LBA-ECO CD-32 Carbon, water and energy flux data, including estimates of photosynthesis, ecosystem respiration and canopy storage data, Brazilian Amazon: 1999-2006

1. Data Set Contents:

This dataset is a compilation of measurements of energy, carbon and water fluxes by the eddy covariance method, meteorological variables, CO2 concentration across a vertical profile, and soil water content. Original data from Brasil flux network sites were obtained for nine eddy covariance tower locations ranging from tropical forests to pastures to agricultural lands, and includes a cerrado and a seasonal-inundated ecotone -- all of them established by the Brazilian-led Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA-ECO). Data have been harmonized across sites and with additional quality control checks, values have been aggregated to hourly, daily, 16-day, and monthly timesteps. This dataset expands upon Version 1 of this compilation (Saleska et al., 2013) and LBA-DMIP meteorological forcing data (model drivers) (de Goncalves et al., 2013) and includes additional calculations of ecosystem respiration, gross ecosystem productivity, and canopy CO2 storage as published in Restrepo-Coupe et al., 2013. This integrated dataset is intended to facilitate comparative ecophysiological studies and data-model synthesis among other research applications.

From east to west and north to south, these sites are the Reserva Cuieiras near Manaus (K34 forest), the Tapajós National forest, near Santarém (K67 and K83 forests, and K77 pasture/agriculture), the Caxiuanã National forest near Belém (CAX forest), the Reserva Jarú (RJA forest) and Fazenda Nossa Senhora (FNS pasture), near Ji-Parana; the Tocantins-Javaes site (JAV seasonally flooded ecotone); and the Reserva Pe-de-Gigante in Sao Paulo state (PEG savanna). Time series periods from 1999-2006 vary among sites. See Restrepo-Coupe et al. (2013, 2017; 2021) for methods.

2. Related Data Sets:

LBA-ECO CD-32 Flux Tower Network Data Compilation, Brazilian Amazon: 1999-2006: https://daac.ornl.gov/LBA/guides/CD32_Brazil_Flux_Network.html

LBA-ECO CD-32 LBA Model Intercomparison Project (LBA-MIP) Meteorological Forcing Data: https://daac.ornl.gov/cgi-bin/dsviewer.pl?ds_id=1177

3. Title of Investigation:

NASA LBA-ECO CD32: Carbon balance in Amazon forests from site to region: integrating remote sensing from satellites and aircraft with ground-based tower and biometric data.

4. Future Modifications and Plans:

New sites and years may be added to the database. Additional quality control may be included. Updates to metadata.

5. Data Characteristics:

5.1. Study Area Descriptions

Site: Bananal_Island (BAN) also known as JAV
Tocantins State, Bananal forest-savanna ecotone seasonaly-inundated
Longitude: -50.159111 Degrees East Decimal
Latitude: -9.824417 Degrees North Decimal
Altitude: 120.000 m
Measurement Height: 40.0000 m

Site: Manaus km 34 (K34)
State of Amazonas, Manaus – km 34 primary forest site
Longitude: -60.209297 Degrees East Decimal
Latitude: -02.609097 Degrees North Decimal
Altitude: 130.000 m
Measurement Height: 50.0000 m

Site: Santarém km 67 (K67)
State of Pará, Santarem, BR-163 highway km67 primary forest site
Longitude: -54.958889 Degrees East Decimal

Latitude: -02.856667 Degrees North Decimal

Altitude: 130.000 m

Measurement Height: 63.0000 m

Site: Santarém km 77 (K77)

State of Pará, Santarem, BR-163 highway km77 pasture-agriculture site

Longitude: -54.536520 Degrees East Decimal

Latitude: -03.011896 Degrees North Decimal

Altitude: 130.000 m

Measurement Height: 18.0000 m

Site: Santarém km 83 (K83)

