Supplementary Information

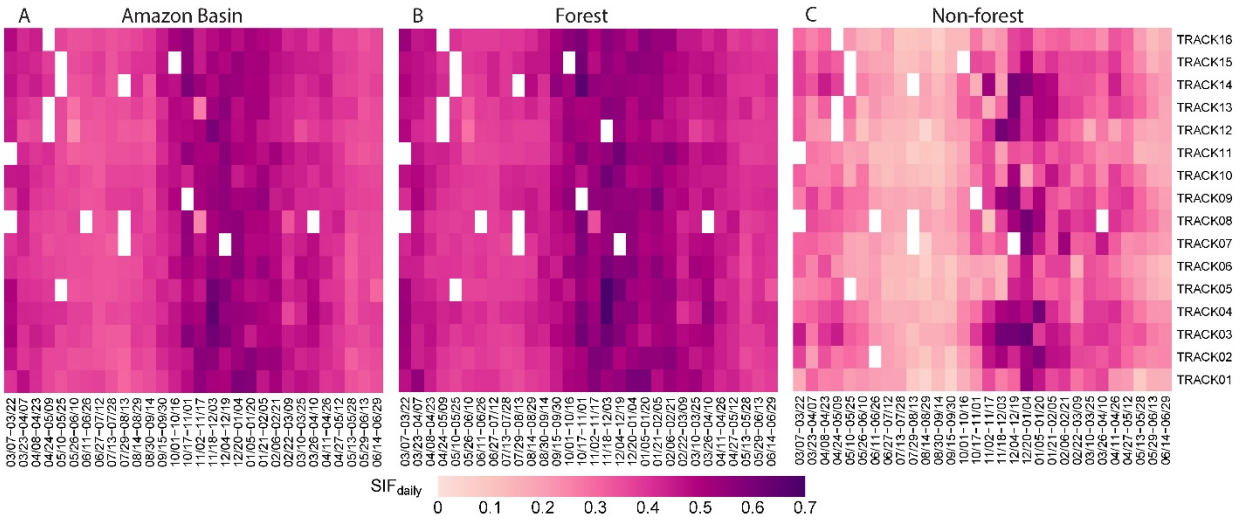

Fig. S1 | Basin-wide mean daily SIF from TROPOMI March 2018 – June 2019. (A) The entire Amazon Basin. (B) All soundings in forests. (C) All soundings in non-forest. Soundings with footprints in water were masked out. Changes in mean daily and instantaneous SIF for the Amazon Basin, forest, and non-forest are further illustrated in figs. S2-4, and the standard errors of the means of the observations are listed in tables S1-S3.

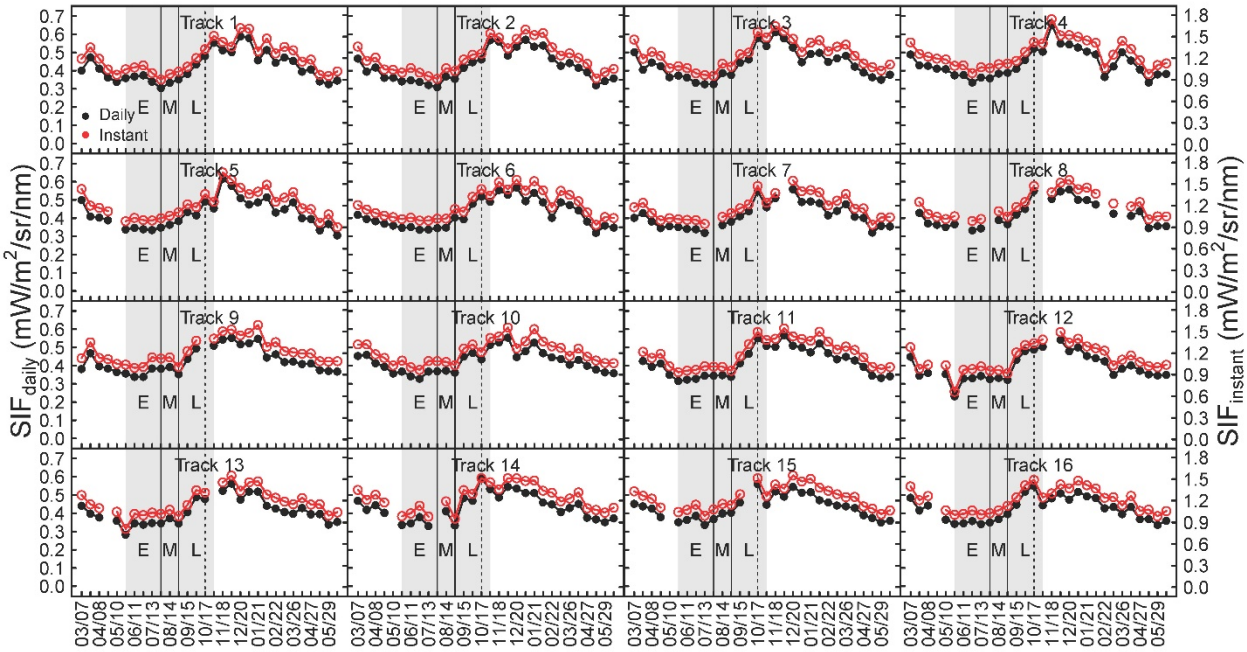

Fig. S2 | Amazon Basin mean daily and instantaneous SIF for each of TROPOMI's tracks. Areas shaded in gray represent the early (E), mid (M), and late (L) dry seasons. The dashed line approximates when TROPOMI's phase angles are lowest. Dates represent the first day of TROPOMI's 16-day revisit cycle. Tick marks are every 16 days and labels are every 32 days. The complete date range represented is March 7, 2018 – June 29, 2019.

