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Supplement of

Temporal variability of observed and simulated gross primary productivity, modulated by vegetation state and hydrometeorological drivers

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S1 Validation Sites

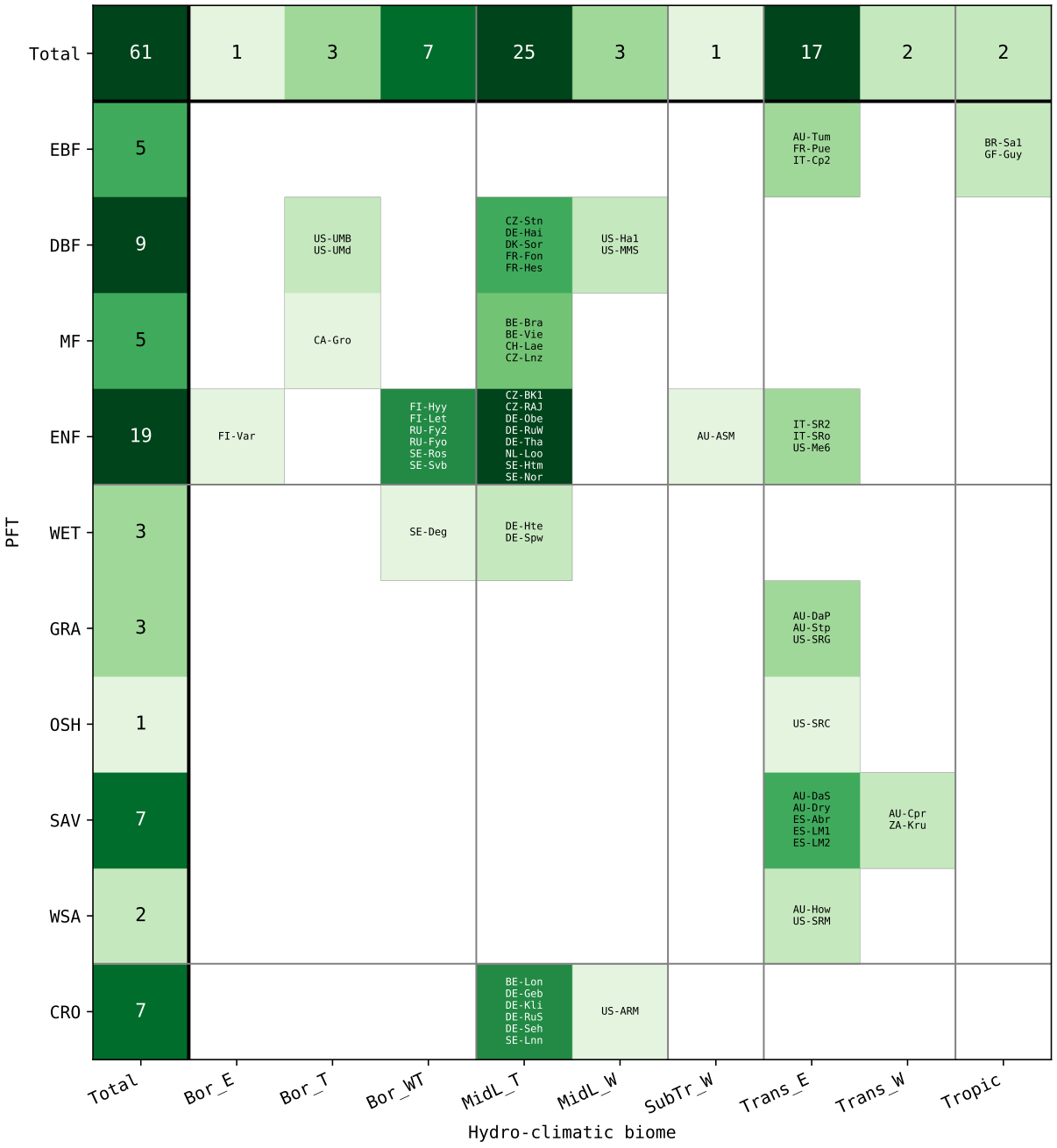

Table S1. Distribution of the selected testsites across PFT and HCB.

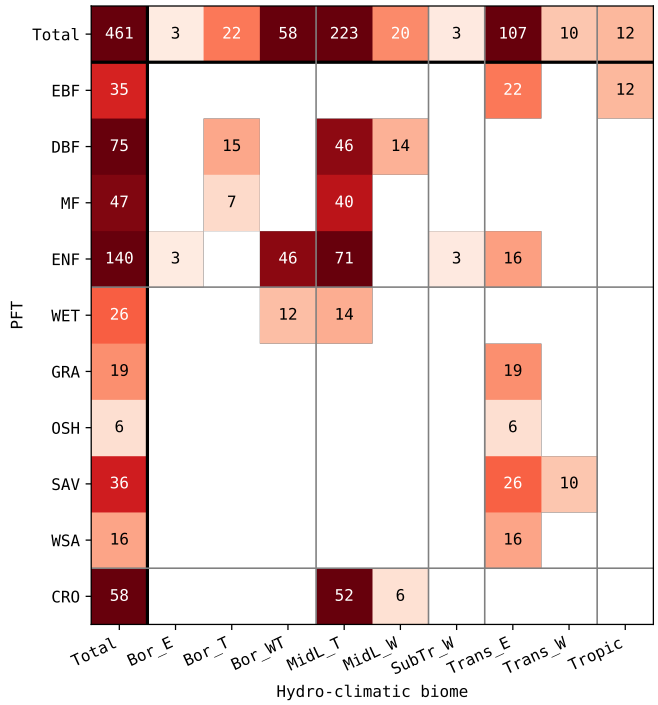

Table S2. Total length of GPP timeseries available (years), aggregated per PFT and HCB.

S2 Quantile regression

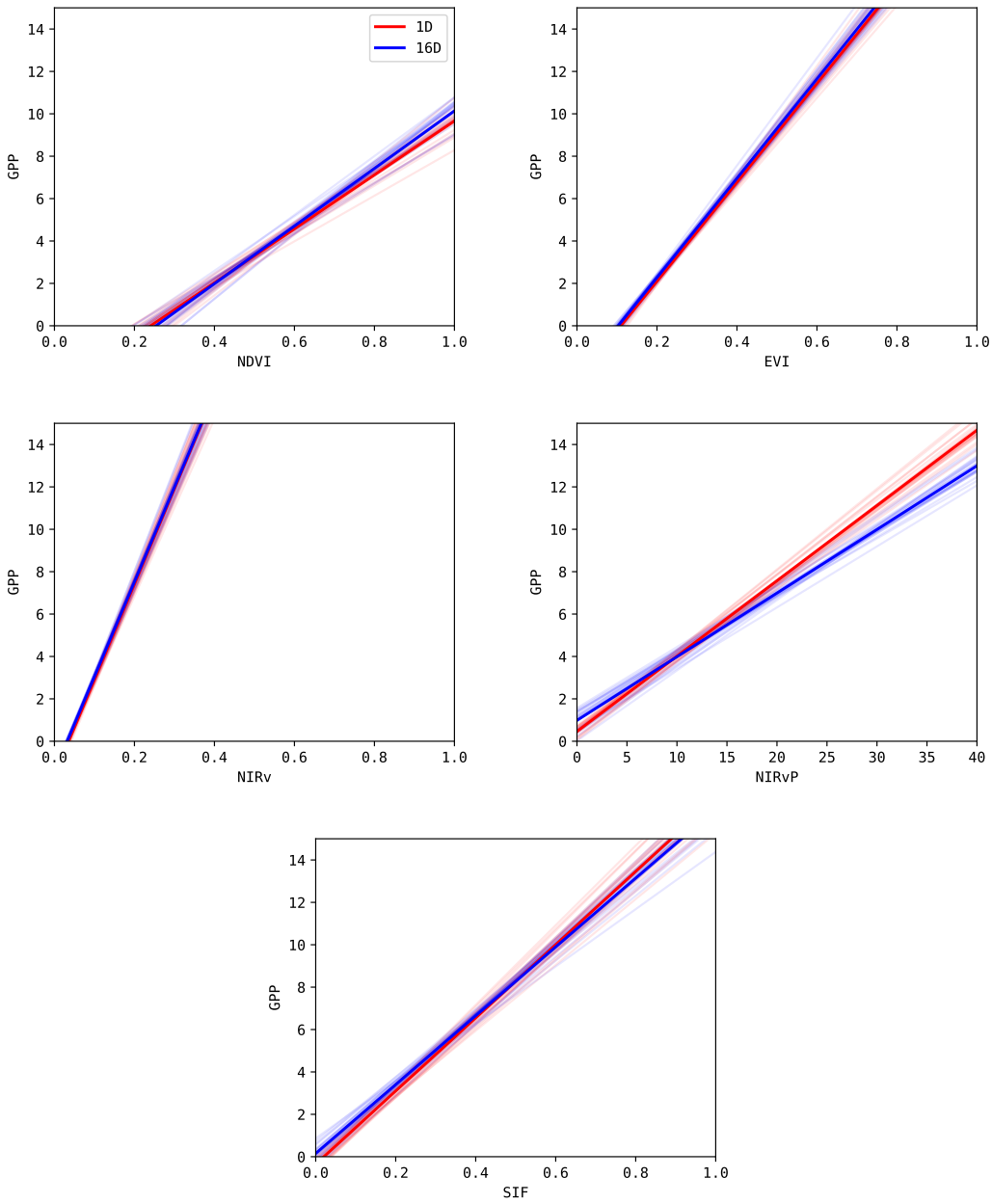

Figure S1. Evaluation of the robustness of the quantile regression between RS observations and tower GPP. The regression was done for daily data (red) and 16-day aggregated data (blue). For each approach, the opaque line shows the mean of 20 regressions using a 50% subsample of the dataset (transparent lines).