State of Pará, Santarem, BR-163 highway km 83 selectively logged primary forest

Longitude: -54.971435 Degrees East Decimal

Latitude: -03.018029 Degrees North Decimal

Altitude: 130.000 m

Measurement Height: 64.0000 m

Site: Caxiuana (CAX)

State of Pará, Caxiuana forest

Longitude: -51.4589833 Degrees East Decimal

Latitude: -1.719719444 Degrees North Decimal

Altitude: 130.000 m

Measurement Height: 51.5000 m

Site: Reserva Jarú (RJA)

Rondônia State, Reserva Jaru, tropical dry forest

Longitude: -61.930903 Degrees East Decimal

Latitude: -10.083194 Degrees North Decimal

Altitude: 191.000 m

Measurement Height: 60.0000 m

Site: Fazenda Nossa Senhora (FNS)

Rondônia State, Fazenda Nossa Senhora, pasture

Longitude: -62.357222 Degrees East Decimal

Latitude: -10.761806 Degrees North Decimal

Altitude: 306.000 m

Measurement Height: 8.5000 m

Site: Reserva Pe-de-Gigante (PEG)

São Paulo State, Reserva Pe-de-Gigante (PDG) cerrado

Longitude: -47.649889 Degrees East Decimal

Latitude: -21.619472 Degrees North Decimal

Altitude: 690.000 m

Measurement Height: 21.0000 m

5.2. Temporal Coverage:

The data files for each site are hourly, daily, daily day-time, daily nighttime, monthly, monthly day-time and monthly nighttime, as follows:

1. HOURLY data: SSS_Cflux_BF.dat (SSS is the unique 3-letter site code). Hour runs from 0 (zero) to 23. Data aggregation interval, i.e., data at 10:00 are from aggregating measurements between 10:00 and 11:00

2. DAILY data: SSSday_Cflux_BF.dat. Prec units (mm hr-1): as average

3. SEASONAL (16-day) data: SSSday16_Cflux_BF.dat. Prec units (mm hr-1): as average

4. MONTHLY data: SSSmonth_Cflux_BF.dat From daily data. Missing if less than 7 days of data, except prec. Prec units (mm day-1): as average

5.3. Time Coverage:

BAN: 24-Oct-03 to 8-Dec-06

CAX: 1-Jan-99 to 30-Jul-03

RJA: 23-Mar-99 to 14-Nov-02

K34: 14-Jun-99 to 30-Sep-06

FNS: 4-Feb-99 to 4-Nov-02

PDG: 1-Jan-04 to 31-Dec-06

K77: 1-Jan-00 to 30-Dec-05

K83: 29-Jun-00 to 12-Mar-04

K67: 2-Jan-02 to 23-Jan-06

5.4. Parameters or Variables:

ID	Variable	Units	Description
1	dateloc	NA	matlab time stamp (LOCAL TIME)
2	Year_LBAMIP	YYYY	Year (LOCAL TIME)
3	DoY_LBAMIP	JD	Julian day (LOCAL TIME)
4	Hour_LBAMIP	HR	Hour (LOCAL TIME)
5	Tair_LBAMIP	degK	Air temperature
6	Qair_LBAMIP	kg kg^{-1}	Specific humidity
7	Wind_LBAMIP	m s^{-1}	Wind speed
8	Rainf_LBAMIP	kg m^{-2} s^{-1}	Rainfall rate
9	PSurf_LBAMIP	Pa	Surface pressure
10	SWdown_LBAMIP	W m^{-2}	Incoming short wave
11	LWdown_LBAMIP	W m^{-2}	Incoming long wave
12	CO2air_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
13	GF_Tair_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
14	GF_Qair_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
15	GF_Wind_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
16	GF_Rainf_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data