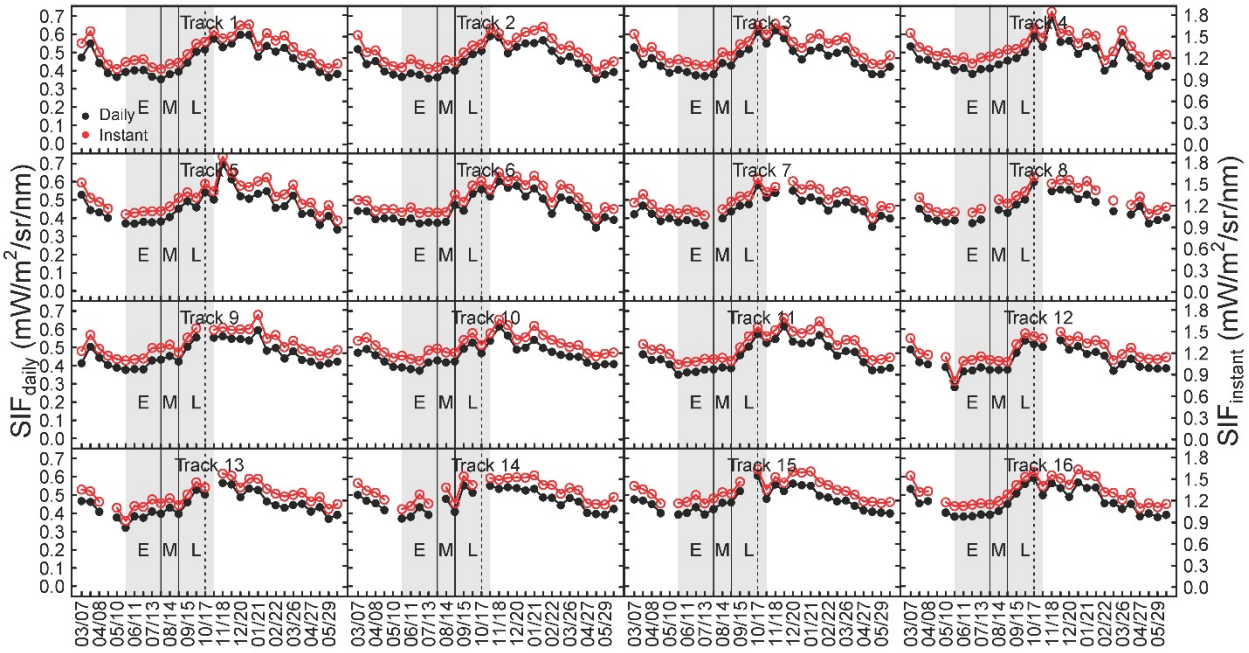

Fig. S3 | Forest mean daily and instantaneous SIF for each of TROPOMI's tracks. Areas shaded in gray represent the early (E), mid (M), and late (L) dry seasons. The dashed line approximates when TROPOMI's phase angles are lowest. Dates represent the first day of TROPOMI's 16-day revisit cycle. Tick marks are every 16 days and labels are every 32 days. The complete date range represented is March 7, 2018 – June 29, 2019.