S3 Impact of ERA5 forcing

Given the gaps in the meteorological observations at the sites, used to force the models, ERA5 data was used to replace some of these variables: air temperature, atmospheric humidity, wind speed, and atmospheric pressure. Simulations with ISBA were performed using this configuration, and compared with simulations using only the tower observations (for sites that had $< 5\%$ gaps in the timeseries), to verify that the impact on the simulated GPP was limited. An example of simulations with both configurations is given in Fig. S2, validation indices of both simulations compared to the observed GPP is given in Tab. S3, and metrics of the similarity between both simulations are given in Tab. S4. From these results, we conclude that the impact of using ERA5 for some of the forcing variables is negligible.

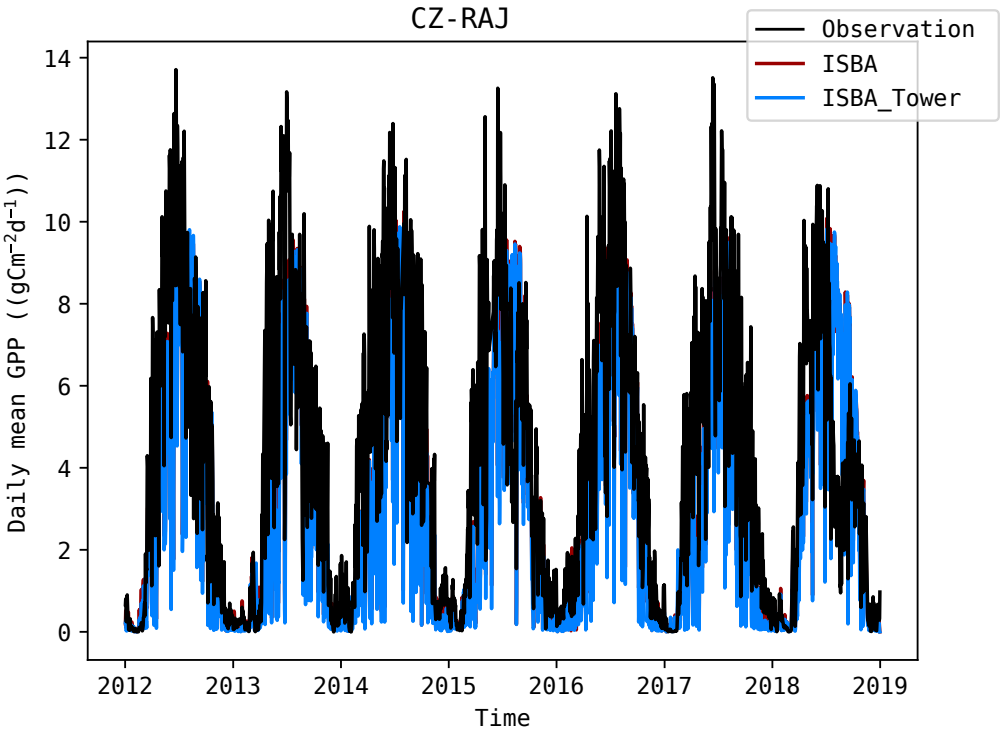

Figure S2. Timeseries of the observed GPP at CZ-RAJ, compared to ISBA simulations with ERA5 variables (as used in the study), and ISBA simulations forced by the in situ meteorological observations (ISBA_Tower). The two simulations are largely overlapping.

		ME ($gC/m^2/d$)	RMSE ($gC/m^2/d$)	r (-)	r_{seas} (-)	r_{anom} (-)
CZ-RAJ	ISBA	-1.01	2.24	0.82	0.94	0.45
	ISBA_Tower	-1.28	2.48	0.80	0.93	0.40
DE-RuW	ISBA	-2.71	3.50	0.78	0.95	0.45
	ISBA_Tower	-2.67	3.48	0.77	0.95	0.46
FR-EM2	ISBA	-2.01	5.98	0.54	0.92	-0.14
	ISBA_Tower	-1.68	5.96	0.53	0.91	-0.17
FR-Hes	ISBA	0.36	2.88	0.85	0.94	0.54
	ISBA_Tower	0.52	2.75	0.86	0.96	0.55
DE-Geb	ISBA	0.81	3.70	0.66	0.85	0.33
	ISBA_Tower	0.68	3.59	0.66	0.87	0.34
IT-SR2	ISBA	0.60	2.07	0.85	0.98	0.56
	ISBA_Tower	0.52	2.03	0.85	0.99	0.57
CZ-Stn	ISBA	0.11	2.53	0.87	0.98	0.49
	ISBA_Tower	0.16	2.49	0.87	0.98	0.51
DE-Hte	ISBA	-0.44	2.28	0.62	0.90	0.04
	ISBA_Tower	-0.34	2.31	0.62	0.90	0.05
ES-LM1	ISBA	-0.72	1.39	0.87	0.99	0.69
	ISBA_Tower	-0.78	1.45	0.87	0.98	0.69
ES-LM2	ISBA	-0.75	1.38	0.87	0.98	0.67
	ISBA_Tower	-0.80	1.46	0.86	0.95	0.67

Table S3. Validation of GPP similated with ISBA (partly with ERA5 forcing variable) and ISBA_Tower (with tower forcing). The 10 sites were selected based on the good quality of the meteorological observations.

	ME ($gC/m^2/d$)	RMSE ($gC/m^2/d$)	r (-)	r_{seas} (-)	r_{anom} (-)
CZ-RAJ	-0.266	0.377	0.996	0.999	0.988
DE-RuW	0.038	0.158	0.998	1.000	0.995
FR-EM2	0.332	0.728	0.992	0.996	0.980
FR-Hes	0.161	0.504	0.995	0.996	0.988
DE-Geb	-0.136	0.487	0.995	0.999	0.988
IT-SR2	-0.083	0.500	0.991	0.993	0.985
CZ-Stn	0.059	0.661	0.990	0.996	0.973
DE-Hte	0.088	0.322	0.993	0.999	0.980
ES-LM1	-0.066	0.368	0.989	0.993	0.980
ES-LM2	-0.056	0.351	0.989	0.993	0.979

Table S4. Metrics to quantify the similarity between GPP similated with ISBA (partly with ERA5 forcing variable) and ISBA_Tower (with tower forcing). The 10 sites were selected based on the good quality of the meteorological observations.

S4 Impact temporal resolution

	All	Inter-site		Seasonal		Anomalies	
Observation	4.16	1.75	0.18	3.17	0.58	2.01	0.24
NDVI	2.11	1.46	0.48	1.32	0.40	0.72	0.12
EVI	2.95	1.70	0.33	2.23	0.57	0.86	0.08
NIRv	3.13	1.79	0.33	2.38	0.58	0.92	0.09
NIRvP	3.34	1.17	0.12	2.57	0.59	1.75	0.27
SIF	3.42	1.63	0.23	2.78	0.66	1.06	0.10
FluxCom$_{RS}$	2.82	1.12	0.16	2.48	0.78	0.67	0.06
FluxCom$_{RSMet}$	2.83	1.15	0.17	2.52	0.79	0.52	0.03
MOD17	3.13	1.36	0.19	2.38	0.58	1.47	0.22
LSA SAF	4.83	2.23	0.21	3.59	0.55	2.30	0.23
ISBA	3.61	1.45	0.16	2.76	0.58	1.80	0.25
ORCHIDEE	3.68	1.34	0.13	2.95	0.64	1.68	0.21

Table S5. Standard deviation of the observed and simulated GPP ($\mathrm{gC/m^2/d}$), decomposed in the inter-site, seasonal and anomalies (obtained after subtracting the spatial and seasonal component) components, and the fraction of the total variance (grey columns). This analysis done after grouping all sites together. A downsampling to 10-daily resolution was performed prior to this analysis.