17	GF_PSurf_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
18	GF_SWdown_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
19	GF_LWdown_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
20	GF_CO2air_LBAMIP	Logical	0-1, where flag = 1 indicates if filled data
21	ta	ºC	Air temperature
22	taed	ºC	Sonic temperature
23	wd	degrees	Wind direction cup anemometer
24	wded	degrees	Wind direction sonic anemometer
25	pressed	kPa	Pressure eddy covariance system
26	press	kPa	Pressure automatic weather station
27	rg	W m^{-2}	Global incident radiation
28	rr	W m^{-2}	Global reflected radiation
29	par	umol photons m^{-2} s^{-1}	Incoming photosynthetic active radiation
30	rpar	umol photons m^{-2} s^{-1}	Reflected photosynthetic active radiation
31	Rn	W m^{-2}	Net radiation
32	FG	W m^{-2}	Soil heat flux
33	wsed	m s^{-1}	Wind speed cup
34	ws	m s-1	Wind speed sonic
35	H	W m-2	Sensible heat flux
36	Hraw	W m-2	Sensible heat flux raw
37	LE	W m-2	Latent heat flux
38	LEraw	W m-2	Latent heat flux raw
39	Fc	umol CO_2 m^{-2} s^{-1}	CO_2 flux
40	Fcraw	umol CO_2 m^{-2} s^{-1}	CO_2 flux raw
41	co2	ppm	CO_2 concentration infrared gas analyzer (IRGA)
42	sco2	umol CO_2 m^{-2} s^{-1}	Storage flux
43	NEE	umol CO_2 m^{-2} s^{-1}	Net ecosystem exchange of CO_2 (forest NEE = Fc

			+ Sco_2)
44	NEEf	umol CO_2 m^{-2} s^{-1}	Filtered NEE
45	mrs	umol CO_2 m^{-2} s^{-1}	Soil respiration
46	ust	m s^{-1}	Friction velocity, u_*
47	rh	%	Relative humidity
48	prec	mm	Precipitation
49	h2o	mmol mol^{-1}	H_2O concentration infrared gas analyzer (IRGA)
50	Fh2o	mmols m^{-2} s^{-1}	Rate of vertical transfer of H_2O
51	U	m s^{-1}	Zonal wind cup anemometer
52	Ued	m s^{-1}	Zonal wind sonic anemometer
53	V	m s^{-1}	Meridional wind cup anemometer
54	Ved	m s^{-1}	Meridional wind sonic anemometer
55	ee	kPa	Vapor pressure
56	ees	kPa	Saturation vapor pressure
57	dpt	ºC	Dew point temperature
58	tsavg	ºC	Average soil temperature
59	eqtemp	ºC	Equivalent temperature
60	abshu	g m^{-3}	Absolute humidity
61	slopee	kPa $ºC^{-1}$	Slope of saturation vapor pressure
62	radtop	W m^{-2}	Hourly theoretical radiation
63	rgs	W m^{-2}	Short wave radiation incoming
64	rgsout	W m^{-2}	Short wave radiation reflected
65	rgl	W m^{-2}	Long wave radiation incoming
66	rglout	W m^{-2}	Short wave radiation reflected
67	stdW	m s^{-1}	Standard deviation vertical wind
68	ang	degrees	Rotation angle
69	Tau	kg m^{-2} s^{-1}	Rate of vertical transference of momentum
70	zl	--	Atmospheric stability parameter
71	tprof1	ºC	Canopy temperature profile
72	tprof2	ºC	Canopy temperature profile
73	tprof3	ºC	Canopy temperature profile
74	tprof4	ºC	Canopy temperature profile
75	tprof5	ºC	Canopy temperature profile

