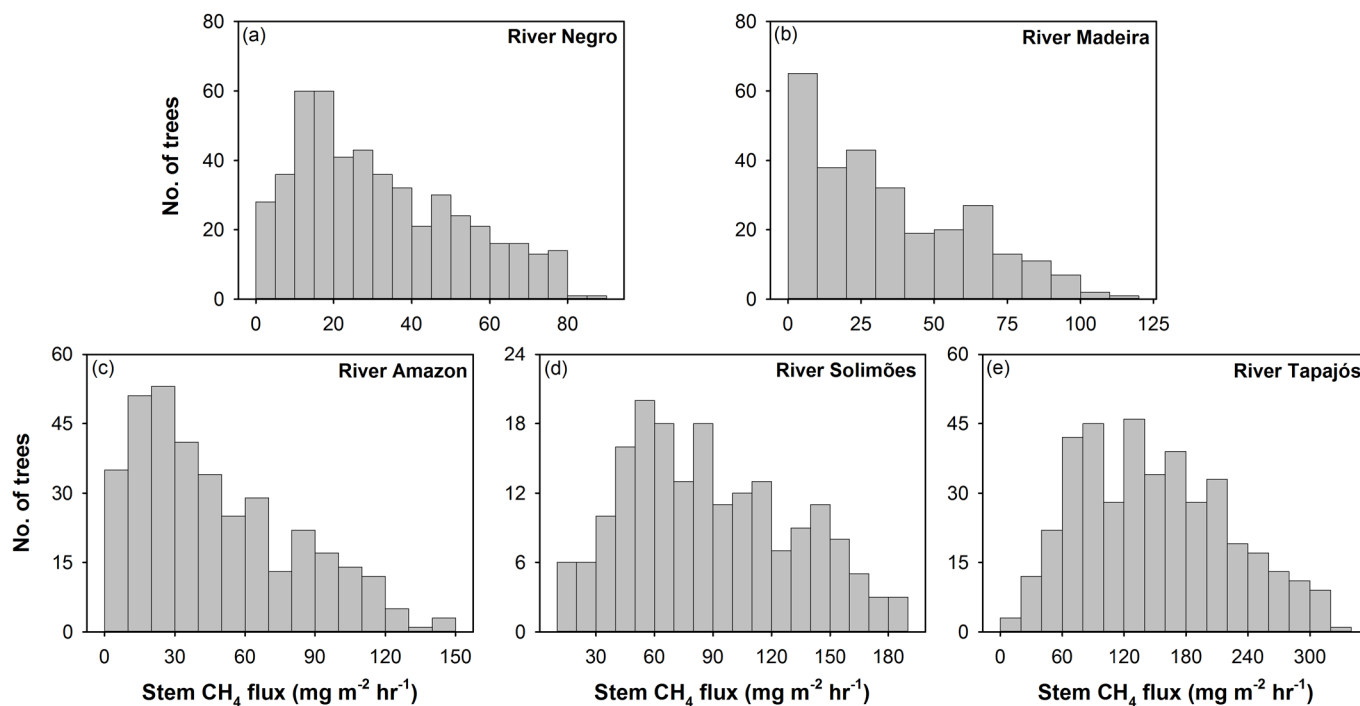


Supplementary Figure 1 Photographs depicting one of the study sites, a typically inundated flooded forest (a), soil flux (b), mature tree stem flux (c) and aquatic flux (d) measurements.



Supplementary Figure 2 Frequency distribution of stem CH_4 fluxes from 20-50 cm of stem height from mature trees measured from river a) Negro, b) Madeira, c) Amazon, d) Solimões and e) Tapajós.

Table 1 Additional information for all sampling sites (50 × 80 m) in this study.

