

Supplementary information

The three major axes of terrestrial ecosystem function

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SUPPLEMENTARY INFORMATION 2

Significance test of the PCA and information redundancy

We evaluated the number of significant axes to be retained in the PCA analysis using the method developed by Dray¹ implemented in the R package ‘*ade4*’². The method is based on similarity measures and the computation of the RV coefficients. The number of permutations used was 999. We found that the significant number of components to be retained that minimize redundancy and loss of information in our study were 3. Therefore PC1, PC2, and PC3 are used in the manuscript.

In order to test the significance of the PCA loadings, we used a combination of three methods: 1) the bootstrapped eigenvector method³, 2) the threshold method – loadings are significant when their absolute value and contribution are larger than a specific threshold depending on the number of dimensions (n_{dim} , i.e. variables), and 3) a fixed threshold fixed according to Richman et al.,⁴. In practice the loadings are significant, and considered as “high relevance”, if 1) the *p-value* from method 1 is below 0.01; 2) their contribution is above $1/n_{\text{dim}}$ (i.e. above 8.3%); and 3) the absolute value of the loadings is above 0.3⁴. The results are summarized in Table S3

The variables considered as significant contributor are indicated in orange bars in Fig. 1 in the main manuscript.

Table SI 2 – Results of the significance tests of the PCA results.

uWUE	ETmax	GSmax	G1	EF	EFampl	GPPsat	NEPmax	Rb	Rbmax	aCUE	WUEt	PC	Method
0.000999001	0.000999001	0.000999001	0.001998002	0.000999001	0.006993007	0.000999001	0.000999001	0.000999001	0.000999001	0.190809191	0.001998002	PC1	Peres-Neto et al., 2003
0.000999001	0.000999001	0.000999001	0.000999001	0.000999001	0.213786214	0.428571429	0.394605395	0.026973027	0.061938062	0.088911089	0.000999001	PC2	Peres-Neto et al., 2003
0.000999001	0.000999001	0.000999001	0.002997003	0.002997003	0.003996004	0.00999001	0.000999001	0.000999001	0.000999001	0.001998002	0.04995005	PC3	Peres-Neto et al., 2003
7.708154434	10.03075429	5.880569121	2.173290044	9.181938859	0.818139908	19.57794222	17.94961399	13.82763524	9.756121477	0.20055208	2.895288341	PC1	Threshold
17.42285848	13.04828471	12.05430943	23.66945175	14.57508742	0.198085833	0.001615278	0.003484071	0.754914679	0.755545231	0.417359938	17.09900319	PC2	Threshold
3.379269342	2.926291726	6.413253626	2.867850108	1.652127883	12.22179405	0.688288113	2.949832357	13.16831749	15.37805824	37.14937935	1.205537727	PC3	Threshold
0.602958338	0.68782649	0.526649627	0.320162857	0.65808092	0.196438175	0.960938564	0.920109803	0.807580937	0.678345114	0.097258079	0.369537071	PC1	Threshold Richmann 1988
0.668208909	0.578268145	0.555806632	0.778837145	0.61116453	0.071249081	0.006433929	0.009449222	0.139091789	0.139149866	0.10342081	0.66196946	PC2	Threshold Richmann 1988
0.211808006	0.197101431	0.291789847	0.195123327	0.148099229	0.402808335	0.095590801	0.197892637	0.418115351	0.451836925	0.702274258	0.126508985	PC3	Threshold Richmann 1988

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