76	tprof6	ºC	Canopy temperature profile
77	tprof7	ºC	Canopy temperature profile
78	tprof8	ºC	Canopy temperature profile
79	tprof9	ºC	Canopy temperature profile
80	tprof10	ºC	Canopy temperature profile
81	avgprofT	ºC	Average temperature across canopy profile
82	msoil1	$m^3 m^{-3}$	Soil humidity profile
83	msoil2	$m^3 m^{-3}$	Soil humidity profile
84	msoil3	$m^3 m^{-3}$	Soil humidity profile
85	msoil4	$m^3 m^{-3}$	Soil humidity profile
86	msoil5	$m^3 m^{-3}$	Soil humidity profile
87	msoil6	$m^3 m^{-3}$	Soil humidity profile
88	msoil7	$m^3 m^{-3}$	Soil humidity profile
89	msoil8	$m^3 m^{-3}$	Soil humidity profile
90	msoil9	$m^3 m^{-3}$	Soil humidity profile
91	msoil10	$m^3 m^{-3}$	Soil humidity profile
92	totalteta	$m^3 m^{-3}$	Total H_2O across soil profile measurement
93	pco2_1	ppm	CO_2 concentration profile
94	pco2_2	ppm	CO_2 concentration profile
95	pco2_3	ppm	CO_2 concentration profile
96	pco2_4	ppm	CO_2 concentration profile
97	pco2_5	ppm	CO_2 concentration profile
98	pco2_6	ppm	CO_2 concentration profile
99	pco2_7	ppm	CO_2 concentration profile
100	pco2_8	ppm	CO_2 concentration profile
101	pco2_9	ppm	CO_2 concentration profile
102	pco2_10	ppm	CO_2 concentration profile
103	avgsto	ppm	Average CO2 storage across canopy profile
104	h2o_1	mmol mol^{-1}	H_2O concentration profile
105	h2o_2	mmol mol^{-1}	H_2O concentration profile
106	h2o_3	mmol mol^{-1}	H_2O concentration profile
107	h2o_4	mmol mol^{-1}	H_2O concentration profile
108	h2o_5	mmol mol^{-1}	H_2O concentration profile

109	h2o_6	mmol mol^{-1}	H_2O concentration profile
110	h2o_7	mmol mol^{-1}	H_2O concentration profile
111	h2o_8	mmol mol^{-1}	H_2O concentration profile
112	h2o_9	mmol mol^{-1}	H_2O concentration profile
113	h2o_10	mmol mol^{-1}	H_2O concentration across canopy profile
114	avgprofW	mmol mol^{-1}	Average H_2O profile
115	Wind1	m s^{-1}	Wind profile
116	Wind2	m s^{-1}	Wind profile
117	Wind3	m s^{-1}	Wind profile
118	Wind4	m s^{-1}	Wind profile
119	Wind5	m s^{-1}	Wind profile
120	Wavg	m s^{-1}	Average wind profile
121	tsoil1	ºC	Soil temperature profile
122	tsoil2	ºC	Soil temperature profile
123	tsoil3	ºC	Soil temperature profile
124	tsoil4	ºC	Soil temperature profile
125	tsoil5	ºC	Soil temperature profile
126	So	W m^{-2}	Top of the atmosphere radiation (TOA)
127	Re_5day	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration – 5day model: 5-20 day night-time average Fc, no Sco_2, no u_* correction
128	Re_5day_ust	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration 5day model: 5-20 day night-time average Fc corrected for low u_* conditions, no Sco_2
129	Re_5day_sco2	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. 5day model: 5-20 day night-time average NEE = Fc + Sco_2, no u_* correction
130	Re_5day_sco2_ust	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. 5day model: 5-20 day night-time average NEE = Fc + Sco_2, corrected for low u_* conditions
131	Re_5day_ust_min	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. 5day model: 5-20 day night-time average Fc corrected for low u_* lower bound, no Sco_2

