

# Ecosystem physio-phenology revealed using circular statistics

## Supplementary information (II)

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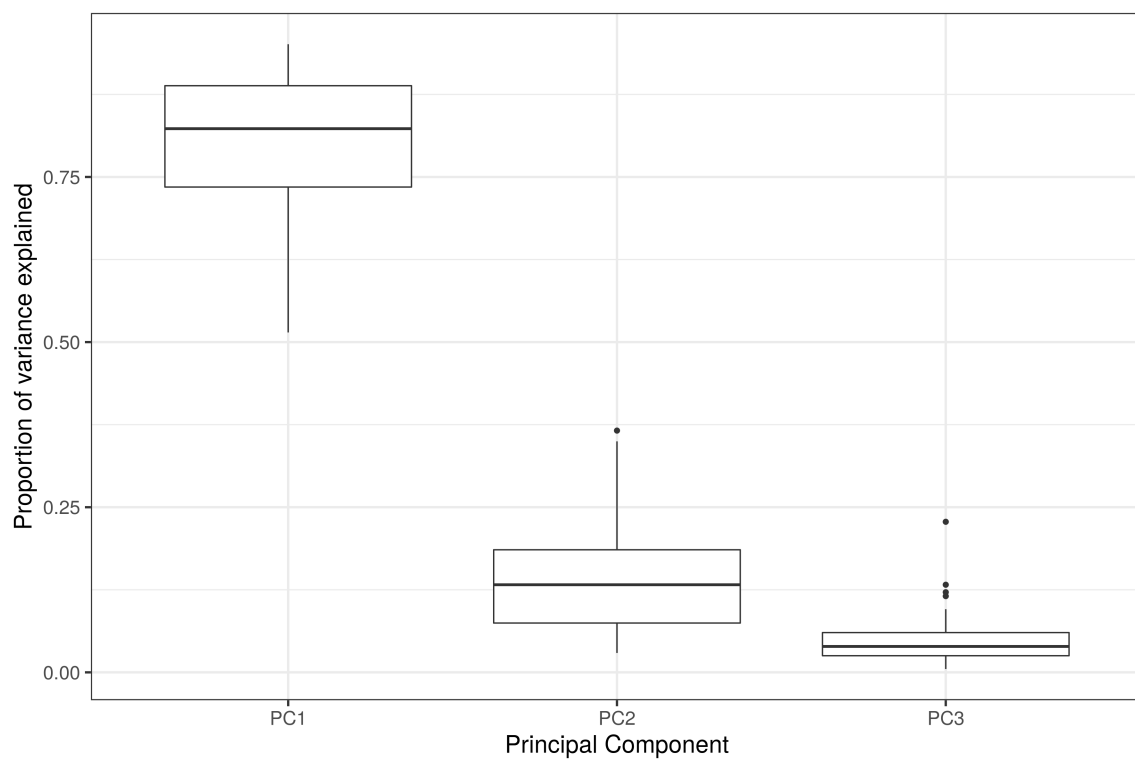
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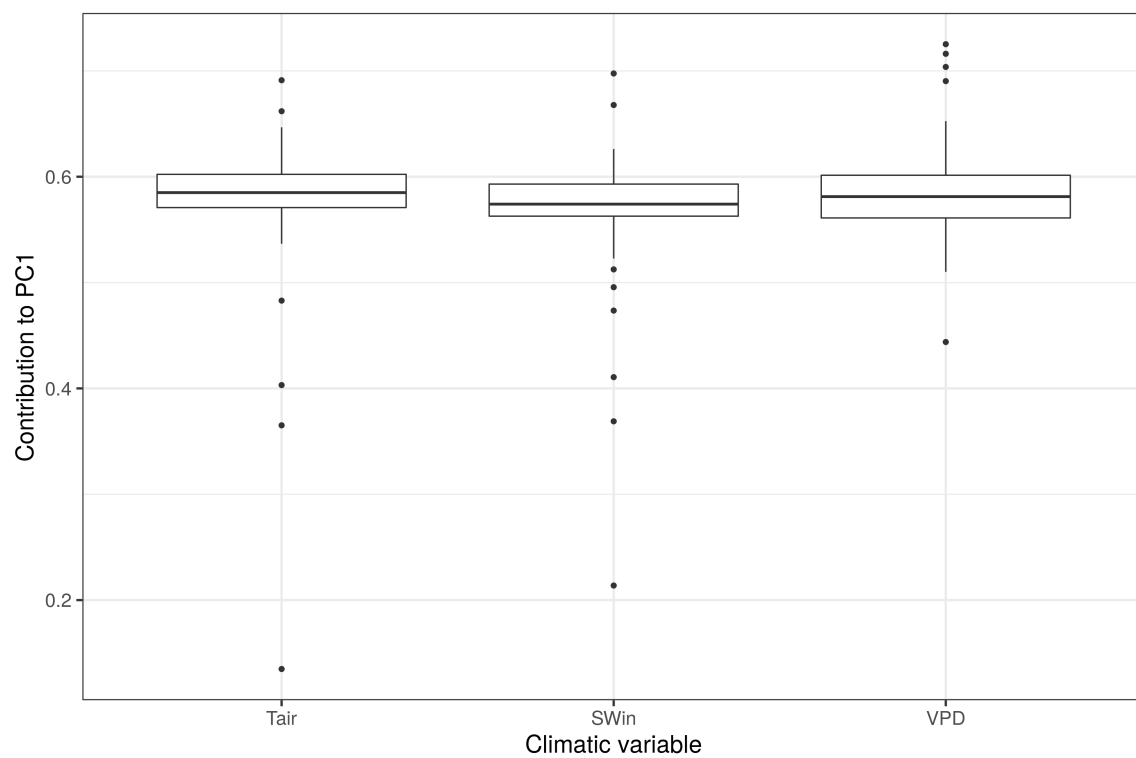
### 1 Principal Component Analysis for Air temperature, Short-wave Incoming Radiation, and Vapor pressure deficit