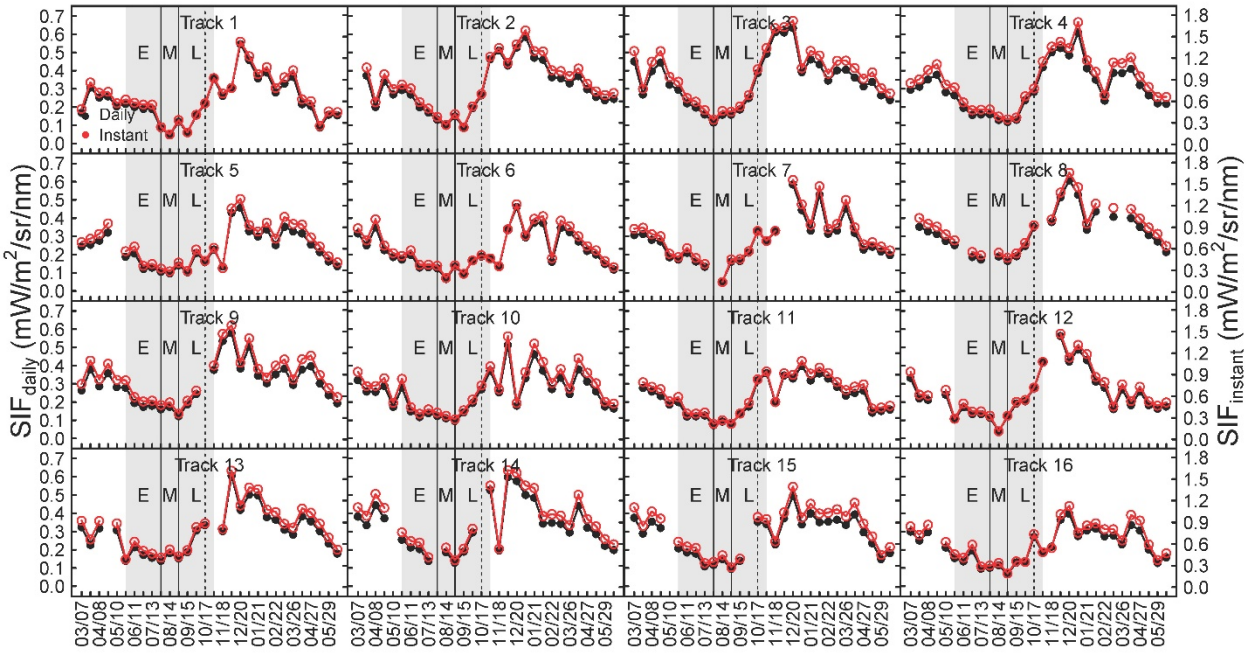

Fig. S4 | Non-forest mean daily and instantaneous SIF for each of TROPOMI's tracks. Areas shaded in gray represent the early (E), mid (M), and late (L) dry seasons. The dashed line approximates when TROPOMI's phase angles are lowest. Dates represent the first day of

TROPOMI's 16-day revisit cycle. Tick marks are every 16 days and labels are every 32 days. The complete date range represented is March 7, 2018 – June 29, 2019.

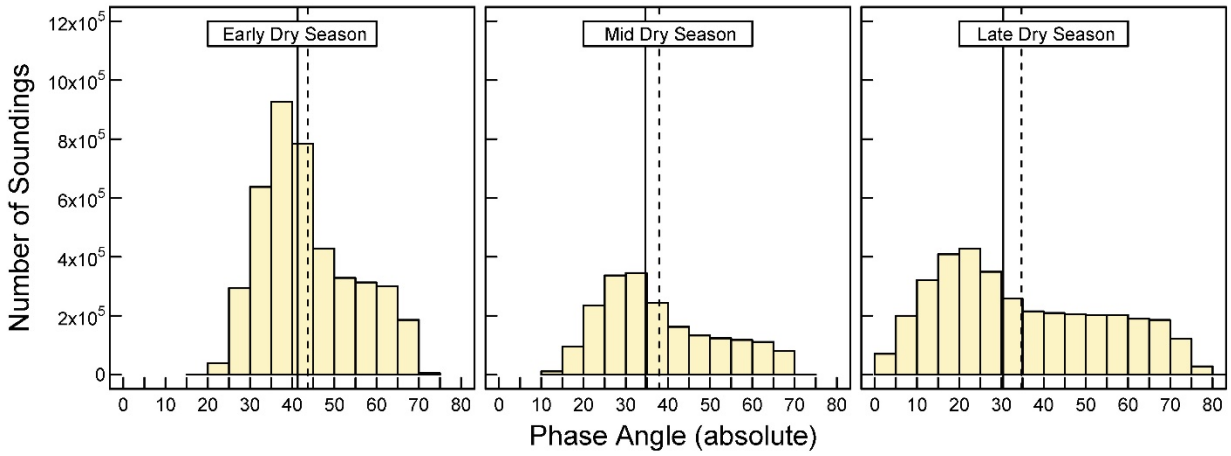

Fig. S5 | The distribution of the phase angle of TROPOMI soundings in early, mid, and late dry season. Dashed line is the mean.

