70.92,81.23,0.26,288.21,0.11,22.92,9.12,2.61,0.01,2.55,93.43,24.89,58.08,
61.69,83.92,9.24,0.5,9.74
```

File #5: Urupa_bgc.csv

Sampling dates: 2001-11-06 to 203-05-20. Samples were collected along the Urupa River between the cities of Ji-Parana and Urupá, Urupa River at Urupa, Urupa River upstream of Urupa, and the Urupa River at Mirante da Serra. There were also two additional samplng sites however the coordinates for those sites were not provided.

Column	Column Heading	Units/format	Description
1	Long	decimal degrees	Location of the sampling site in decimal degrees of longitude: negative values indicate west of the Prime Meridian
2	Lat	decimal degrees	Location of the sampling site in decimal degrees of latitude negative values indicate south of the Equator
3	Site_Code		Site code for site name or "None" if none provided
4	Site_Name		Sampling site name or description
5	Date	YYYYMMDD	Sampling date
6	Time	HH:MM	Sampling time in local time reported using a 24 hour clock
7	Temp	degrees C	Water temperature reported in degrees Celsius (degrees C)
8	pH		pH of the water sample reported in pH units
9	Cond	uS/cm	Conductivity of the water sample reported in microSiemens per centimeter (uS/cm)
10	OD_conc	ppm	Concentration of dissolved oxygen reported in parts per million (ppm)

11	OD_sat	% sat	Concentration of dissolved oxygen reported in percent saturation (%sat)
12	Resp	uM/h	Respiration reported in micromoles of CO2 per hour (uM/h)
13	Cl	uM	Chloride ion concentration reported in micromoles per liter (uM)
14	NO2	uM	Nitrite ion concentration reported in micromoles per liter (uM)
15	SO4	uM	Sulfate ion concentration reported in micromoles per liter (uM)
16	NO3	uM	Nitrate ion concentration reported in micromoles per liter (uM)
17	PO4	uM	Phosphate ion concentration reported in micromoles per liter (uM)
18	Na	uM	Sodium ion concentration reported in micromoles per liter
19	NH4	uM	Ammonium ion concentration reported in micromoles per liter (uM)
20	K	uM	Potassium ion concentration reported in micromoles per liter (uM)
21	Mg	uM	Magnesium ion concentration reported in micromoles per liter (uM)
22	Ca	uM	Calcium ion concentration reported in micromoles per liter (uM)
23	DOC_wt	mg/L	Concentration of dissolved organic carbon reported in milligrams of carbon per liter (mg/L)
24	DIC_wt	mg/L	Concentration of dissolved inorganic carbon reported in milligrams of carbon per liter (mg/L)
25	DOC_mol	uM	Concentration of dissolved organic carbon reported in micromoles of carbon per liter (uM)
26	DIC_mol	uM	Concentration of dissolved inorganic carbon reported in micromoles of carbon per liter (uM)
27	OD_umol	uM	Concentration of dissolved oxygen reported in micromoles of oxygen per liter of water
missing data are represented by -9999			

Sample data from File #5:

```
Long,Lat,Site_Name,Site_code,Date,Time,Temp,pH,Cond,OD,OD_sat,Resp,Cl,NO2,SO4,NO3,PO4,Na,NH4,K,
Mg,Ca,DOC_wt,DIC_wt,DOC_mol,DIC_mol,OD_umol,
-62.1177,-11.0019,Urupa River between the cities of Ji-Parana and Urupá,U-1,20011106,8:10,25,6.04,24.3,7.28,88.4,0.225,7.08,3.76,3.78,3.96,-
9999,38.49, 40.92,59.51,32.07,25.91,
6.22,6.78,518.04,154.02,227.5
-62.1177,-11.0019,Urupa River between the cities of Ji-Parana and Urupá,U-1,20011113,8:11,26.3,6.26,20.8,6.68,82.9,0.079,7.13,4.56,3.76,4.06,-9999,
35.95,38.41,52.81,34.25,30.59,4.76,7.85,396.58,178.34,208.75
...