S5 Variability

		All	Daily		Weekly		Monthly		Annual		Interannual	
Obs	EBF-Tropic	2.25	1.21	0.36	1.03	0.26	0.98	0.24	0.58	0.08	0.70	0.12
	DBF-MidL_T	5.11	1.11	0.06	1.06	0.04	1.08	0.04	4.47	0.86	0.30	0.00
	ENF-Bor_WT	3.61	0.94	0.07	0.80	0.06	0.66	0.04	3.07	0.83	0.30	0.01
	ENF-MidL_T	3.50	1.16	0.10	1.00	0.07	0.74	0.05	3.02	0.77	0.36	0.01
	ENF-Trans_E	3.25	1.20	0.15	0.94	0.09	0.71	0.07	2.46	0.67	0.40	0.02
	SAV-Trans_E	2.05	0.57	0.07	0.54	0.09	0.52	0.07	1.71	0.75	0.30	0.02
	CRO-MidL_T	4.75	1.03	0.06	0.93	0.04	1.47	0.09	3.98	0.76	0.74	0.03
NDVI	EBF-Tropic	0.79			0.04	0.02	0.15	0.32	0.29	0.29	0.62	0.74
	DBF-MidL_T	1.89			0.33	0.07	0.80	0.38	0.92	0.56	0.08	0.01
	ENF-Bor_WT	1.08			0.09	0.01	0.37	0.25	0.74	0.70	0.05	0.00
	ENF-MidL_T	1.02			0.21	0.10	0.47	0.49	0.47	0.38	0.05	0.00
	ENF-Trans_E	0.64			0.19	0.16	0.37	0.38	0.23	0.46	0.03	0.01
	SAV-Trans_E	1.41			0.19	0.05	0.41	0.22	0.78	0.71	0.03	0.00
	CRO-MidL_T	1.42			0.24	0.06	0.65	0.36	0.76	0.58	0.04	0.00
EVI	EBF-Tropic	1.03			0.15	0.07	0.14	0.04	0.66	0.77	0.33	0.25
	DBF-MidL_T	3.59			0.48	0.04	1.38	0.33	2.08	0.63	0.07	0.00
	ENF-Bor_WT	1.44			0.08	0.00	0.45	0.24	0.86	0.74	0.05	0.00
	ENF-MidL_T	1.40			0.19	0.03	0.48	0.19	0.88	0.76	0.08	0.01
	ENF-Trans_E	0.53			0.15	0.09	0.22	0.32	0.23	0.59	0.13	0.07
	SAV-Trans_E	1.34			0.21	0.05	0.32	0.30	0.77	0.65	0.03	0.00
	CRO-MidL_T	2.76			0.42	0.03	1.15	0.21	1.63	0.75	0.11	0.00
NIRv	EBF-Tropic	1.35			0.19	0.07	0.17	0.05	0.84	0.77	0.43	0.22
	DBF-MidL_T	4.02			0.56	0.04	1.61	0.39	2.27	0.57	0.11	0.00
	ENF-Bor_WT	1.38			0.08	0.00	0.45	0.22	0.85	0.76	0.07	0.00
	ENF-MidL_T	1.36			0.17	0.03	0.50	0.23	0.89	0.72	0.07	0.01
	ENF-Trans_E	0.48			0.14	0.10	0.22	0.36	0.21	0.54	0.10	0.07
	SAV-Trans_E	1.36			0.21	0.05	0.31	0.32	0.75	0.63	0.04	0.00
	CRO-MidL_T	3.15			0.42	0.03	1.28	0.23	1.88	0.75	0.15	0.00
NIRvP	EBF-Tropic	2.06			0.42	0.15	0.42	0.15	1.13	0.63	0.54	0.14
	DBF-MidL_T	4.93			1.43	0.16	1.85	0.31	2.34	0.54	0.13	0.00
	ENF-Bor_WT	2.17			0.24	0.04	0.75	0.20	1.40	0.75	0.13	0.00
	ENF-MidL_T	2.38			0.71	0.22	0.82	0.29	1.15	0.46	0.04	0.00
	ENF-Trans_E	1.65			0.44	0.14	0.50	0.29	0.88	0.57	0.09	0.01
	SAV-Trans_E	1.49			0.43	0.18	0.49	0.30	0.86	0.52	0.01	0.00
	CRO-MidL_T	4.01			0.86	0.08	1.55	0.33	2.07	0.56	0.10	0.00
SIF	EBF-Tropic	1.47			0.53	0.22	0.47	0.17	0.89	0.61	0.11	0.01
	DBF-MidL_T	4.31			0.72	0.05	1.41	0.18	3.12	0.78	0.13	0.00
	ENF-Bor_WT	2.12			0.43	0.06	0.91	0.43	1.27	0.50	0.12	0.01
	ENF-MidL_T	2.55			0.63	0.09	0.84	0.17	1.71	0.73	0.09	0.00
	ENF-Trans_E	1.44			0.30	0.06	0.29	0.06	1.15	0.88	0.00	0.00
	SAV-Trans_E	1.68			0.26	0.03	0.48	0.13	1.48	0.84	0.03	0.00
	CRO-MidL_T	3.83			0.67	0.05	1.32	0.16	2.78	0.79	0.15	0.00

Table S6. Standard deviation of the observed and simulated GPP ($\mathrm{gC/m^2/d}$), decomposed in the different timescale components using SSA. The median values for 6 land cover types are reported here. The fraction of the total variability is given in the grey columns.

		All	Daily		Weekly		Monthly		Annual		Interannual	
Obs	EBF-Tropic	2.25	1.21	0.36	1.03	0.26	0.98	0.24	0.58	0.08	0.70	0.12
	DBF-MidL_T	5.11	1.11	0.06	1.06	0.04	1.08	0.04	4.47	0.86	0.30	0.00
	ENF-Bor_WT	3.61	0.94	0.07	0.80	0.06	0.66	0.04	3.07	0.83	0.30	0.01
	ENF-MidL_T	3.50	1.16	0.10	1.00	0.07	0.74	0.05	3.02	0.77	0.36	0.01
	ENF-Trans_E	3.25	1.20	0.15	0.94	0.09	0.71	0.07	2.46	0.67	0.40	0.02
	SAV-Trans_E	2.05	0.57	0.07	0.54	0.09	0.52	0.07	1.71	0.75	0.30	0.02
	CRO-MidL_T	4.75	1.03	0.06	0.93	0.04	1.47	0.09	3.98	0.76	0.74	0.03
FluxCom$_{RS}$	EBF-Tropic	0.49			0.19	0.20	0.12	0.08	0.37	0.72	0.03	0.00
	DBF-MidL_T	3.07			0.45	0.03	0.71	0.08	2.78	0.90	0.09	0.00
	ENF-Bor_WT	2.90			0.33	0.02	0.40	0.02	2.75	0.96	0.08	0.00
	ENF-MidL_T	2.95			0.45	0.03	0.53	0.04	2.70	0.93	0.10	0.00
	ENF-Trans_E	1.87			0.28	0.02	0.33	0.04	1.64	0.93	0.07	0.00
	SAV-Trans_E	0.92			0.18	0.03	0.34	0.12	0.79	0.86	0.02	0.00
	CRO-MidL_T	2.78			0.47	0.03	0.69	0.08	2.44	0.88	0.10	0.00
FluxCom$_{RSMet}$	EBF-Tropic	0.75	0.53	0.59	0.22	0.10	0.22	0.10	0.31	0.21	0.05	0.01
	DBF-MidL_T	3.05	0.42	0.02	0.26	0.01	0.41	0.02	2.95	0.95	0.03	0.00
	ENF-Bor_WT	2.53	0.35	0.02	0.20	0.01	0.27	0.01	2.49	0.97	0.01	0.00
	ENF-MidL_T	2.88	0.42	0.02	0.24	0.01	0.29	0.01	2.82	0.96	0.05	0.00
	ENF-Trans_E	1.90	0.22	0.01	0.15	0.01	0.19	0.01	1.86	0.97	0.03	0.00
	SAV-Trans_E	1.07	0.20	0.04	0.14	0.02	0.20	0.04	1.00	0.91	0.06	0.00
	CRO-MidL_T	2.94	0.45	0.03	0.24	0.01	0.29	0.01	2.87	0.96	0.03	0.00
MOD17	EBF-Tropic	3.29			1.64	0.39	1.26	0.23	1.61	0.38	0.07	0.00
	DBF-MidL_T	3.61			1.21	0.24	0.97	0.12	2.23	0.63	0.07	0.00
	ENF-Bor_WT	3.24			1.05	0.23	0.92	0.17	1.84	0.60	0.06	0.00
	ENF-MidL_T	2.89			0.98	0.21	0.79	0.13	1.77	0.64	0.04	0.00
	ENF-Trans_E	2.35			0.74	0.16	0.67	0.13	1.57	0.71	0.06	0.00
	SAV-Trans_E	1.81			0.47	0.09	0.50	0.15	1.33	0.74	0.03	0.00
	CRO-MidL_T	2.69			0.91	0.18	0.93	0.19	1.71	0.63	0.09	0.00
LSA SAF	EBF-Tropic	3.20	2.20	0.57	1.00	0.11	0.67	0.06	1.49	0.26	0.31	0.01
	DBF-MidL_T	6.72	2.47	0.15	1.46	0.06	0.87	0.03	5.72	0.77	0.10	0.00
	ENF-Bor_WT	5.45	2.07	0.15	1.27	0.06	0.94	0.03	4.59	0.76	0.17	0.00
	ENF-MidL_T	4.74	2.00	0.19	1.29	0.07	0.62	0.02	3.92	0.72	0.14	0.00
	ENF-Trans_E	2.66	1.03	0.18	0.58	0.05	0.33	0.02	2.26	0.75	0.27	0.01
	SAV-Trans_E	1.57	0.71	0.15	0.51	0.12	0.33	0.07	1.19	0.67	0.13	0.01
	CRO-MidL_T	3.06	1.21	0.16	0.72	0.05	0.68	0.05	2.52	0.75	0.15	0.00
ISBA	EBF-Tropic	2.94	1.95	0.53	0.94	0.12	0.57	0.05	1.49	0.30	0.07	0.00
	DBF-MidL_T	4.47	1.37	0.10	0.95	0.05	0.88	0.04	3.88	0.80	0.49	0.01
	ENF-Bor_WT	2.76	0.79	0.08	0.60	0.05	0.43	0.02	2.43	0.84	0.15	0.00
	ENF-MidL_T	2.89	0.94	0.11	0.70	0.06	0.39	0.02	2.49	0.81	0.14	0.00
	ENF-Trans_E	3.72	1.17	0.10	0.72	0.05	0.47	0.03	3.22	0.84	0.25	0.01
	SAV-Trans_E	2.34	0.40	0.06	0.40	0.08	0.53	0.05	2.01	0.77	0.40	0.03
	CRO-MidL_T	4.26	1.42	0.13	0.95	0.07	1.14	0.08	3.34	0.72	0.48	0.01
ORCHIDEE	EBF-Tropic	1.32	0.89	0.55	0.33	0.08	0.45	0.15	0.56	0.21	0.04	0.00
	DBF-MidL_T	5.03	1.13	0.05	1.04	0.05	1.34	0.07	4.52	0.81	0.18	0.00
	ENF-Bor_WT	3.22	0.64	0.04	0.49	0.02	0.34	0.01	3.07	0.92	0.12	0.00
	ENF-MidL_T	2.47	0.63	0.07	0.51	0.04	0.34	0.02	2.25	0.86	0.13	0.00
	ENF-Trans_E	2.23	0.66	0.09	0.47	0.04	0.73	0.10	1.91	0.72	0.14	0.00
	SAV-Trans_E	2.41	0.53	0.05	0.54	0.05	0.55	0.06	2.19	0.83	0.61	0.05
	CRO-MidL_T	4.57	0.96	0.05	0.79	0.03	1.35	0.08	4.14	0.85	0.33	0.01