132	Re_5day_ust_max	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. 5day model: 5-20 day night-time average Fc corrected for upper bound $u_{*, \text{no Sco2}}$
133	Re_5day_sco2_ust_min	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. 5day model: 5-20 day night-time average NEE = Fc + Sco_2, corrected for lower bound u_*
134	Re_5day_sco2_ust_max	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. 5day model: 5-20 day night-time average (derived using NEE = Fc + Sco_2, corrected for upper bound u_*)
135	Re_fourier_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using Fc, no u_* correction, no Sco_2
136	Re_fourier_ust_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using Fc u_* corrected, no Sco_2
137	Re_fourier_sco2_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using NEE = Fc + Sco_2, no u* corrected
138	Re_fourier_sco2_ust_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using NEE = Fc + Sco_2, u_* corrected
139	Re_fourier_ust_min_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using Fc corrected for u_* lower bound, no Sco_2
140	Re_fourier_ust_max_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) (derived using Fc, corrected for u_* upper bound, no Sco_2
141	Re_fourier_sco2_ust_min_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using NEE = Fc + Sco_2, corrected for u_* lower bound
142	Re_fourier_sco2_ust_max_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Fourier method: Re as in Richardson & Hollinger, (2005) derived using

			NEE = Fc + Sco_2, corrected for u_* upper bound
143	NEE_night	μmol CO_2 m-2 s-1	NEE: net ecosystem exchange. NEE= Fc + Sco_2, nighttime values used for Re calculations, no u_* corrected
144	Fc_night	μmol CO_2 m^{-2} s^{-1}	Fc: CO_2 flux. Nighttime values used for Re calculations, no u_* corrected
145	NEE_night_ust	μmol CO_2 m^{-2} s^{-1}	NEE: net ecosystem exchange. NEE = Fc + Sco_2, nighttime values used for Re calculations. NEE corrected for low u_* values
146	Fc_night_ust	μmol CO_2 m^{-2} s^{-1}	Fc: CO_2 flux. Nighttime values used for Re calculations, u_* corrected, no Sco_2
147	Re_5day_ust_Sco2_LUT	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Calculated using the 5day model: 5-20 day night-time average – derived using NEE=Fc+Sco_2. The Sco_2 filled using the LUT method. NEE corrected for low u_* values
148	Re_5day_ust_Sco2_IwataLIN	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Calculated by 5day model: 5-20 day night-time average – derived using NEE=Fc+Sco_2. The Sco_2 filled using Iwata et al. (2005) linear method. NEE corrected for low u_* values
149	Re_5day_ust_Sco2_IwataLN	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Calculated by 5day model: 5-20 day night-time average – derived using NEE=Fc+Sco_2. The Sco_2 filled using Iwata et al. (2005) natural logarithm method. NEE corrected for low u_* values
150	Re_5day_ust_Sco2_IwataPOL	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. NEE=Fc+Sco_2. The Sco_2 filled using Iwata et al. (2005) second degree polynomial method. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* values

151	Re_5day_ust_Sco2_EC	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. NEE=Fc+Sco_2. The Sco_2 filled using CO2 from the EC system. Re calculated by 5day model: 5-20 day night-time average. NEE corrected for low u_* values
152	Re_5day_ust_Sco2_DIEL	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. NEE=Fc+Sco_2. The Sco_2 filled using the Diel method. The Re calculated by 5day model: 5-20 day night-time average. NEE corrected for low u_* values
153	NEEnogap_5day_ust_Sco2_LUT	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange. NEE=Fc+Sco_2. The Sco_2 filled using the LUT method. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u* values
154	NEEnogap_5day_ust_Sco2_IwataLIN	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange. NEE=Fc+Sco_2. The Sco2 filled using Iwata et al. (2005) linear method. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* values
155	NEEnogap_5day_ust_Sco2_IwataLN	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange. NEE=Fc+Sco_2. The Sco_2 filled using Iwata et al. (2005) natural logarithm method. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* values
156	NEEnogap_5day_ust_Sco2_IwataPOL	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange. NEE=Fc+Sco_2. The Sco_2 filled using Iwata et al. (2005) second degree polynomial method. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* values
157	NEEnogap_5day_ust_Sco2_EC	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange. NEE=Fc+Sco_2. The Sco_2 filled using CO_2 from the EC system. Re calculated by the 5day model:

			5-20 day night-time average. NEE corrected for low u_* values
158	NEEnogap_5day_ust_Sco2_DIEL	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange. NEE=Fc+Sco_2. The Sco_2 filled using the Diel method. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* values
159	GEP_5day_sco2_ust	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. NEE u_* corrected. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* values
160	GEP_5day_sco2_ust_max	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. NEE u_* lower bound corrected. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* upper bound values
161	GEP_5day_sco2_ust_min	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Re calculated by the 5day model: 5-20 day night-time average. NEE corrected for low u_* lower bound values
162	GEP_5day_ust	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Re calculated by the 5day model: 5-20 day night-time average. Fc corrected for low u_* (no Sco_2)
163	GEP_5day_ust_max	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Re calculated by the 5day model: 5-20 day night-time average. Fc corrected for low u_* upper bound (no Sco_2)
164	GEP_5day_ust_min	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Re calculated by the 5day model: 5-20 day night-time average. Fc corrected low u_* lower bound (no Sco_2)
165	GEP_5day_sco2	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Re calculated by the 5day model: 5-20 day night-time average. Derived using NEE = Fc + Sco_2, no u_* correction
166	GEP_5day	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Re calculated

			by the 5day model: 5-20 day night-time average. Derived using Fc no u_* correction (no Sco_2)
167	GEP_5day_sco2_ust_hyperbola	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Filled using the light response curve. Re calculated by the 5day model: 5-20 day night-time average. Derived using NEE = Fc + Sco_2, corrected for u_*
168	GEP_5day_sco2_ust_hyperbola	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Filled using the light response curve. Re calculated by the 5day model: 5-20 day night-time average. Derived using NEE = Fc + Sco_2, corrected for low u* values
169	GEP_5day_ust_hyperbola	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Filled using the light response curve. Re calculated by the 5day model: 5-20 day night-time average. Derived using Fc u_* corrected (no Sco_2)
170	GEP_5day_sco2_hyperbola	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Filled using the light response curve. Re calculated by the 5day model: 5-20 day night-time average. Derived using NEE = Fc + Sco_2 no u_* correction
171	GEP_5day_hyperbola	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Filled using the light response curve. Re calculated by the 5day model: 5-20 day night-time average. Derived using Fc, no u_* correction, no Sco_2
172	NEE_spike5_free	µmol CO_2 m^{-2} s^{-1}	NEE: net ecosystem exchange. NEE spike free (m=5) as in Papale et al. (2006)
173	NEEnogap_5day_sco2_ust	µmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange u_* corrected NEE = Fc + Sco_2, u_* corrected. Nighttime NEE = Re calculated by the 5day model: 5-20 day night-time average. Daytime GEP filled using the light response curve and Re
174	NEEnogap_5day	µmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange u_* corrected

	_ust		Fc (no Sco_2). Nighttime NEE = Re calculated by the 5day model: 5-20 day night-time average. Daytime GEP filled using the light response curve and Re
175	NEEnogap_5day _sco2	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange NEE = Fc + Sco_2 no u_* corrected.. Nighttime NEE = Re calculated by the 5day model: 5-20 day night-time average. Daytime GEP filled using the light response curve and Re
176	NEEnogap_5day	μmol CO_2 m^{-2} s^{-1}	Filled NEE: net ecosystem exchange assumed Fc, no Sco_2 , no u_* corrected. Nighttime NEE = Re calculated by the 5day model: 5-20 day night-time average. Daytime GEP filled using the light response curve and Re
177	Sco2_LUT	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux filled using the look up table (LUT) method
178	Sco2_IwataLIN	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux filled using the Iwata et al. (2005) linear method
179	Sco2_IwataLN	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux filled using the Iwata et al. (2005) natural logarithm method
180	Sco2_IwataPOL	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux filled using the Iwata et al. (2005) second degree polynomial method
181	Sco2_EC	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux filled using the CO_2 from the eddy covariance system
182	Sco2_DIEL	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux filled using the Diel method
183	Fc_spike7_free	μmol CO_2 m^{-2} s^{-1}	Fc: CO_2 flux spike free (m=7) as in Papale et al. (2006)
184	Sco2	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux
185	GEP_5day_ust_ Sco2_LUT	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Derived using NEE=Fc+Sco_2 corrected for low u_*. The Sco_2 filled using the look up table (LUT) method. The Re calculated by the 5day model: 5-20 day night-