-62.546,-11.1261,Urupa River upstream of Urupa,U-3,20011120,11:50,29.3,7.09,52.5,7.3,95.6,0.186,13.2,11.62,3.15,-9999,-
9999,112.46,12.91,85.24,92.45,117.6,3.81,21.92,317.17,498.18,228.13
-62.546,-11.1261,Urupa River upstream of Urupa,U-3,20011127,11:30,27.6,6.63,43,7.17,91,0.258,16.9,8.84,6.39,1.58,-9999,121.21,-
9999,117.96,75.7,91.89,8.08,16.04,673.71,364.55,224.06
...
-9999,-9999,-9999,U-6,20030506,17:20,27.4,7.05,50.4,6.41,79.7,0.231,18.6,-9999,2.17,-9999,2.2,104.67,1.61,-9999,71.62,91.54,5.87,21.38,-9999,-9999,-
9999
-9999,-9999,-9999,U-6,20030520,16:32,29.2,7.32,55.4,7.6,97.4,0.125,10.34,-9999,0.31,-9999,1.48,115.22,0.76,51.2,86.5,110.33,2.58,18.64,-9999,-9999,-
9999
```

File #6: Ji_Parana_Extensive_landcover_soils.csv

No sampling dates were provided for these data.

Column	Column Heading	Units/format	Description
1	Long	decimal degrees	Location of the sampling site in decimal degrees of longitude: negative values indicate west of the Prime Meridian
2	Lat	decimal degrees	Location of the sampling site in decimal degrees of latitude negative values indicate south of the Equator
3	Site_Name		Sampling site name or description
4	Site_Code		Sampling site location code
5	Pasture	%	Percent of river basin area in pasture
6	Forest	%	Percent of river basin area in forest
7	Urbanization	%	Percent of river basin area in urban land cover
8	Other	%	Percent of river basin area in land cover other than pasture forest or urban
8	Slope	degrees	Average slope for the basin. Data were derived from the SIGTERON data set (Cochrane and Cochrane, 1998)
10	ECEC	cMol kg-1	Effective cation exchange capacity of the soils in the catchment area. (calculated as the sum of Ca2+, Mg2+, Na+, K+, H+, and Al3+) reported in centimoles of charge per kg of soil. Data were derived from the SIGTERON data set (Cochrane and Cochrane, 1998)

Sample data from File #6:

```
Long,Lat,Site_Name,Site_Code,Pasture,Forest,Urbanization,Other,Slope,ECEC
-60.1906,-12.7333,Comemoracao 1,COM-1,12,46,0.2,53.9,1.68,1.35
-60.2618,-12.6104,Second Station on Comemoracao,C-2,7.9,63.6,4.7,35.7,1.69,1.21
...
-61.7145,-11.9054,Bamburro Stream at Santa Luzia,R-2,80.7,19.3,0,80.7,1.99,6.16
-61.7784,-11.7603,Anta Atirada Stream before the city of Rolim de Moura,R-
4,69.3,27.9,0,72.1,2.41,5.18
...
-62.8316,-10.8135,Jaru River at Tarilandia,JA-4,21.7,78.3,0,21.7,3.45,3.04
-62.6102,-11.0821,Urupa River at Mirante da Serra,U-4,17.3,72.3,0,24.8,3.92,3
```

ShapeFile Descriptions

There are five shapefiles provided as compressed files (.zip). When unzipped, files 7, 8, 9, and 11 contain six files (*.shx, *.dbf, *.prj, *.sbn,*.sbx, and *.shp). File # 10 also contains an xml (.xml) file, for a total of seven files. The shapefile parameters and attributes are described below.

File #7: ext_sampling_sites.zip: This file depicts the sampling site locations.

Parameters:

Geometry Type: Point
Projected Coordinate System: WGS_1984_UTM_Zone_20S
Geographic Coordinate System: GCS_WGS_1984
Datum: D_WGS_1984
Prime Meridian: Greenwich
Angular Unit: Degree
Projection: Transverse Mercator
Scale Factor: 0.99960000
Latitude of Origin: 0.00000000
False_Easting: 500000.00000000
False_Northing: 10000000.00000000
Central_Meridian: -63.00000000

Linear_Unit: Meter

Attributes

FID: Internal feature number; sequential unique whole numbers that are automatically generated
Shape: Feature geometry
PONTOS_ID: Number generated by data provider; no reference found

File #8: ext_sub-basins.zip: This shapefile depicts a smaller subset of the main study drainage basins.