Table S7. (Continued) Standard deviation of the observed and simulated GPP ($\mathrm{gC/m^2/d}$), decomposed in the different timescale components using SSA. The median values for 6 land cover types are reported here. The fraction of the total variability is given in the grey columns.

S6 GPP Covariance

	Spatial Spatial	Seasonal Seasonal	Anomalies Anomalies	Spatial Seasonal	Spatial Anomalies	Seasonal Anomalies
Observation	3.13	10.84	4.22	0.12	-0.12	-0.34
NDVI	2.13	1.77	0.55	0.04	-0.04	-0.01
EVI	2.87	5.07	0.81	0.00	0.00	-0.04
NIRv	3.19	5.77	0.94	-0.01	0.01	-0.05
NIRvP	1.36	7.38	3.15	0.02	-0.02	-0.37
SIF	2.74	7.70	1.11	-0.03	0.03	0.05
FluxCom$_{RS}$	1.26	6.24	0.44	0.00	0.00	-0.01
FluxCom$_{RSMet}$	1.31	6.70	0.29	0.04	-0.04	-0.16
MOD17	1.94	5.86	2.27	0.03	-0.03	-0.15
LSA SAF	5.01	13.53	5.66	0.17	-0.16	-0.44
ISBA	2.13	8.31	3.43	0.09	-0.09	-0.31
ORCHIDEE	1.81	10.09	3.08	0.16	-0.16	-0.71

Table S8. (Co-)variance of the observed and simulated GPP ($\mathrm{gC/m^2/d}$), decomposed in the inter-site, seasonal and anomalies (obtained after subtracting the spatial and seasonal component) components. Analysis of the concatenated timeseries.

	Daily					Weekly					Monthly				
	D	W	M	S	I	D	W	M	S	I	D	W	M	S	I
Observation	0.96	0.11	0.00	0.02	0.00	0.11	0.62	0.07	0.06	0.00	0.00	0.07	0.56	0.12	0.00
NDVI	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.07	0.00	0.00	0.06	0.23	0.22	0.01
EVI	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.11	0.00	0.00	0.05	0.28	0.42	0.02
NIRv	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.12	0.00	0.00	0.06	0.29	0.41	0.02
NIRvP	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.33	0.38	0.01	0.00	0.33	0.67	0.67	0.01
SIF	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.14	0.21	0.01	0.00	0.14	0.81	0.74	0.02
FluxCom$_{RS}$	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.04	0.03	0.00	0.00	0.04	0.21	0.21	0.01
FluxCom$_{RSMet}$	0.12	0.01	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00
MOD17	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.41	0.49	0.01	0.00	0.41	0.60	0.51	0.01
LSA SAF	2.01	0.24	0.03	0.00	0.00	0.24	0.65	0.07	0.01	0.00	0.03	0.07	0.38	0.02	0.00
ISBA	0.86	0.11	0.01	0.00	0.00	0.11	0.47	0.06	0.00	0.00	0.01	0.06	0.21	0.03	0.01
ORCHIDEE	0.53	0.06	0.00	0.00	0.00	0.06	0.34	0.04	0.00	0.00	0.00	0.04	0.48	0.04	0.00

	Seasonal					Interannual				
	D	W	M	S	I	D	W	M	S	I
Observation	0.02	0.06	0.12	8.31	0.03	0.00	0.00	0.00	0.03	0.08
NDVI	0.00	0.07	0.22	0.43	0.02	0.00	0.00	0.01	0.02	0.00
EVI	0.00	0.11	0.42	1.22	0.03	0.00	0.00	0.02	0.03	0.00
NIRv	0.00	0.12	0.41	1.08	0.03	0.00	0.00	0.02	0.03	0.01
NIRvP	0.00	0.38	0.67	1.79	0.03	0.00	0.01	0.01	0.03	0.00
SIF	0.00	0.21	0.74	2.93	0.05	0.00	0.01	0.02	0.05	0.01
FluxCom$_{RS}$	0.00	0.03	0.21	5.03	0.07	0.00	0.00	0.01	0.07	0.01
FluxCom$_{RSMet}$	0.00	0.00	0.01	6.38	0.00	0.00	0.00	0.00	0.00	0.00
MOD17	0.00	0.49	0.51	2.63	0.03	0.00	0.01	0.01	0.03	0.00
LSA SAF	0.00	0.01	0.02	8.66	0.01	0.00	0.00	0.00	0.01	0.02
ISBA	0.00	0.00	0.03	6.74	0.02	0.00	0.00	0.01	0.02	0.04
ORCHIDEE	0.00	0.00	0.04	7.43	0.01	0.00	0.00	0.00	0.01	0.02

Table S9. (Co-)variance of the observed and simulated GPP ($\mathrm{gC/m^2/d}$), of the daily, weekly, monthly, seasonal and inter-annual timescale (obtained with SSA). The median for all sites is given here.