Id	Location (Latitude/longitude)	River	Water type	Water season	Water table depth range (m)	No. of mature trees	No. of young trees
S1	3°19' 40.8"S; 60°42' 39.2"W 3°19' 42.3"S; 60°42' 43.3"W	Solimões	White water	High	-0.95 to 9.5	445	275
S2	3°24' 37.1"S; 60°14' 45.6"W 3°24' 42.8"S; 60°14' 31.4"W	Solimões	White water	High	-1 to 8.5	436	244
N3	2°49' 25.9"S; 60°28' 22.4"W	Negro	Black water	High	-1 to 9.5	436	198
N4	2°37' 41.6"S; 60°48' 41.6"W	Negro	Black water	High	-1 to 9.2	424	240
N5	2°30' 37.9"S; 60°46' 16.8"W	Negro	Black water	High	-0.94 to 8.2	439	231
N6	2°48' 58.5"S; 60°45' 53"W	Negro	Black water	High	-1 to 8.2	425	234
A7	2°20' 18.9"S; 57°35' 7.8"W	Amazon	White water	High	-1 to 7.5	390	199
A8	2°12' 21.4"S; 55°6' 14.6"W	Amazon	White water	High	-1 to 7	370	54
A9	2°31' 26.4"S; 54°32' 3.6"W 2°31' 58.8"S; 54°32' 47.3"W	Amazon	White water	High	-0.99 to 7.1	292	67
T10	2°28' 53.9"S; 54°58' 22.7"W 2°28' 40.5"S; 54°58' 20.1"W 2°28' 56.3"S; 54°58' 21"W 2°28' 29.6"S; 54°58' 12.2"W	Tapajós	Clear water	High	-1 to 6.5	361	173
T11	2°57' 47.4"S; 55°5' 10.8"W	Tapajós	Clear water	High	-1 to 5.4	370	197
T12	2°15' 51.7"S; 54°50' 2.3"W 2°15' 47.4"S; 54°50' 10.8"W	Tapajós	Clear water	High	-1 to 8.1	322	49
M13	8°1' 1"S; 63°5' 1"W	Madeira	White water	Falling	-1 to 0	520	246

Table 2 Tree species identified within our 13 plots across the central Amazon basin.

Family ^a	Genus	Species
Anacardiaceae	<i>Spondias</i>	<i>mombin</i> L.
Boraginaceae	<i>Cordia</i>	<i>nodosa</i> Lam.
Burseraceae	<i>Protium</i>	<i>heptaphyllum</i> (Aubl.) March.
Celastraceae	<i>Maytenus</i>	<i>guianensis</i> Klotzsch
Chrysobalanaceae	<i>Licania</i>	<i>heteromorpha</i> Benth.
Combretaceae	<i>Buchenavia</i>	<i>grandis</i> Ducke
Combretaceae	<i>Terminalia</i>	<i>amazonica</i> (J.F.Gmel.) Exell
Euphorbiaceae	<i>Hevea</i>	<i>brasiliensis</i> (Willd. ex A.Juss.) Müll.Arg.
Fabaceae	<i>Albizia</i>	<i>inundata</i> (Mart.) Barneby & J.W. Grimes
Fabaceae	<i>Albizia</i>	<i>Lebbeck</i> (L.) Benth.
Fabaceae	<i>Bowdichia</i>	<i>virgilioides</i> Kunth
Fabaceae	<i>Cassia</i>	<i>leiandra</i> Benth.
Fabaceae	<i>Dinizia</i>	<i>excelsa</i> Ducke
Fabaceae	<i>Macrolobium</i>	<i>acacifolium</i> (Benth) Benth.
Fabaceae	<i>Parkia</i>	<i>multijuga</i> Benth.
Fabaceae	<i>Peltogyne</i>	<i>venosa</i> (Valh) Benth.
Fabaceae	<i>Sclerolobium</i>	<i>paniculatum</i> Vogel
Goupiaceae	<i>Goupia</i>	<i>glabra</i> Aubl.
Lecythidaceae	<i>Cariniana</i>	<i>micrantha</i> Ducke
Lecythidaceae	<i>Eschweilera</i>	<i>coriacea</i> (DC.) S.A.Mori
Malvaceae	<i>Pseudobombax</i>	<i>munguba</i> (Mart.) Dugand
Monimiaceae	<i>Hennecartia</i>	<i>omphalandra</i> J. Poiss.
Moraceae	<i>Brosimum</i>	<i>acutifolium</i>
Moraceae	<i>Brosimum</i>	<i>rubescens</i> Taub.
Moraceae	<i>Clarisia</i>	<i>racemosa</i> Ruiz & Pav.
Myristicaceae	<i>Osteophloeum</i>	<i>platyspermum</i> (Spruce ex A.DC.) Warb.
Rubiaceae	<i>Genipa</i>	<i>americana</i> L.
Salicaceae	<i>Casearia</i>	<i>arborea</i> (Rich.) Urb.
Salicaceae	<i>Laetia</i>	<i>corymbulosa</i> Spruce ex Benth.
Sapotaceae	<i>Pouteria</i>	<i>caimito</i> (Ruiz & Pav.) Radlk.
Simaroubaceae	<i>Simarouba</i>	<i>amara</i> Aubl.
Urticaceae	<i>Cecropia</i>	<i>latiloba</i> Miq.
Violaceae	<i>Amphirrhox</i>	<i>longifolia</i> (A.St.-Hil.) Spreng.
Annonaceae	<i>Guatteria</i>	<i>sp.</i>
Apocynaceae	<i>Lacmellea</i>	<i>sp.</i>
Bignoniaceae	<i>Handroanthus</i>	<i>sp.</i>
Boraginaceae	<i>Cordia</i>	<i>sp.</i>
Burseraceae	<i>Protium</i>	<i>sp.</i>
Clusiaceae	<i>Caraipa</i>	<i>sp.</i>
Clusiaceae	<i>Clusia</i>	<i>sp.</i>
Clusiaceae	<i>Garcinia</i>	<i>sp.</i>
Erythroxylaceae	<i>Erythroxylum</i>	<i>sp.</i>
Euphorbiaceae	<i>Alchornea</i>	<i>sp.</i>
Euphorbiaceae	<i>Croton</i>	<i>sp.</i>
Euphorbiaceae	<i>Hevea</i>	<i>sp.</i>