Parameters:

Geometry Type: Polygon
Projected Coordinate System: WGS_1984_UTM_Zone_20S
Geographic Coordinate System: GCS_WGS_1984
Datum: D_WGS_1984
Prime Meridian: Greenwich
Angular Unit: Degree
Projection: Transverse Mercator
Scale Factor: 0.99960000
Latitude of Origin: 0.00000000
False_Easting: 500000.00000000
False_Northing: 10000000.00000000
Central_Meridian: -63.00000000
Linear_Unit: Meter

Attributes:

FID: Internal feature number; sequential unique whole numbers that are automatically generated
Shape: Feature geometry
AREA: Area of polygon in square meters
PERIMETER: Perimeter of polygon in meters
GRID_CODE: Number generated by data provider; no reference found
RIO: River drainage basin
ID: Data collection station ID

File #9: int_sitesl.zip: This shapefile depicts the locations of data collection stations.

Parameters:

Geometry Type: Point
Projected Coordinate System: WGS_1984_UTM_Zone_20S
Geographic Coordinate System: GCS_WGS_1984
Datum: D_WGS_1984
Prime Meridian: Greenwich
Angular Unit: Degree
Projection: Transverse Mercator
Scale Factor: 0.99960000
Latitude of Origin: 0.00000000
False_Easting: 500000.00000000
False_Northing: 10000000.00000000
Central_Meridian: -63.00000000
Linear_Unit: Meter

Attributes:

FID: Internal feature number; sequential unique whole numbers that are automatically generated
Shape: Feature geometry
AREA: Possibly an extraneous field since this is a point shapefile. All values are zero.
PERIMETER: Possibly an extraneous field since this is a point shapefile. All values are zero.
PONTOS_: Number generated by data provider; no reference found
PONTOS_ID: Number generated by data provider; no reference found
STATIONS_: Number generated by data provider; no reference found
NOME: Data collection station ID

File #10: int_sub_basinsl.zip: This shapefile depicts the area of the drainage basins. Note- when unzipped, this file also contains a .xml file.

Parameters:

Geometry Type: Polygon
Projected Coordinate System: WGS_1984_UTM_Zone_20S
Geographic Coordinate System: GCS_WGS_1984
Datum: D_WGS_1984

Prime Meridian: Greenwich
Angular Unit: Degree
Projection: Transverse Mercator
Scale Factor: 0.99960000
Latitude of Origin: 0.00000000
False_Easting: 500000.00000000
False_Northing: 10000000.00000000
Central_Meridian: -63.00000000
Linear_Unit: Meter

Attributes:

FID: Internal feature number; sequential unique whole numbers that are automatically generated
Shape: Feature geometry
AREA: Area of polygon in square meters
PERIMETER: Perimeter of polygon in meters
ID: Data collection station ID
River: River drainage basin

File #11: urupa_basin.zip: This shapefile depicts the area of the Urupa drainage basin.

Parameters:

Geometry Type: Polygon
Projected Coordinate System: WGS_1984_UTM_Zone_20S
Geographic Coordinate System: GCS_WGS_1984
Datum: D_WGS_1984
Prime Meridian: Greenwich
Angular Unit: Degree
Projection: Transverse Mercator
Scale Factor: 0.99960000
Latitude of Origin: 0.00000000
False_Easting: 500000.00000000
False_Northing: 10000000.00000000
Central_Meridian: -63.00000000
Linear_Unit: Meter

Attributes:

FID: Internal feature number; sequential unique whole numbers that are automatically generated
Shape: Feature geometry
AREA: Area of polygon in square meters
PERIMETER: Perimeter of polygon in meters
GRID_CODE: Number generated by data provider; no reference found
RIO: River drainage basin
ID: Data collection station ID

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

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Rondonia - Rio Ji-Parana (Rondonia)	-63.41528	-60.015	-8.03333	-12.92694	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 1999/05/24 to 2003/05/20.