S7 Model performance: ME and RMSE

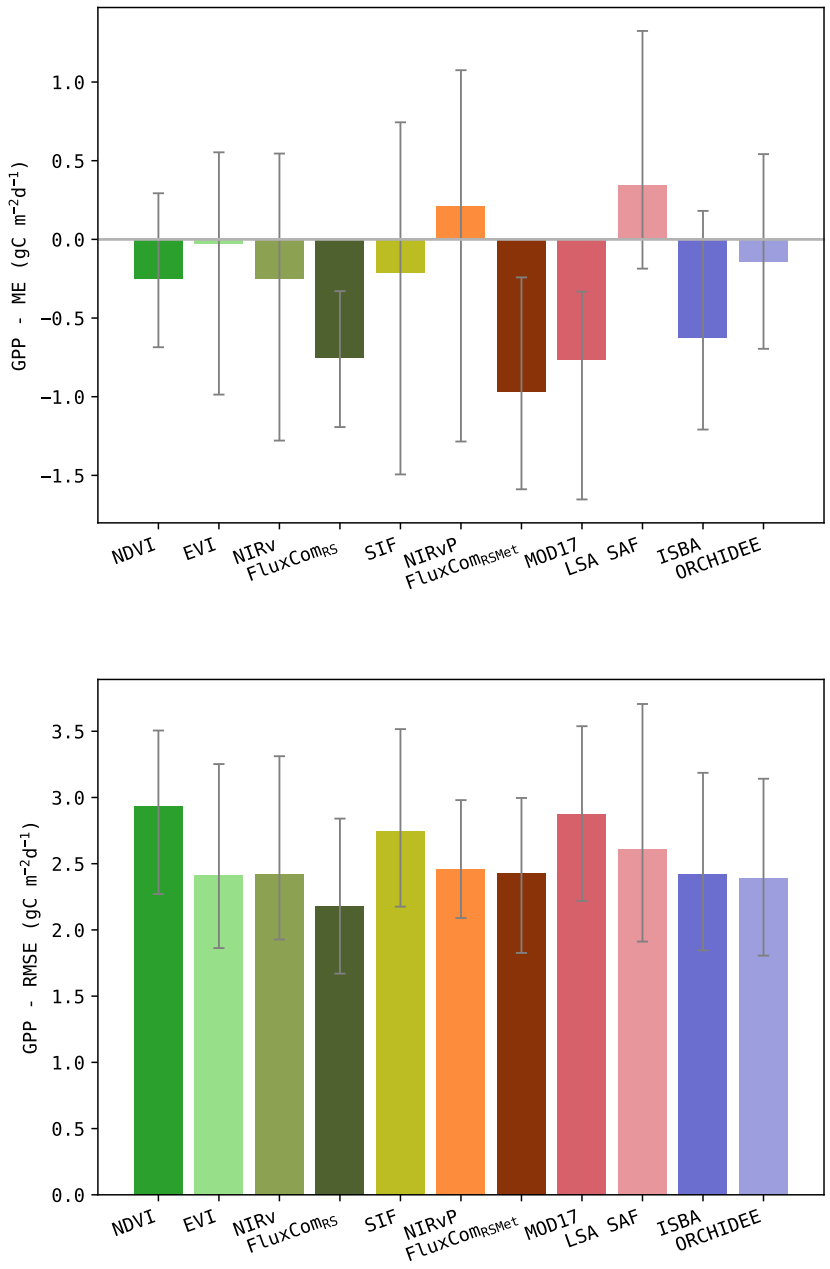

Figure S3. ME (top) and RMSE (bottom) of the GPP obtained by the models, validated with the in-situ observations. Bars show the median score accross the sites, errorbars indicate the 25 and 75 percentile. Note: this is not an independent validation.

S8 Covariance of GPP Drivers

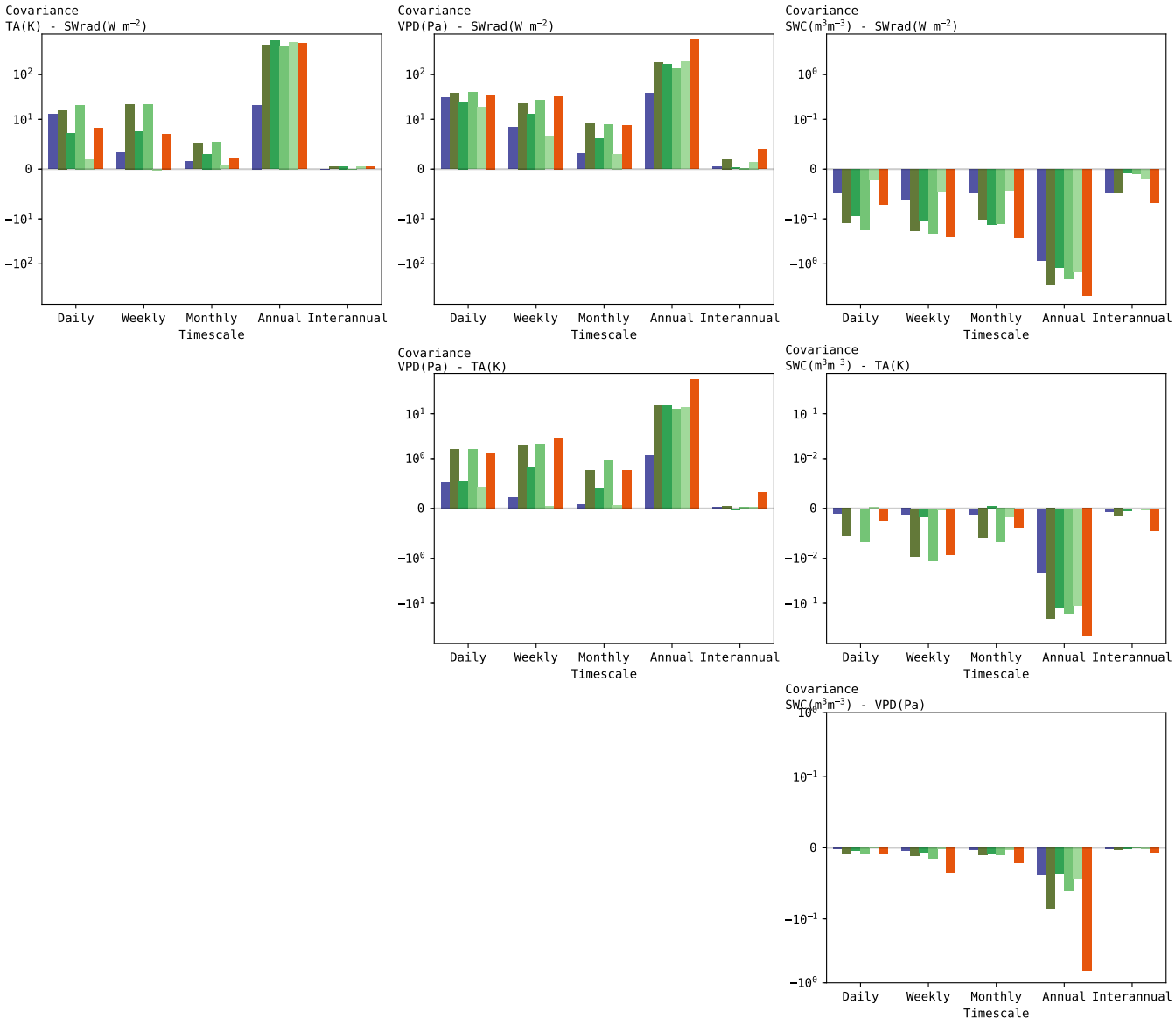

Figure S4. Covariance of the GPP drivers: SWrad, TA, VPD and SWC. Median of the sites, classified per land cover type.