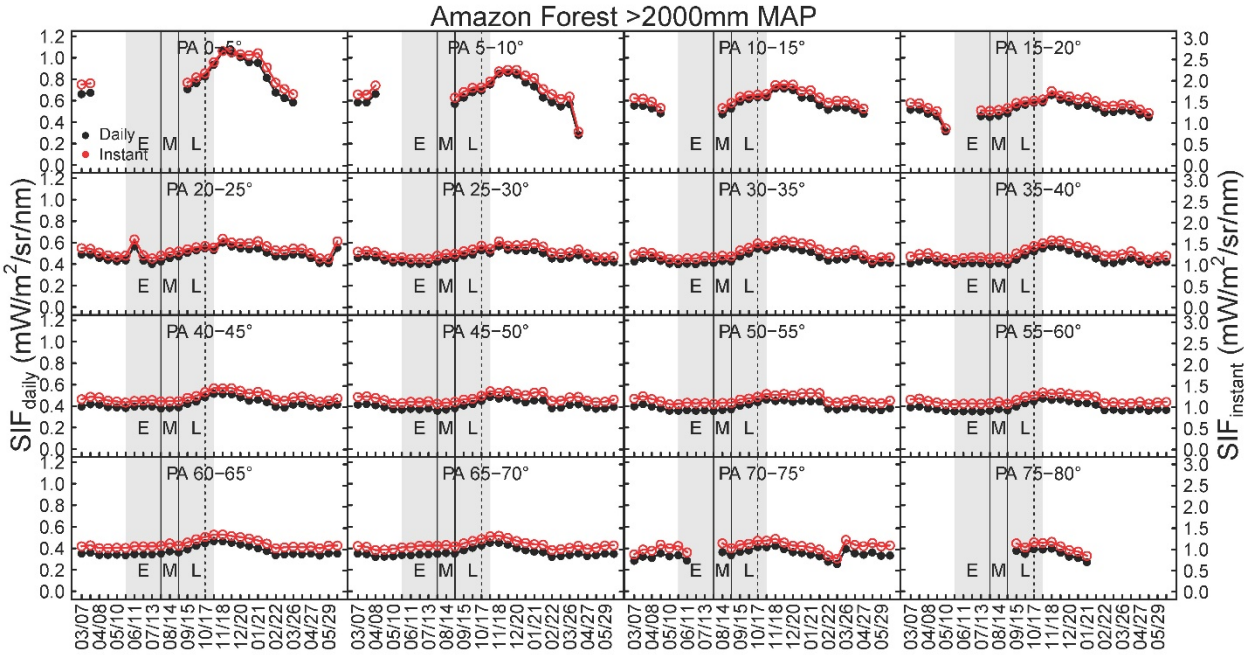

Fig. S6 | SIF_{daily} and $SIF_{instant}$ at different phase angles (PA) for Amazon forest with mean annual precipitation (MAP) > 2000 mm. Areas shaded in gray represent the early (E), mid (M), and late (L) dry seasons. The dashed line approximates when TROPOMI's phase angles are lowest. Dates represent the first day of TROPOMI's 16-day revisit cycle. Tick marks are every 16 days and labels are every 32 days. The complete date range represented is March 7, 2018 – June 29, 2019.

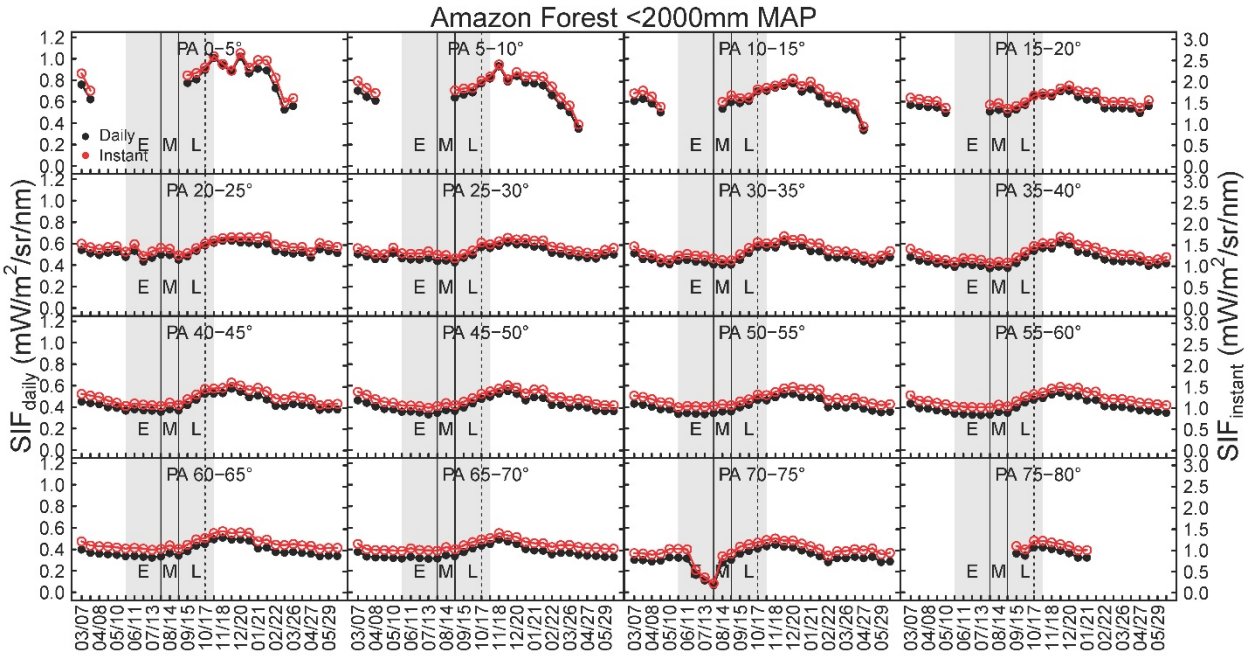

Fig. S7 | SIF_{daily} and $SIF_{instant}$ at different phase angles (PA) for Amazon forest with mean annual precipitation (MAP) < 2000 mm. Areas shaded in gray represent the early (E), mid (M), and late (L) dry seasons. The dashed line approximates when TROPOMI's phase angles are lowest. Dates represent the first day of TROPOMI's 16-day revisit cycle. Tick marks are every 16 days and labels are every 32 days. The complete date range represented is March 7, 2018 – June 29, 2019.