The principal component analysis shows that for most of the sites the first component explain more than 70 % of the variation for air temperature, short-wave incoming radiation and vapor pressure deficit (Fig. S1, Tab. S1). For the first component the contribution of each variable is similar between the sites (Fig. S2, Tab. S2). The results show that to some extent all variables

5 are represented in the first component.



**Figure S1.** Contribution of each principal component to explain the variance of air temperature, short-wave incoming radiation and vapor pressure deficit. Each category represent the distribution for all the FLUXNET sites analyzed in this study.



**Figure S2.** Contribution of the climate variables to PC1. Tair = Air temperature, SWin = Short-wave Incoming radiation, VPD = Vapor pressure deficit. For visualization purposes if the sign of the contribution was negative for all variables of the site, the sign was changed to positive

Table S1: Contribution of the principal components to explain the variance of air temperature, short-wave incoming radiation, and vapor pressure deficit.

Site name	PC1	PC2	PC3
US-Ha1	0.81	0.14	0.05
US-PFa	0.79	0.17	0.04
BE-Bra	0.89	0.07	0.04
BE-Vie	0.87	0.11	0.02
DE-Tha	0.87	0.09	0.04
DK-Sor	0.83	0.12	0.04
FI-Hyy	0.73	0.17	0.1
IT-Col	0.87	0.07	0.06
NL-Loo	0.78	0.15	0.08
CH-Dav	0.82	0.14	0.04
RU-Fyo	0.82	0.13	0.05
US-NR1	0.94	0.04	0.03
IT-Ren	0.82	0.14	0.03
US-MMS	0.82	0.13	0.05
US-WCr	0.75	0.18	0.07
CA-Man	0.64	0.35	0.01
DK-ZaH	0.7	0.24	0.06
FR-Pue	0.73	0.21	0.06
US-Los	0.71	0.24	0.04
US-UMB	0.85	0.13	0.03
US-Var	0.95	0.03	0.02
AU-How	0.62	0.29	0.09
AU-Tum	0.9	0.07	0.03
FI-Sod	0.77	0.21	0.03
IT-SRo	0.9	0.08	0.02
US-Syv	0.91	0.05	0.04
US-Ton	0.92	0.07	0.01
ZA-Kru	0.76	0.19	0.05
DE-Hai	0.86	0.1	0.04
FR-LBr	0.73	0.15	0.12