- Temporal Resolution: Monthly (Ji Parana intensive sampling), weekly (Urupa intensive sampling) and two seasonal campaigns (one dry season, one wet season for the Ji Parana extensive sampling)

Platform/Sensor/Parameters measured include:

- FIELD INVESTIGATION / FIELD SURVEY / SURFACE WATER CHEMISTRY
- DEM (DIGITAL ELEVATION MODEL) / ANALYSIS / WATERSHED CHARACTERISTICS

3. Data Application and Derivation:

These data are useful for river biogeochemical characterization and modeling.

4. Quality Assessment:

All data sets were checked for inconsistencies. During analyses in the laboratory standard QA/QC protocols were followed with blanks and known standards run regularly to ensure the accuracy and precision of the results.

Overall land-use/land cover classification accuracy was 89.12%, with an overall Kappa Statistic of 0.8667. These values were above the minimum limits for acceptance described in the literature (Ballester et al., 2001).

5. Data Acquisition Materials and Methods:

Site description

The Ji-Parana Basin, with a drainage area of 75,000 km2, is located in Rondonia state in the southwestern Amazon Basin. The headwaters of the Ji-Parana River are formed by the confluence of the Comemoracao and Pimenta Bueno rivers. The Ji-Parana River channel has a total length of 972 km and varies in width from 150 to 500 m, whereas the channel widths of the major tributaries range from 30 to 200 m. The high and low water periods for these rivers range from December to May, and from June to November, respectively. Oxisols and Ultisols are the predominant soil types in the basin, encompassing 47% and 24% of the total drainage area, respectively. Entisols cover 14%, Alfisols 13% and Eptisols 2% of the basin.

The basin was divided into 14 drainage units according to the river network morphology and degree of land-use impact. Four categories of land use impact were determined as a function of the percentage of pasture coverage: low (0 to 15 percent); medium (15 to 30 percent); high (30 to 50 percent) and very high (50 to 75 percent).

Sampling Campaigns

For the intensive sampling campaign, water samples were collected nine times between 1999 and 2001. Samples were collected at five sites along the main channel of the Ji-Parana´ River, at the mouths of six major tributaries, and at three headwater sites, for a total of 14 sampling stations. See Figure 1.

A more spatially extensive sampling of riverwater with the same chemistry measurements was done once in the dry season and once in the wet season at a larger set of sampling points (38 and 33 sites, respectively) within the Ji Parana Basin.

Weekly collections of river water between Nov 2001 and May 2003 were done at six stations on the Urupa River for the same basic chemistry measurements.

Methods

At each site, 50-100 L of water were collected from the river in the middle of the channel at 60 percent of the total depth using an electric pump. Water samples were taken from the middle of the river channel with a Niskin bottle. Aliquots of sample were filtered, stored in polyethylene bottles and preserved with thymol.

Ion concentrations:

Concentration of ions (Ca, Mg, Na, K, Cl and the soluble reactive form of the nutrient phosphate—PO4) were later determined in the laboratory by liquid chromatography, with a Dionex DX500. Electrical conductivity was measured in the field with an Amber Science portable meter, model 1481-61, and pH with Orion 250 A meter (Ballester et al., 2003).

Organic matter analyses:

At each site, 50–100 L of water were collected from the river in the middle of the channel at 60% of the total depth using an electric pump. The water sample was sieved (greater than 63 um) in order to separate the coarse suspended solid (CSS) fraction, which was immediately preserved with HgCl2, to a final concentration of 100 mM. The fine suspended solid (FSS) fraction (less than 63 um and greater than 0.1 um) and ultrafiltered dissolved organic matter (UDOM) fraction (less than 0.1 um and greater than 1000 daltons) were isolated in the laboratory with a Millipore tangential flow ultrafiltration system (model Pellicon-2; Millipore, Billerica, Massachusetts, USA), using membrane cartridges having a nominal 0.1-mm pore size (model Durapore VVPP; Millipore) and a 1000-daltons molecular weight nominal cut off (model PLAC; Millipore), respectively. After filtration, the material was roto-evaporated and then dried to constant mass in an oven, both at 508 degrees C. The average percentage recovery of organic matter in all samples during ultrafiltration was 98 plus or minus 8 percent, of which an average of 20 plus or minus 6 percent was recovered as UDOM, from both forested and pasture drainage areas (Bernardes et al., 2004).