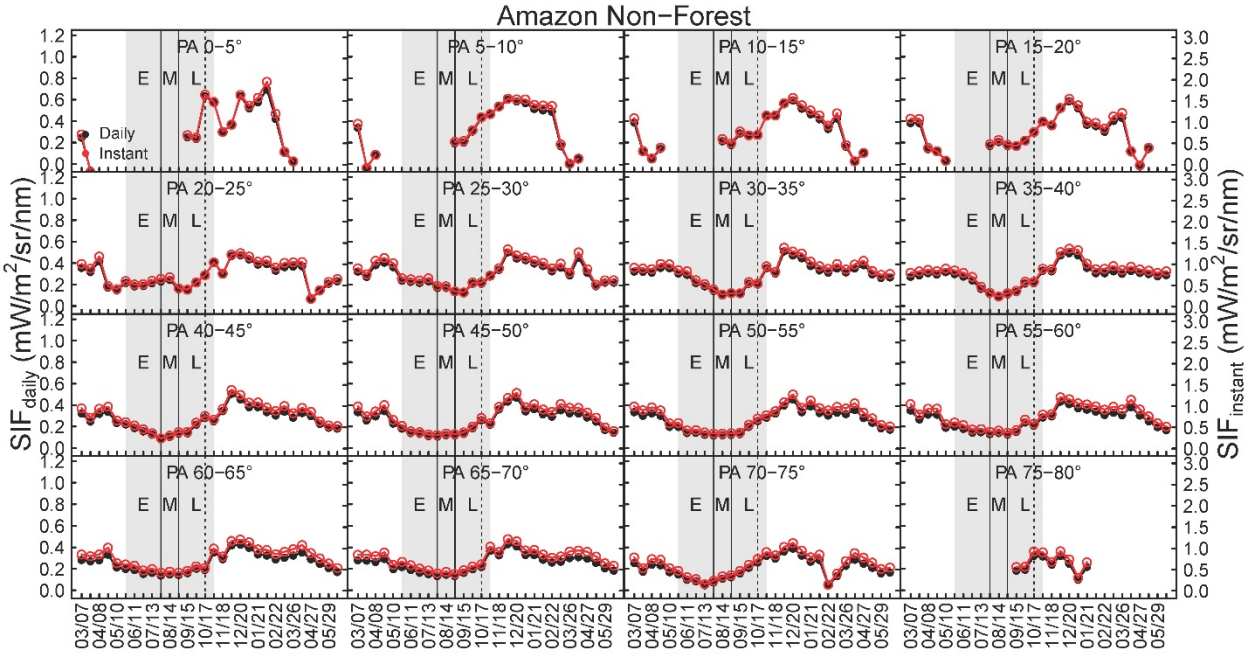

Fig. S8 | SIF_{daily} and $SIF_{instant}$ at different phase angles (PA) for TROPOMI soundings of non-forest, non-water land cover in the Amazon. Areas shaded in gray represent the early (E),

mid (M), and late (L) dry seasons. The dashed line approximates when TROPOMI's phase angles are lowest. Dates represent the first day of TROPOMI's 16-day revisit cycle. Tick marks are every 16 days and labels are every 32 days. The complete date range represented is March 7, 2018 – June 29, 2019.