S9 Correlation between GPP and its drivers

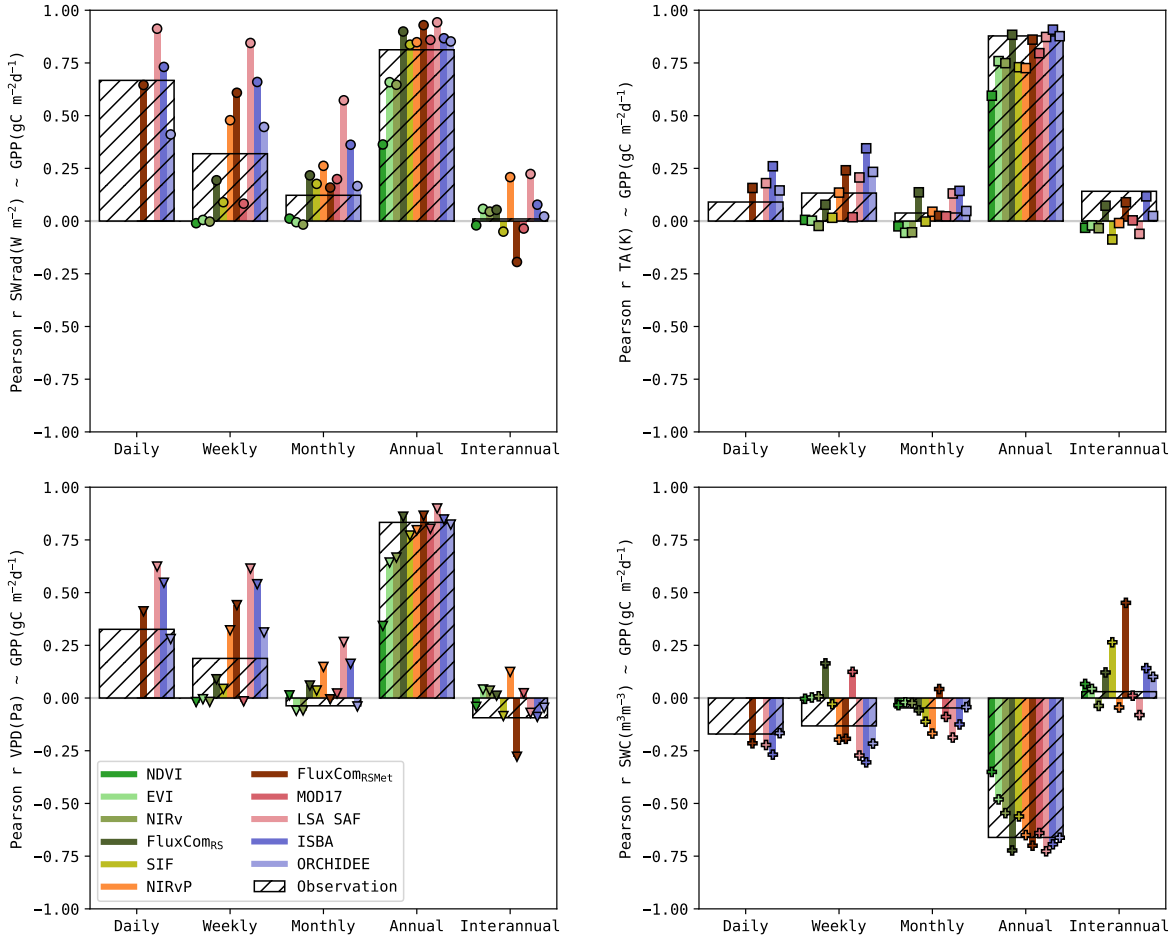

Figure S5. Correlation of the simulated GPP and its drivers (median for all sites). Correlation based on observations are in the hashed bars. The colored barplots indicate the correlation in the simulations.

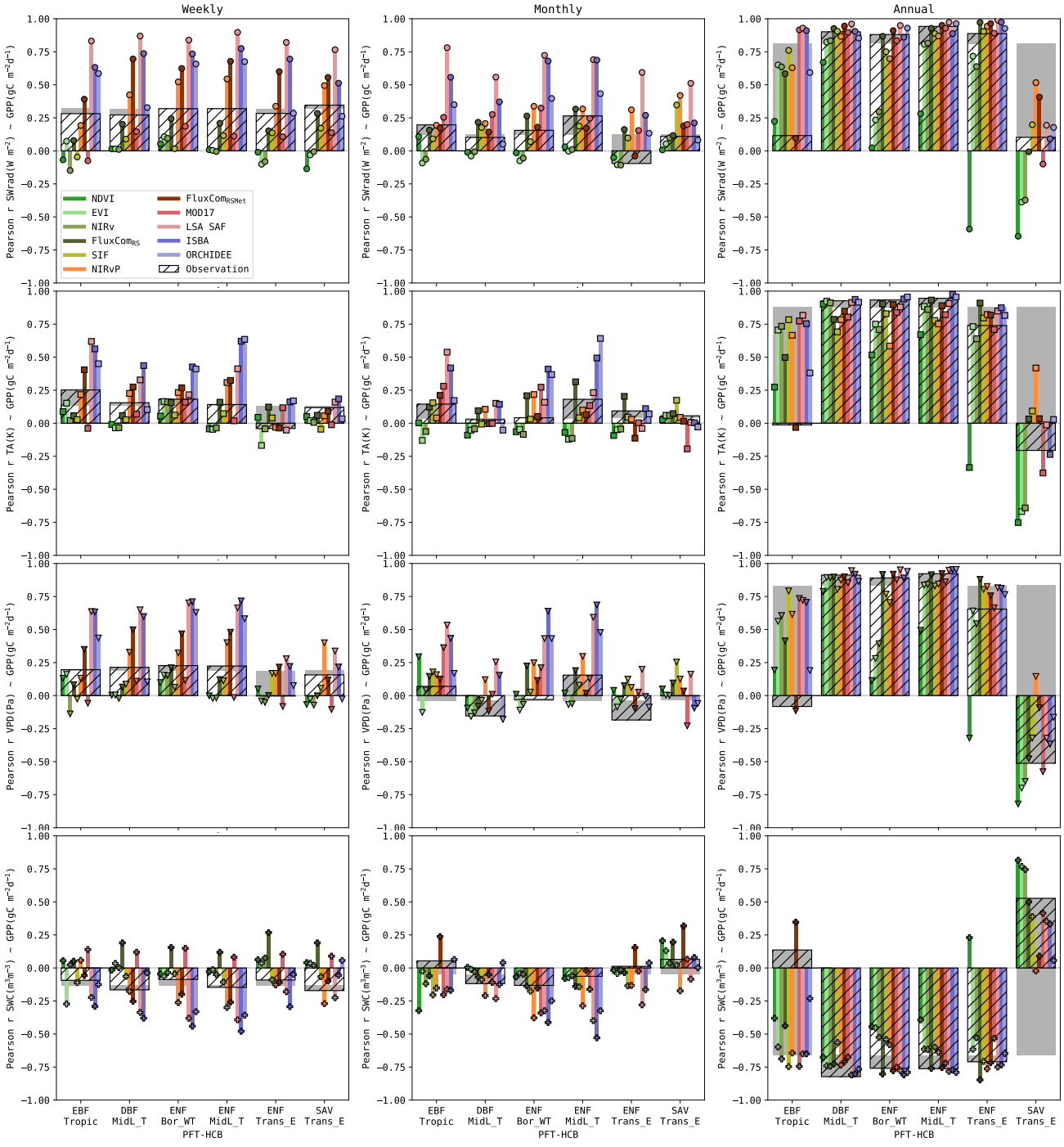

Figure S6. Pearson r of the simulated GPP and its drivers at weekly, monthly and seasonal scale. Correlation based on observations are in the hashed bars and gray bars highlight the deviation for a land cover from the overall average. The colored barplots indicate the correlation in the simulations.

S10 Accuracy of the GPP-driver covariance

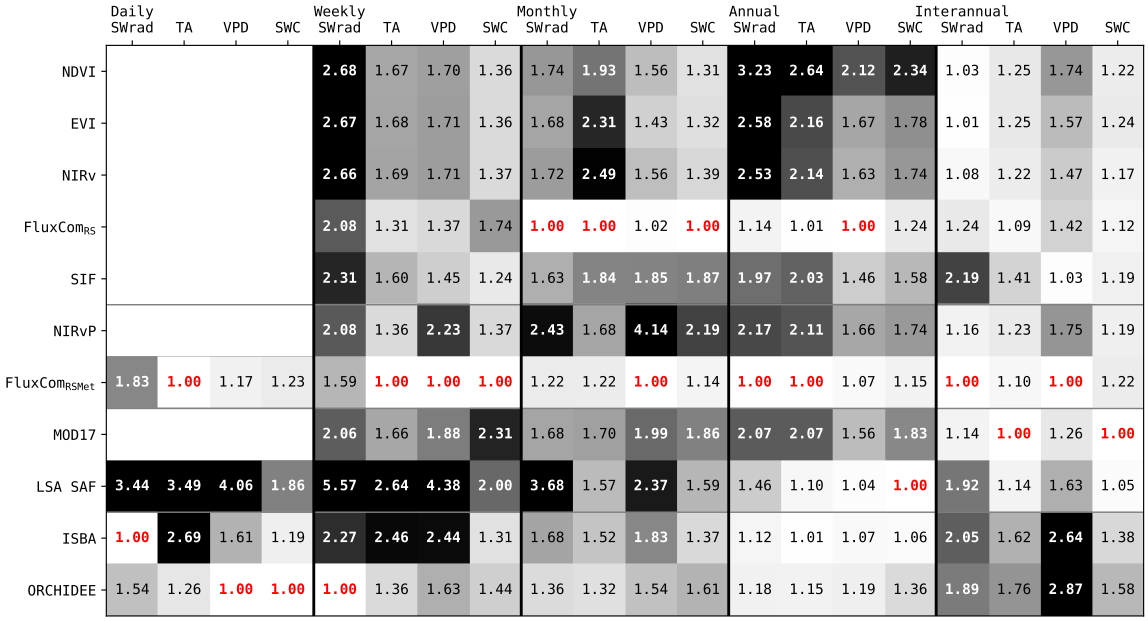

Table S10. RMSE of the driver-GPP covariances at weekly, monthly and annual timescale. The values are relative to the lowest RMSE score (best model has unitless value 1)