			time average
186	GEP_5day_ust_ Sco2_IwataLIN	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Derived using NEE=Fc+Sco_2 corrected for low u_*. The Sco_2 filled using Iwata et al. (2005) linear method. The Re calculated by the 5day model: 5-20 day night-time average
187	GEP_5day_ust_ Sco2_IwataLN	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Derived using NEE=Fc+Sco_2 corrected for low u_*. The Sco_2 filled using Iwata et al. (2005) natural logarithm method. The Re calculated by the 5day model: 5-20 day night-time average
188	GEP_5day_ust_ Sco2_IwataPOL	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Derived using NEE=Fc+Sco2 corrected for low u_*. The Sco_2 filled using Iwata et al. (2005) second degree polynomial method. The Re calculated by the 5day model: 5-20 day night-time average
189	GEP_5day_ust_ Sco2_EC	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Derived using NEE=Fc+Sco_2 corrected for low u_*. The Sco_2 filled using CO_2 from the EC system. The Re calculated by the 5day model: 5-20 day night-time average
190	GEP_5day_ust_ Sco2_DIEL	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. NEE=Fc+Sco_2 corrected for low u_*. The Sco_2 filled using the Diel method. The Re calculated by the 5day model: 5-20 day night-time average
191	GEP_5day_ust_ Sco2_UST	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. NEE=Fc+Sco_2 corrected for low u_*. The Sco_2 filled using the u_* method. The Re calculated by the 5day model: 5-20 day night-time average
192	GEP_5day_ust_ Sco2_REG	µmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. NEE=Fc+Sco_2 corrected for low u_*. The Sco_2

			filled using Regression method. The Re calculated by the 5day model: 5-20 day night-time average
193	GEP_model	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected, Re based on the 5day model
194	GEPmodel_ust_max	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected for upper bound.
195	GEPmodel_ust_min	μmol CO_2 m^{-2} s^{-1}	GEP: gross ecosystem productivity. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected for lower bound.
196	Re_model	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected, Re based on the 5day model.
197	Remodel_ust_max	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected for lower bound.
198	Remodel_ust_min	μmol CO_2 m^{-2} s^{-1}	Re: ecosystem respiration. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected for lower bound.
199	Sco2_model	μmol CO_2 m^{-2} s^{-1}	Sco_2: storage flux. Selected for analysis. Method varies at each site. Refer to Restrepo-Coupe et al. (2013) for details
200	NEE_model_ust_max	μmol CO_2 m^{-2} s^{-1}	NEE: net ecosystem exchange. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected for upper bound
201	NEE_model_ust_min	μmol CO_2 m^{-2} s^{-1}	NEE: net ecosystem exchange. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected for lower bound
202	NEE_model	μmol CO_2 m^{-2} s^{-1}	NEE: net ecosystem exchange. Selected for analysis, when needed Sco_2 filled by site-specific method, u_* corrected