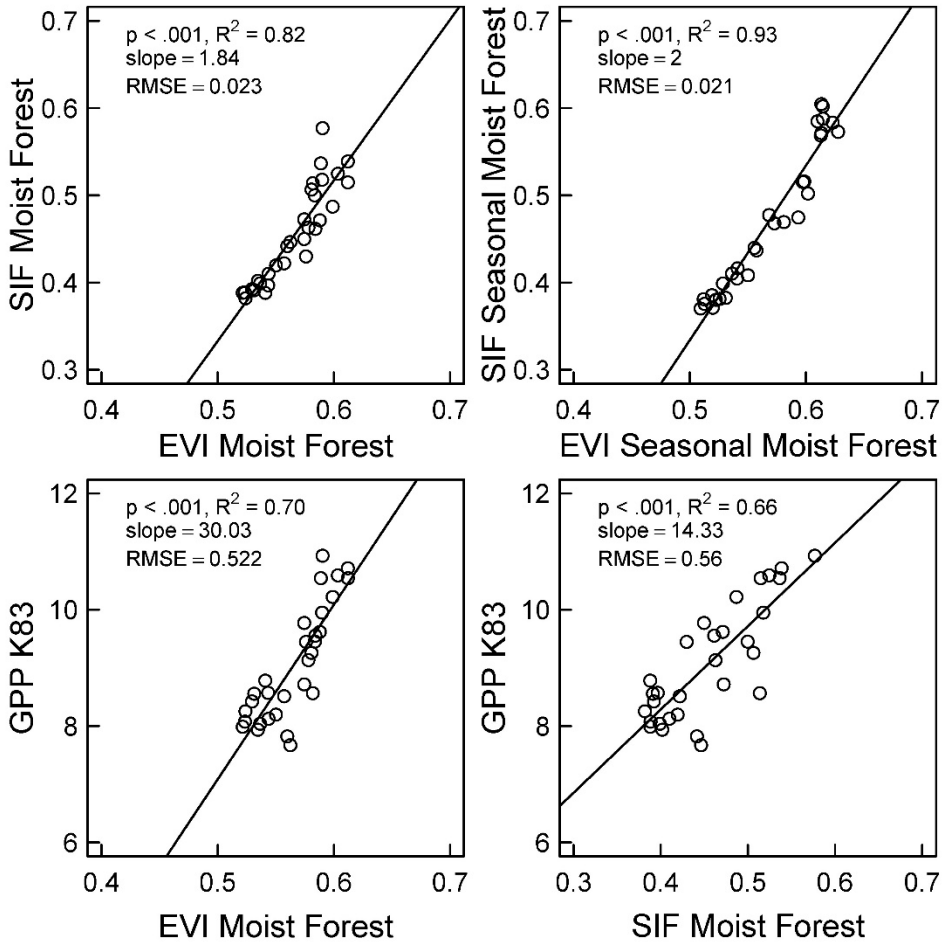

Fig. S9 | Relationships between MODIS EVI, TROPOMI SIF, and GPP from the K83 eddy tower site.

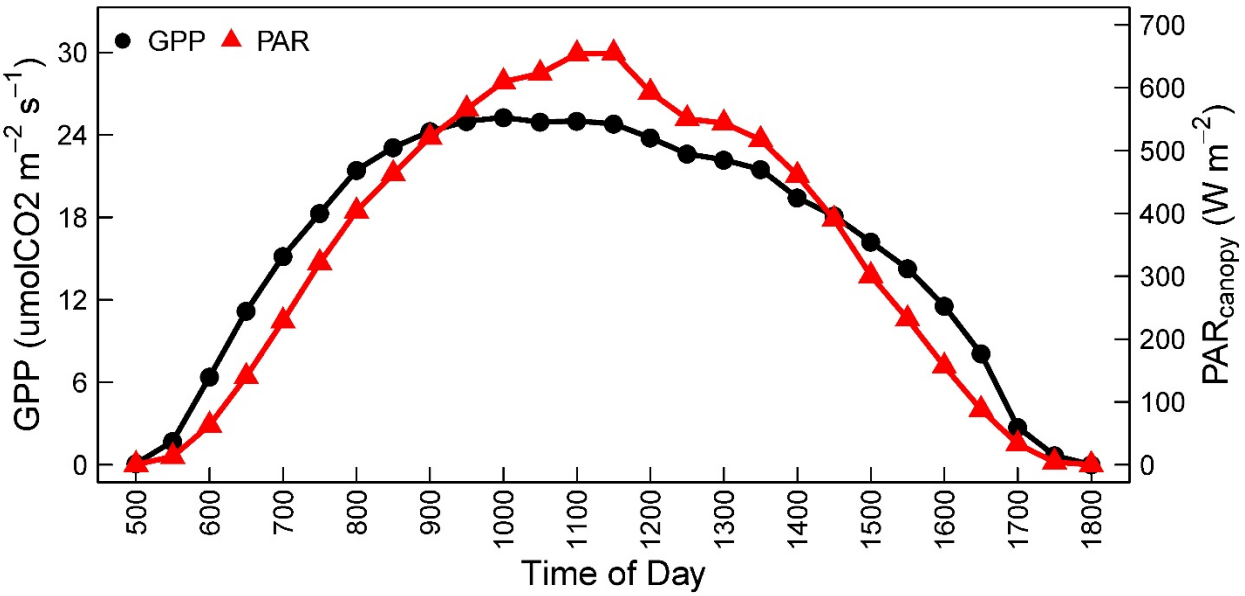

Fig. S10 | Diurnal GPP and PAR at K83. Mean half-hourly GPP and PAR from K83 eddy flux tower 2000-2004.