Euphorbiaceae	<i>Sapium</i>	<i>sp.</i>
Euphorbiaceae	<i>Tetrorchidium</i>	<i>sp.</i>
Fabaceae	<i>Hymenaea</i>	<i>sp.</i>
Fabaceae	<i>Inga</i>	<i>sp.</i>
Fabaceae	<i>Macarobium</i>	<i>sp.</i>
Fabaceae	<i>Parkia</i>	<i>sp.</i>
Fabaceae	<i>Peltogyne</i>	<i>sp.</i>
Fabaceae	<i>Swartzia</i>	<i>sp.</i>
Lauraceae	<i>Ocotea</i>	<i>sp.</i>
Lecythidaceae	<i>Eschweilera</i>	<i>sp.</i>
Lecythidaceae	<i>Lechytis</i>	<i>sp.</i>
Malpighiaceae	<i>Acmanthera</i>	<i>sp.</i>
Malvaceae	<i>Luehea</i>	<i>sp.</i>
Malvaceae	<i>Mollia</i>	<i>sp.</i>
Meliaceae	<i>Cedrela</i>	<i>sp.</i>
Nyctaginaceae	<i>Guapira</i>	<i>sp.</i>
Olacaceae	<i>Heisteria</i>	<i>sp.</i>
Rubiaceae	<i>Cuviera</i>	<i>sp.</i>
Rutaceae	<i>Zanthoxylum</i>	<i>sp.</i>
Salicaceae	<i>Casearia</i>	<i>sp.</i>
Sapindaceae	<i>Cupania</i>	<i>sp.</i>
Sapotaceae	<i>Micropholis</i>	<i>sp.</i>
Sapotaceae	<i>Pouteria</i>	<i>sp.</i>
Urticaceae	<i>Cecropia</i>	<i>sp.</i>
Violaceae	<i>Amphirrhox</i>	<i>sp.</i>
Vochysiaceae	<i>Qualea</i>	<i>sp.</i>
Annonaceae	-	-
Arecaceae	-	-
Bignoniaceae	-	-
Burseraceae	-	-
Erythroxylaceae	-	-
Euphorbiaceae	-	-
Fabaceae	-	-
Lecythidaceae	-	-
Meliaceae	-	-
Moraceae	-	-
Myrsinaceae	-	-
Ochnaceae	-	-
Quiinaceae	-	-
Rubiaceae	-	-
Rutaceae	-	-
Sapotaceae	-	-

^a Out of the 2357 trees investigated, only 40% of the tree species could be identified, with some trees only up to genus level.

Table 3 Surface area (m²) used to estimate ecosystem contributions from all CH₄ emitting pathways in each sampling plot.