Determination of Lignin-derived Phenols:

Lignin oxidation, elemental, and isotopic analysis Lignin analyses were made according to the CuO oxidation procedure of Hedges and Ertel (1982) as modified by Goni and Hedges (1990). Briefly, between 30 to 300 mg of dry sample was oxidized at 1558 degrees C for 3 h with CuO under basic (8 percent NaOH) conditions. The reaction solution was spiked with a nine-compound gas chromatography recovery standard mixture (in pyridine), acidified and extracted with diethyl ether. The lignin extract was diluted in pyridine, mixed with regisil plus an absolute recovery standard, and analyzed on a Hewlett Packard 5890 series II gas chromatograph (Agilent Technologies, Palo Alto, California, USA) fitted with a DB-1 fused-silica capillary column (J&W Scientific, Folsom, California, USA). Identities of all phenols were confirmed by mass spectrometry of selected samples vs. commercial standards (Bernardes et al., 2004).

Carbon and Nitrogen Concentrations:

Organic carbon and nitrogen concentrations were determined using a Carlo Erba CHN analyzer (Thermoquest, Rodano, Italy). Isotope measurements were performed with a Finnigan Delta-E mass spectrometer (ThermoFinnigan, Bremen, Germany) fitted with dual inlet and dual collector systems.

Basin characterization:

River sites and basin characteristics were calculated using the data sets compiled as layers in ArcInfo (ESRI, 1997) Geographical Information System (GIS)

and ERDASIMAGINE (Image Processing) software. To delineate subbasins boundaries of the sampling sites, a 50-m horizontal and vertical resolution Digital Elevation Model (DEM) and the river network were derived from 1:100,000 maps from the Brazilian Institute of Geography and Statistics (Ballester et al., 2003). Watershed boundaries were delineated using ArcInfo,GIS hydrological modeling tools. First, a depressionless DEM was produced by identifying and filling all sinks. Then, flow direction and accumulation were derived from this DEM, using the approach developed by Jenson and Domingues (1988). Finally, watersheds were delineated, assuming a minimum contributing area of 50 cells above a set of cells in a grid, or as the total area flowing to a given outlet (each sampling point in this case). The zonal statistic function of ArcInfo was used to calculate average values of ECEC and slope in the areas drained by each of the 14 river sectors.

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:

Ballester, M.V.R., D.D. Victoria, A.V. Krusche, R. Coburn, R.L. Victoria, J.E. Richey, M.G. Logsdon, E. Mayorga, and E. Matricardi. 2003. A remote sensing/GIS-based physical template to understand the biogeochemistry of the Ji-Parana river basin (Western Amazonia). Remote Sensing of Environment 87(4):429-445.

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ESRI (1997). Arc-Info version 7.3. Redlands, CA, USA: Environmental Systems Research Institute.

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Victoria, R. L., Richey, J. E., Bernardes, M., Ballester, M. V. R., Gomes, B. M., Krusche, A. V., and Mayorga, E. (2000). Effects of land use changes in the biogeochemistry of Ji-Parana river, a meso-scale river in the state of Rondonia, southern Amazon. Proceedings of the LBA Experiment in Amazonia First Scientific Conference, Belem, Para-Brazil, June 25-28.

Related Publications

- Aufdenkampe, A.K., J.I. Hedges, J.E. Richey, A.V. Krusche, and C.A. Llerena. 2001. Sorptive fractionation of dissolved organic nitrogen and amino acids onto fine sediments within the Amazon Basin. Limnology and Oceanography 46(8):1921-1935.
- Krusche, A.V., M.V.R. Ballester, R.L. Victoria, et al. 2005. Effects of land use changes in the biogeochemistry of fluvial systems of the Ji-Parana River Basin, Rondonia. Acta Amazonica 35(2):197-205.
- Richey, J.E., A.V. Krusche, L.A. Deegan, V.M. Ballester, T.W. Biggs, and R. Victoria. 2001. Land use changes and the biogeochemistry of river corridors in the Amazon. Global Change Newsletter 45:19-22.

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