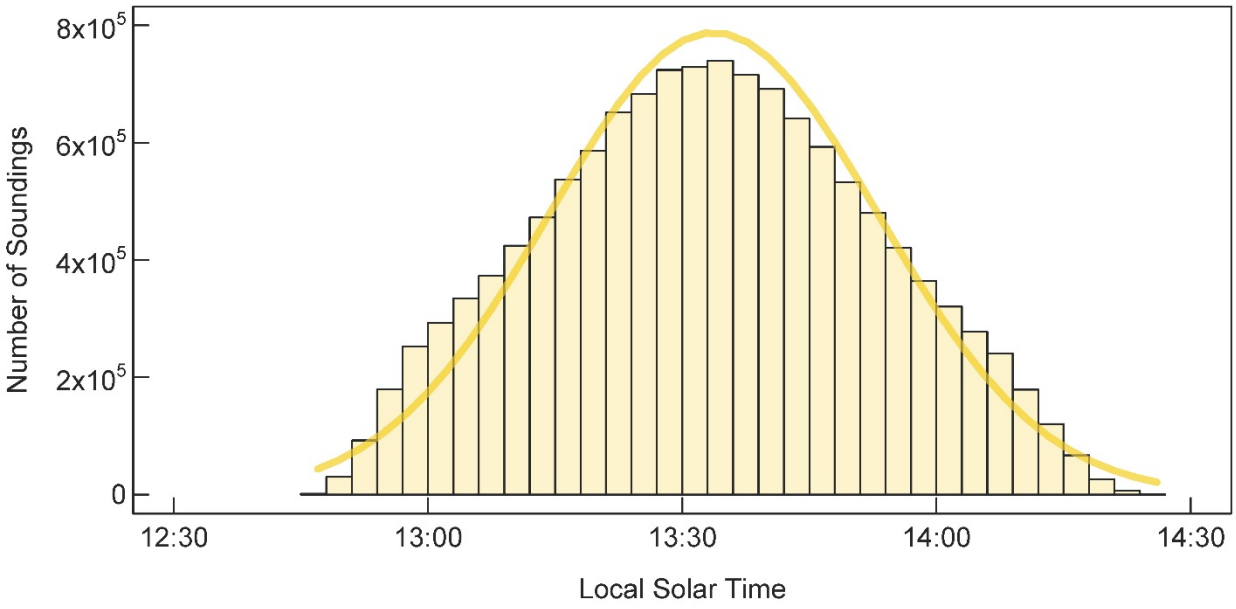

Fig. S11 | Frequency of the local solar time of TROPOMI soundings in the Amazon.

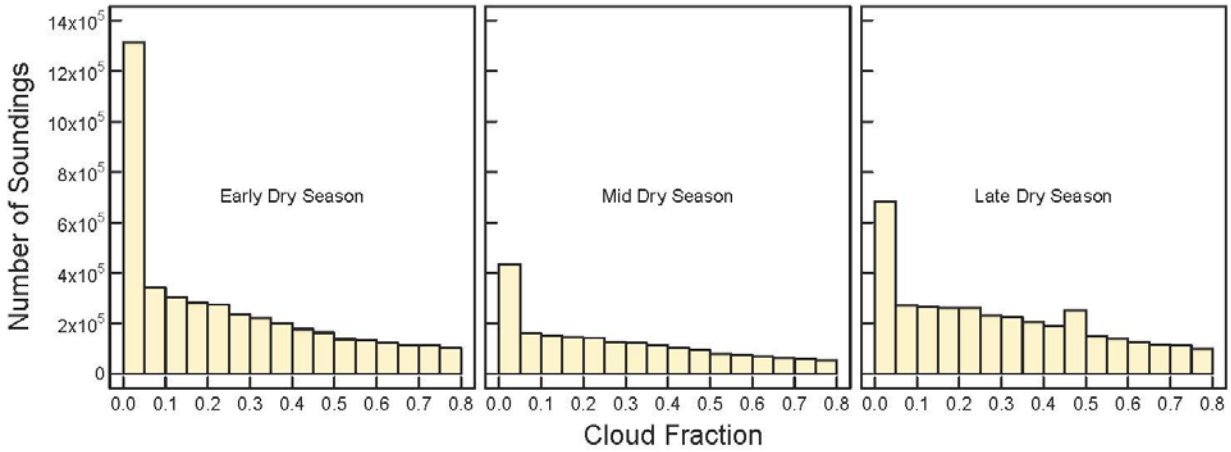

Fig. S12 | Frequency histograms of early, mid, and late dry season cloud fraction of TROPOMI SIF soundings.

Table S1. Standard error of the mean of $SIF_{instant}$ observations in the Amazon Basin (Fig. S1A). Column header is the track number.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
03/07	0.004	0.002	0.001	0.001	0.001	0.001	0.001	NA	0.001	0.002	NA	0.001	0.001	0.001	0.001	0.001
03/23	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.001
04/08	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
04/24	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	NA	NA	0.001	0.001	NA
05/10	0.001	0.001	0.001	0.001	NA	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	NA	NA	0.001
05/26	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
06/11	0.001	0.02	0.001	0.001	0.001	0.001	0.001	NA	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
06/27	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
07/13	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
07/29	0.001	0.001	0.001	0.001	0.001	0.001	NA	NA	0.001	0.001	0.001	0.001	0.001	NA	0.001	0.001
08/14	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
08/30	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
09/15	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
10/01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	NA	0.001
10/17	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	NA	0.001	0.001	0.001	0.001	0.006	0.001	0.001
11/02	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.015	0.001	0.001	0.001	0.001	0.046	0.002	0.002	0.001
11/18	0.001	0.002	0.002	0.002	0.002	0.001	0.002	0.001	0.002	0.002	0.002	0.049	0.002	0.002	0.002	0.002
12/04	0.001	0.001	0.002	0.002	0.002	0.001	NA	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
12/20	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
01/05	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001
01/21	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.002	0.001	0.001	0.001
02/06	0.001	0.001	0.001	0.002	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.002
02/22	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.045	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
03/10	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001
03/26	0.001	0.001	0.001	0.002	0.002	0.001	0.001	NA	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001