Id	River	Water season	M_tree stem surface area ^a	M_tree stem surface area ^b	Y_tree stem surface area ^c	Y_tree stem surface area ^d	Y_tree Leaf area	Tree basal area (M + Y)	Soil surface area	Aquatic surface area	Macrophyte surface area
S1	Solimões	High	532	774	36.1	39.1	3768	48	409	3071	472
S2	Solimões	High	364	502	32.7	33.2	4050	21.7	426	3352	200
N3	Negro	High	310	434	26.8	27.9	3010	17.2	993	2990	0
N4	Negro	High	372	542	31.5	32.8	3480	29.2	1009	2962	0
N5	Negro	High	426	613	31.1	33.4	3627	32.2	1064	2904	0
N6	Negro	High	330	477	29.1	30.3	3487	17.2	1608	2375	0
A7	Amazon	High	405	589	25.9	27.0	3085	32.2	1138	2712	118
A8	Amazon ^e	High	318	457	7.7	7.5	3851	16.6	0	3593	390
A9	Amazon ^e	High	271	361	9.5	9.6	3598	17.1	0	3190	793
T10	Tapajós	High	498	716	21.8	23.2	2906	49.2	1293	2454	204
T11	Tapajós	High	462	666	26.2	28	3073	42.4	1149	2180	629
T12	Tapajós ^e	High	367	547	6.9	7.4	3119	26.2	0	3571	403
M13	Madeira	Falling	503	669	34.4	35.1	4059	46.4	3043	950	0

^a Surface area of mature trees between 0 and 140 cm above the soil surface; ^b Surface area of mature trees 0–5 m (maximum) above the soil surface estimated using the relationship established between stem CH₄ flux and stem height intervals between 0 and 140 cm; ^c Surface area of young trees between 0 and 135 cm above the soil surface; ^d Surface area of young trees up to 1.85 m of stem height estimated using the relationship between stem CH₄ flux and stem height intervals; ^e The study sites were fully flooded with no raised hummocks or exposed soil.

Table 4 Coefficient of variation (%) for surface areas used in the ecosystem contribution estimations.

River	M_tree stem surface area ^a	M_tree stem surface area ^b	Y_tree stem surface area ^c	Y_tree stem surface area ^d	Tree basal area	Aquatic surface area	Soil surface area	Macrophyte surface area
Negro (<i>n</i> = 4)	44.7	49.8	22.8	24.7	55.2	10.3	25.2	-
Madeira (<i>n</i> = 3)	35	38.6	20.5	20.4	38.3	42.8	38.4	-
Amazon (<i>n</i> = 3)	40.5	45	24.7	25.7	55.9	13.9	173	78.3
Solimões (<i>n</i> = 2)	47.9	52.6	25.7	25.8	58.8	9.2	5.2	39.5
Tapajós (<i>n</i> = 3)	44.9	48.3	27.2	28	55.1	27	87.1	92.7

^a Surface area of mature trees between 0 and 140 cm above the soil surface; ^b Surface area of mature trees 0-5 m (maximum) above the soil surface estimated using the relationship established between stem CH₄ flux and stem height intervals between 0 and 140 cm; ^c Surface area of young trees between 0 and 135 cm above the soil surface; ^d Surface area of young trees up to 1.85 m of stem height estimated using the relationship between stem CH₄ flux and stem height intervals.

Table 5 Estimated surface areas for the entire lowland Amazon basin (km²)^a.

Months	Flooded Forest	Aquatic surfaces	Macrophytes	Soil surfaces	Open water
January	177,080	169,951	77,491	286,621	65,484
February	221,231	214,102	88,469	242,470	50,444
March	280,666	273,537	97,778	183,035	56,408
April	361,137	354,009	110,610	102,563	66,233
May	441,200	434,072	120,200	22,501	73,200
June	463,701	456,572	107,604	0	70,452
July	368,669	361,541	110,352	95,031	76,307
August	273,229	266,101	103,583	190,472	73,313
September	311,571	304,442	74,362	152,130	78,360
October	176,100	168,972	56,982	287,601	56,300
November	198,781	191,652	52,800	264,920	45,528
December	136,342	129,214	66,958	327,359	54,978

^a Surface areas estimated for the entire lowland Amazon basin using Melack *et al.*³⁴ and Hess *et al.*²² as described under methods section.