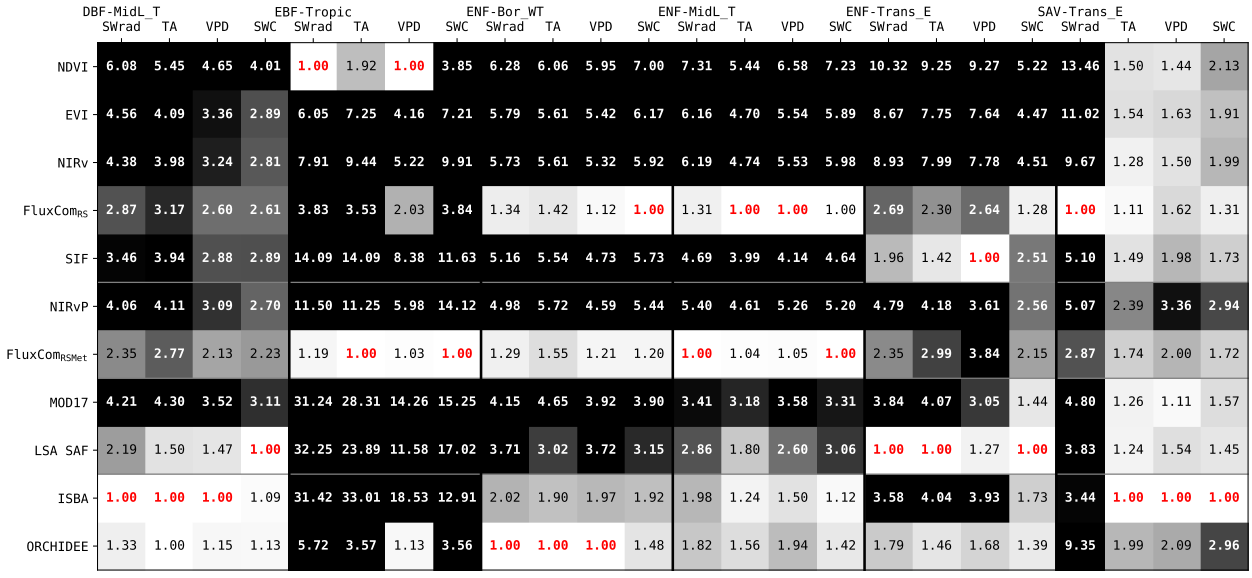

Table S11. RMSE of the driver-GPP covariances at annual timescale, per biome. The values are relative to the lowest RMSE score (best model has unitless value 1)

S11 Phenology

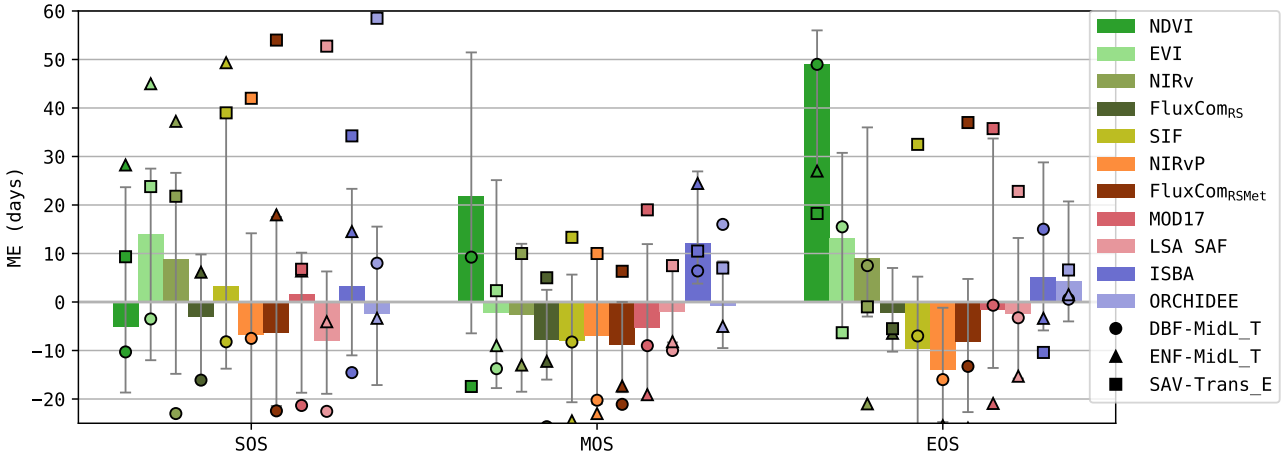

Figure S7. Mean errors (per site) in the timing of the start, max and end of the seasonal GPP cycle (SOS, MOS and EOS)

S12 Mean annual cycle

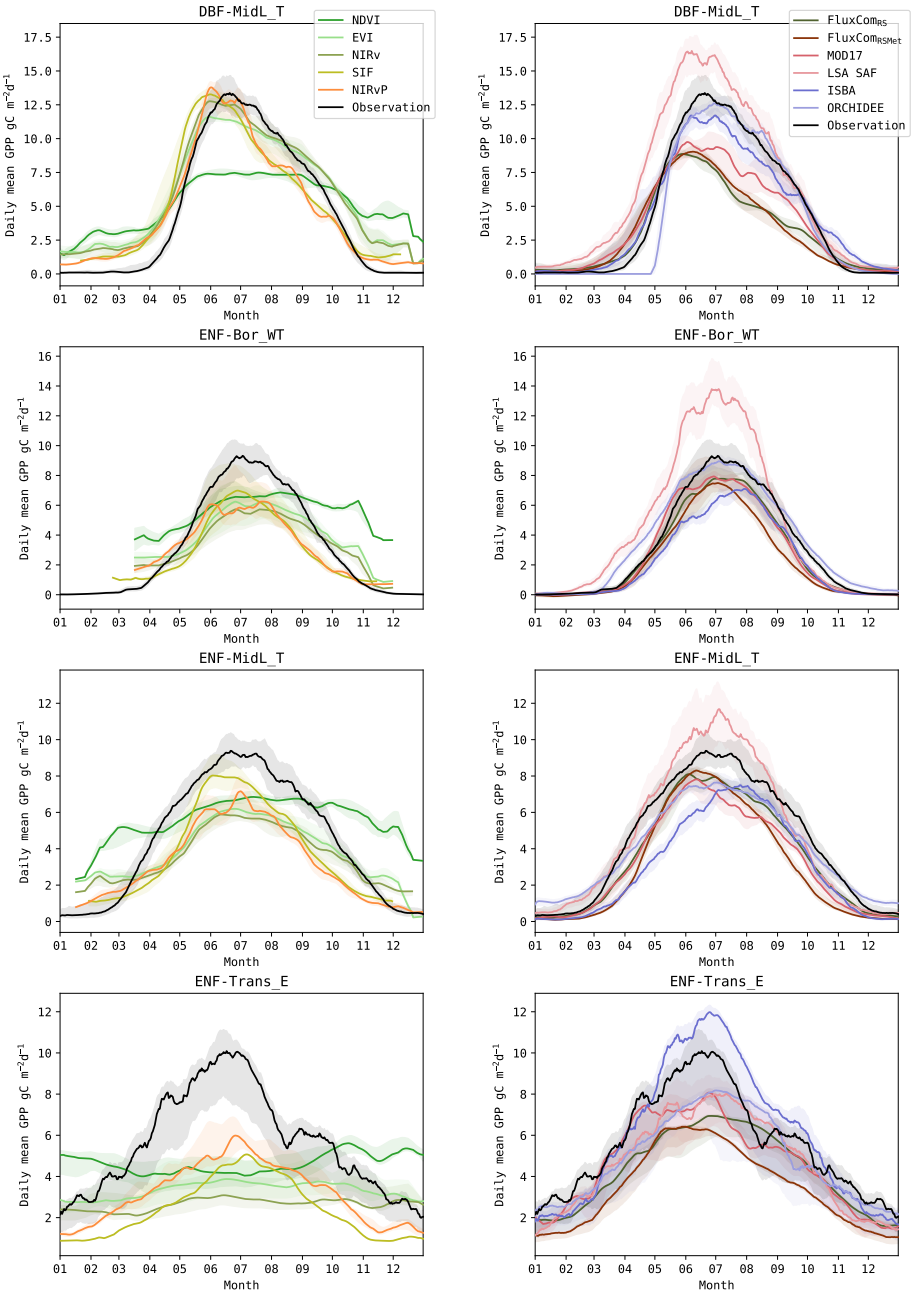

Figure S8. Annual GPP cycle in observations and models, for sites in the DBF-Midl_T, ENF-Bor_WT , ENF-Midl_T and ENF-Trans_E biomes. The lines show the median cycle, and the shaded area shows the 25-75 percentile. Timeseries of sites located at the southern hemisphere were shifted by 6 months, to match with the annual cycle of sites in the northern hemisphere.