04/11	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
04/27	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
05/13	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
05/29	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
06/14	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Table S2. Standard error of the mean of $SIF_{instant}$ observations in the Amazon forest (Fig. S1B). Column header is the track number.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
03/07	0.011	0.004	0.003	0.004	0.005	0.004	0.004	NA	0.004	0.006	NA	0.003	0.004	0.003	0.003	0.004
03/23	0.004	0.004	0.007	0.005	0.004	0.003	0.003	0.004	0.004	0.004	0.003	0.003	0.004	0.004	0.005	0.004
04/08	0.004	0.003	0.003	0.003	0.004	0.005	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
04/24	0.004	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.002	0.003	0.004	NA	NA	0.002	0.002	NA
05/10	0.003	0.003	0.003	0.002	NA	0.002	0.003	0.002	0.002	0.003	0.002	0.002	0.002	NA	NA	0.002
05/26	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.002	0.003
06/11	0.003	NA	0.002	0.002	0.003	0.003	0.002	NA	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
06/27	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
07/13	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
07/29	0.002	0.002	0.002	0.002	0.003	0.003	NA	NA	0.002	0.002	0.003	0.002	0.002	NA	0.002	0.002
08/14	0.003	0.003	0.002	0.002	0.002	0.003	0.004	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002
08/30	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003
09/15	0.004	0.004	0.003	0.002	0.003	0.003	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003
10/01	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.005	0.005	0.003	0.003	NA	0.004
10/17	0.004	0.004	0.008	0.005	0.005	0.005	0.007	0.006	NA	0.003	0.006	0.005	0.005	0.012	0.004	0.005
11/02	0.005	0.005	0.006	0.004	0.005	0.008	0.005	0.022	0.004	0.004	0.005	0.006	0.053	0.007	0.006	0.005
11/18	0.008	0.009	0.006	0.006	0.007	0.006	0.007	0.005	0.006	0.005	0.007	0.063	0.007	0.005	0.006	0.005
12/04	0.004	0.005	0.007	0.009	0.006	0.005	NA	0.005	0.005	0.006	0.004	0.008	0.004	0.005	0.005	0.006
12/20	0.006	0.007	0.005	0.005	0.007	0.006	0.006	0.006	0.007	0.005	0.006	0.007	0.006	0.005	0.005	0.006
01/05	0.005	0.006	0.008	0.006	0.004	0.007	0.011	0.005	0.004	0.006	0.005	0.005	0.003	0.005	0.005	0.004
01/21	0.004	0.005	0.003	0.004	0.005	0.005	0.006	0.005	0.007	0.005	0.005	0.009	0.007	0.004	0.004	0.004
02/06	0.005	0.004	0.004	0.005	0.005	0.005	0.009	0.008	0.006	0.005	0.006	0.005	0.004	0.006	0.006	0.004
02/22	0.004	0.003	0.004	0.005	0.006	0.006	0.006	0.059	0.004	0.004	0.004	0.005	0.004	0.003	0.003	0.005
03/10	0.005	0.004	0.004	0.003	0.004	0.005	0.004	0.004	0.003	0.004	0.007	0.006	0.005	0.004	0.004	0.004
03/26	0.005	0.005	0.005	0.005	0.005	0.003	0.005	NA	0.006	0.003	0.004	0.003	0.003	0.004	0.003	0.003
04/11	0.003	0.003	0.004	0.003	0.003	0.006	0.005	0.003	0.003	0.003	0.003	0.003	0.005	0.003	0.003	0.003
04/27	0.004	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.006
05/13	0.005	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.002	0.002	0.002	0.002
05/29	0.003	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002
06/14	0.003	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Table S3. Standard error of the mean of $SIF_{instant}$ observations in Amazon non-forest (Fig. S1C). Column header is the track number.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
03/07	0.004	0.002	0.002	0.002	0.001	0.001	0.001	NA	0.001	0.002	NA	0.001	0.001	0.001	0.001	0.002
03/23	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.001
04/08	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
04/24	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	NA	NA	0.001	0.001	NA
05/10	0.001	0.001	0.002	0.001	NA	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	NA	NA	0.001
05/26	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001
06/11	0.001	0.02	0.001	0.001	0.001	0.002	0.001	NA	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
06/27	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
07/13	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
07/29	0.001	0.001	0.001	0.001	0.001	0.001	NA	NA	0.001	0.001	0.001	0.001	0.001	NA	0.001	0.001
08/14	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
08/30	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
09/15	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
10/01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	NA	0.001
10/17	0.001	0.002	0.002	0.002	0.001	0.001	0.002	0.001	NA	0.001	0.001	0.001	0.001	0.006	0.001	0.001
11/02	0.001	0.002	0.002	0.002	0.002	0.001	0.002	0.02	0.001	0.001	0.001	0.001	0.081	0.002	0.002	0.001
11/18	0.001	0.002	0.002	0.002	0.003	0.001	0.002	0.002	0.002	0.002	0.002	NA	0.002	0.002	0.002	0.002
12/04	0.001	0.001	0.002	0.002	0.002	0.001	NA	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002
12/20	0.002	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
01/05	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.001	0.001	0.002	0.002
01/21	0.001	0.002	0.001	0.002	0.002	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.003	0.002	0.001	0.002
02/06	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.003	0.001	0.001	0.002	0.002	0.002
02/22	0.002	0.001	0.002	0.002	0.001	0.001	0.002	0.067	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.002
03/10	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001
03/26	0.001	0.001	0.002	0.002	0.002	0.001	0.001	NA	0.003	0.001	0.001	0.001	0.002	0.002	0.001	0.001
04/11	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
04/27	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
05/13	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
05/29	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
06/14	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Table S4. Area of the Amazon Basin and land cover types used in our study.

Region	Area (km^2)
Amazon	5,974,715
Forest	3,787,974
Forest >2000mm MAP	2,815,460
Forest <2000mm MAP	952,526
Non-forest	698,303