203	par_fill	µmol CO_2 m^{-2} s^{-1}	PAR: photosynthetic active radiation – filled
204	Pc	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity. GEP at PAR>725 and PAR<925 µmol m^{-2} s^{-1}
205	Pc_GEPfill	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity. Selected for analysis, derived from filled GEP at PAR>725 and PAR<925 µmol m^{-2} s^{-1}.
206	Pc_AM	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity morning. GEP at PAR>725 and PAR<925 µmol m^{-2} s^{-1}
207	Pc_PM	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity afternoon. GEP at PAR>725 and PAR<925 µmol m^{-2} s^{-1}
215	Pcatmed.VPD	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity at VPD values 1-2 kPa and PAR>725 and PAR<925 µmol m^{-2} s^{-1}
214	PcatlowVPD	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity at VPD values 0-1 kPa and PAR>725 and PAR<925 µmol m^{-2} s^{-1}
216	PcathighVPDvalues	µmol CO_2 m^{-2} s^{-1}	Pc: photosynthetic capacity at high VPD values 2-3 kPa and PAR>725 and PAR<925 µmol m^{-2} s^{-1}
217	VPD	kPa	Vapor pressure deficit

Missing Value: -9999.00

5.5. Data Organization

SSS_Cflux_BF.dat = the base file in each of these archives (with the hourly data)
(SSS is the unique 3-letter site code = the second 3 letters in the archive file)
ASCII format file sample for PEG (Pe-de-Gigante):

6. Application and Derivation:

This data set is an assimilation of eddy flux data that was independently produced and generously provided by the PIs of a variety of tower projects in the Amazon of Brazil. This integrated data set is intended to facilitate integrative studies and data-model synthesis from a common reference point.

Please note that the availability of this common data set notwithstanding, the LBA data sharing policy (http://www.lbaeco.org/lbaeco/data/data_poldoc.htm) still requires any author or presenter of this data to contact and appropriately credit PIs from individual projects that generated the data used. The necessary contact information and references (in brackets) are supplied in the table below.

Site ID	**PI (includes references)**
K34:	Manzi, A., Nobre, A. (INPA, Brazil) (Araújo et al., 2002)
CAX:	da Costa (Universidade Federal do Pará, Brazil), Malhi, Y. (University of Oxford) (Souza Filho et al., 2005)
K67:	Wofsy, S. (Harvard University, USA), Saleska, S. (University of Arizona, USA), Camargo, A. CENA/University of São Paulo, Brazil). (Hutyra et al., 2007; Saleska et al., 2003)
K83:	Goulden M. (University of California Irvine, USA), Miller, S. (The State University of New York, Albany, USA), da Rocha, H. (USP, Brazil). (da Rocha et al., 2004; Goulden et al., 2004; Miller et al., 2004)
K77:	Fitzjarrald, D. (The State University of New York, Albany , USA) (Sakai et al., 2004)
RJA:	Manzi, A. (INPA, Brasil), Cardoso, F. (UFR, Brazil) (Kruijt et al., 2004; von Randow et al., 2004)
FNS:	Waterloo, M.(Vrije Universiteit Amsterdam, The Netherlands), Manzi, A. (INPA, Brazil) (von Randow et al., 2004)
JAV:	da Rocha, H. (University of São Paulo, Brazil) (Borma et al., 2009)
PEG:	da Rocha, H. (University of São Paulo, Brazil) (Cabral et al., 2015)

For site-specific measurement instrumentation see site specific references and other metadata data (ftp://lbaworking.daac.ornl.gov/lba/carbon_dynamics/ CD32_Brasil_flux_network/comp)

7. Quality Assessment:

See the following references for details:

Saleska, S.R., H.R. da Rocha, A.R. Huete, A.D. Nobre, P. Artaxo, and Y.E. Shimabukuro. 2013. LBA-ECO CD-32 Flux Tower Network Data Compilation, Brazilian

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de Goncalves, L.G.G., N. Restrepo-Coupe, H.R. da Rocha, S.R. Saleska, and R. Stockli. 2013. LBA-ECO CD-32 LBA Model Intercomparison Project (LBA-MIP) Meteorological Forcing Data. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA http://dx.doi.org/10.3334/ORNLDAAC/1177

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8. Acquisition Materials and Methods:

Post-processed data (MATLAB R2007b code – University of Arizona)

9. Data Access:

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

10. References:

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