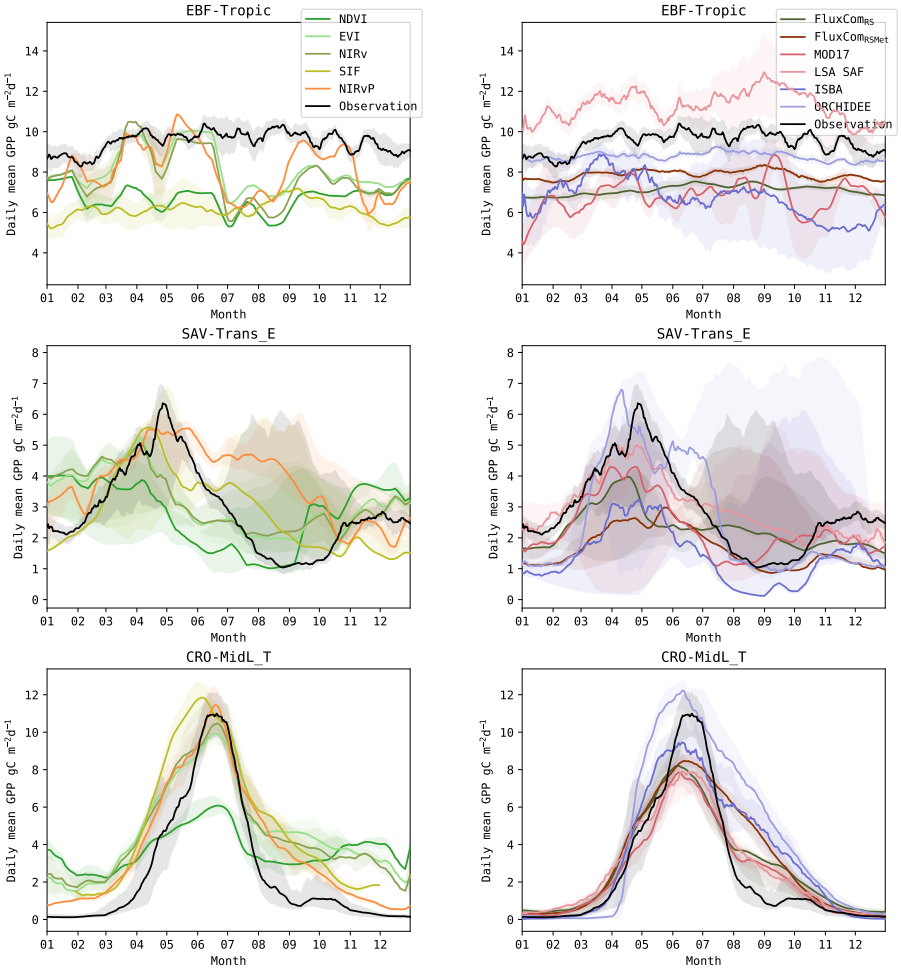

Figure S9. Annual GPP cycle in observations and models, for sites in the EBF-Tropic, SAV-Trans_E , and CRO-Midl_T biomes. The lines show the median cycle, and the shaded area shows the 25-75 percentile. Timeseries of sites located at the southern hemisphere were shifted by 6 months, to match with the annual cycle of sites in the northern hemisphere.

S13 PFT-specific regressions

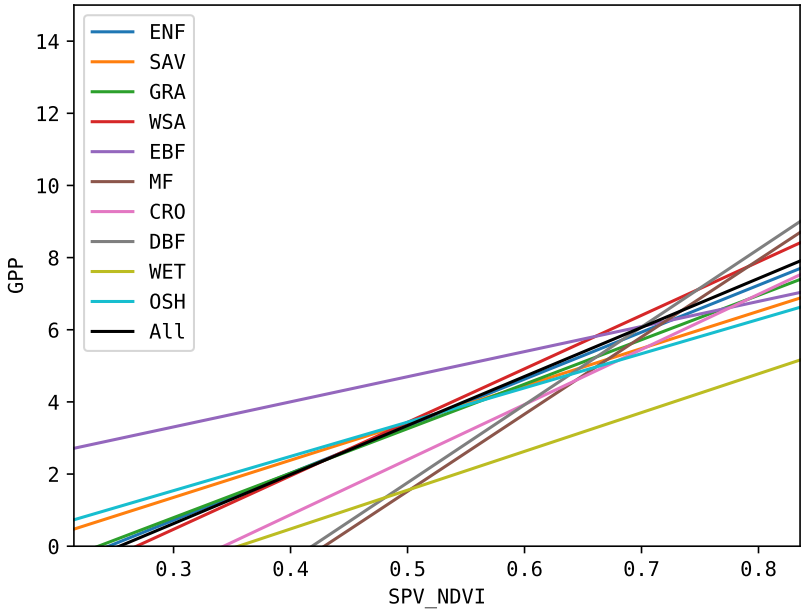

Figure S10. Quantile regression models to estimate GPP from NDVI. The global regression (in black) and PFT-specific regressions (in colors) are shown. The same was performed for EVI, NIRv, SIF and NIRvP.

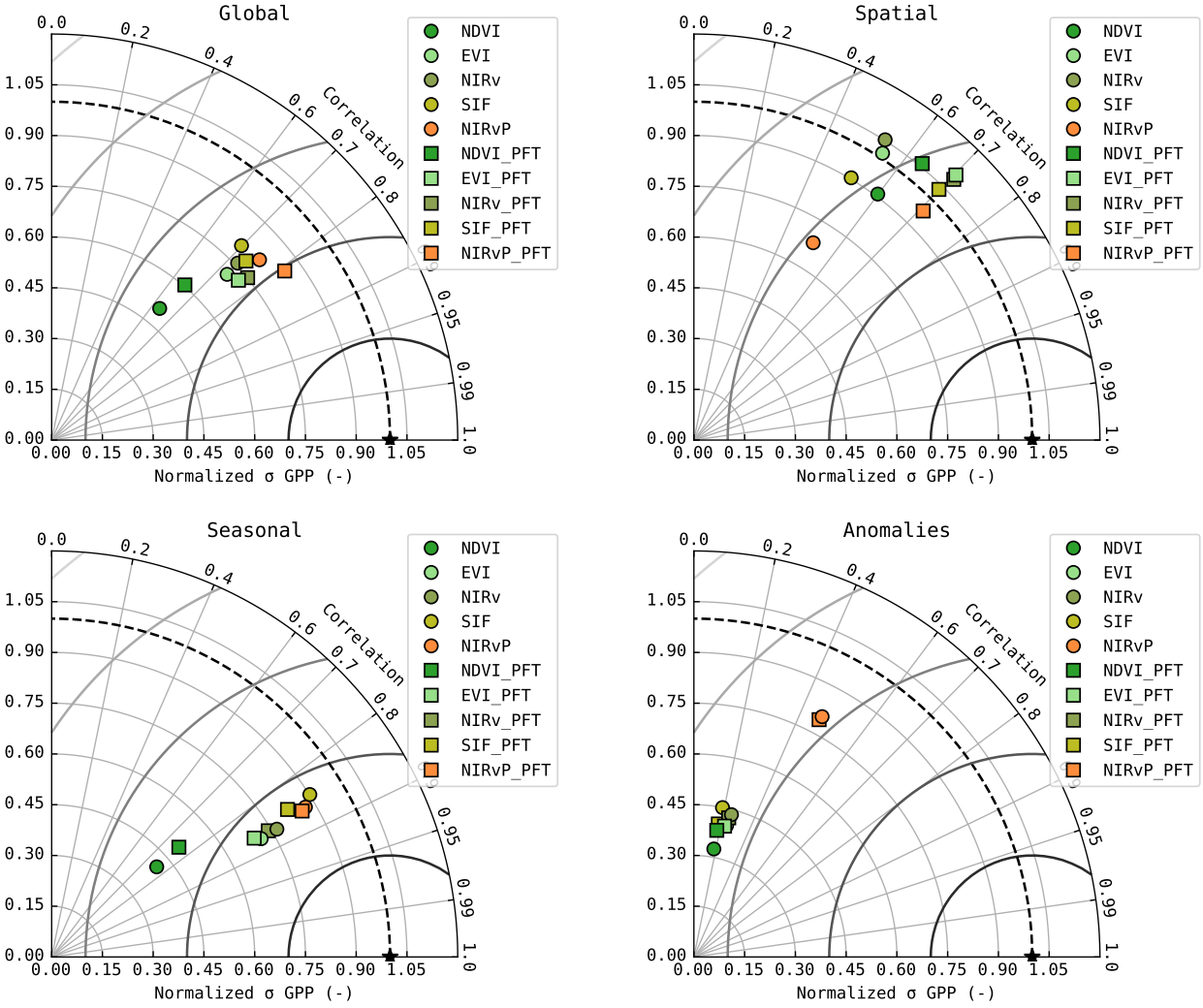

Figure S11. Taylor diagram of the simulated GPP with global and PFT-specific regression. The validation of the full dataset is shown (top left), as well as the spatial component (top right), seasonal component (bottom left) and anomalies (bottom right)