IT-Cpz	0.78	0.15	0.08
US-Me2	0.86	0.13	0.01
IT-Lav	0.77	0.17	0.06
RU-Cok	0.63	0.37	0.01
AT-Neu	0.88	0.09	0.03
CH-Lae	0.92	0.06	0.03
DE-Gri	0.91	0.05	0.04
GF-Guy	0.84	0.11	0.05
IT-MBo	0.54	0.33	0.13
IT-Noe	0.92	0.05	0.03
IT-Ro2	0.9	0.07	0.03
US-Blo	0.88	0.12	0.01
US-GLE	0.92	0.06	0.02
US-SRM	0.51	0.26	0.23
US-Wkg	0.58	0.29	0.12
BR-Sa1	0.94	0.05	0.01
CH-Cha	0.92	0.06	0.02
CH-Fru	0.73	0.2	0.07
ES-LJu 1	0.82	0.15	0.03
ES-LJu 2	0.73	0.2	0.07
FR-Fon	0.82	0.14	0.04
CZ-wet	0.88	0.1	0.02
IT-Ro1	0.66	0.32	0.02

Table S2: Contribution of the climate variables to the first component (PC1). Tair = Air Temperature, SWin = Short-wave Incoming radiation, VPD = Vapor Pressure Deficit

Site name	Tair	SWin	VPD
US-Ha1	0.57	0.61	0.55
US-PFa	0.62	0.58	0.53
BE-Bra	0.57	0.59	0.57
BE-Vie	0.58	0.6	0.55
DE-Tha	0.58	0.56	0.59
DK-Sor	0.57	0.56	0.61

FI-Hyy	0.54	0.59	0.6
IT-Col	0.58	0.57	0.58
NL-Loo	0.54	0.6	0.59
CH-Dav	0.61	0.54	0.58
RU-Fyo	0.57	0.61	0.56
US-NR1	-0.58	-0.58	-0.58
IT-Ren	0.61	0.58	0.53
US-MMS	0.59	0.59	0.54
US-WCr	0.61	0.6	0.52
CA-Man	0.4	0.57	0.72
DK-ZaH	0.6	0.47	0.65
FR-Pue	0.6	0.5	0.62
US-Los	0.65	0.62	0.44
US-UMB	0.59	0.53	0.6
US-Var	0.58	0.57	0.58
AU-How	0.37	0.67	0.65
AU-Tum	-0.59	-0.57	-0.57
FI-Sod	0.48	0.6	0.63
IT-SRo	0.59	0.57	0.56
US-Syv	0.58	0.57	0.58
US-Ton	0.6	0.56	0.57
ZA-Kru	0.6	0.62	0.51
DE-Hai	0.59	0.58	0.56
FR-LBr	0.57	0.57	0.59
IT-Cpz	-0.61	-0.56	-0.56
US-Me2	0.6	0.53	0.6
IT-Lav	0.62	0.58	0.54
RU-Cok	0.55	0.41	0.73
AT-Neu	0.58	0.59	0.56
CH-Lae	0.57	0.57	0.59
DE-Gri	0.58	0.57	0.58
GF-Guy	0.57	0.57	0.6
IT-MBo	0.13	0.7	0.7

IT-Noe	0.59	0.58	0.57
IT-Ro2	0.59	0.57	0.58
US-Blo	0.6	0.53	0.59
US-GLE	0.58	0.57	0.58
US-SRM	0.61	0.56	0.56
US-Wkg	0.66	0.37	0.65
BR-Sa1	0.58	0.57	0.58
CH-Cha	0.57	0.58	0.58
CH-Fru	0.59	0.63	0.51
ES-LJu 1	-0.61	-0.52	-0.6
ES-LJu 2	0.63	0.51	0.59
FR-Fon	0.54	0.6	0.59
CZ-wet	0.56	0.57	0.6
IT-Ro1	0.69	0.21	0.69