

Global patterns of phosphatase activity in natural soils

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SUPPLEMENTARY INFORMATION

Competing financial interests

The author(s) declare no competing financial interests

Fig S1 Histogram

Histogram of Acid phosphatase measurements compiled in these database (left, n=329). We log-transformed Acid phosphatase values for the modeling to ensure that the residuals were approximately normally distributed (right, n=329).

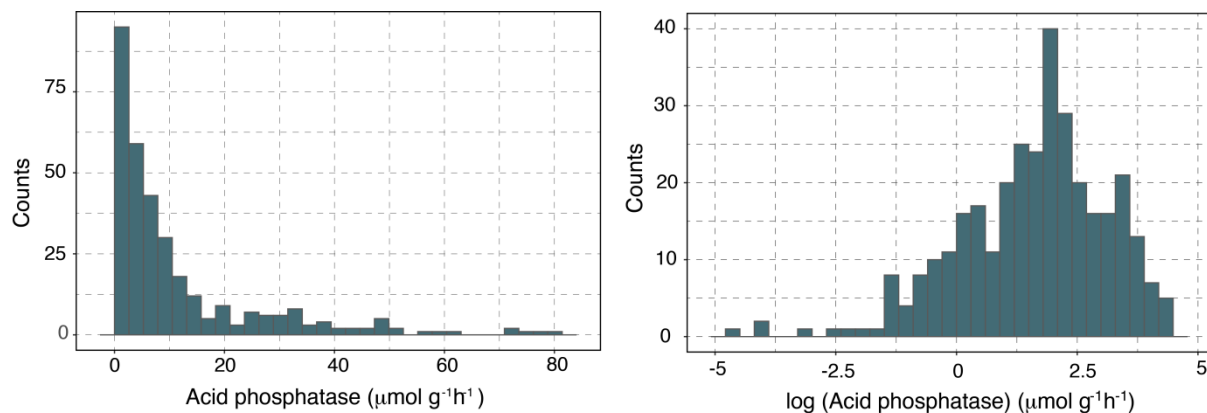
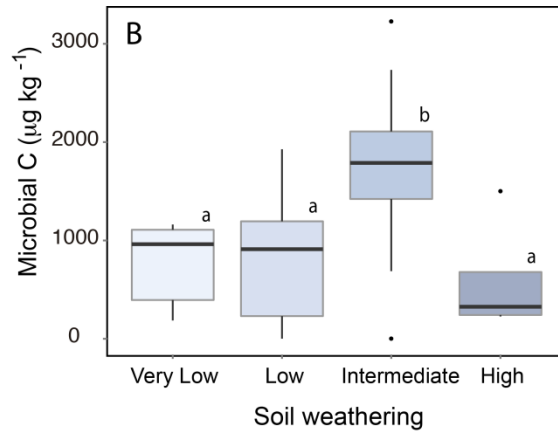
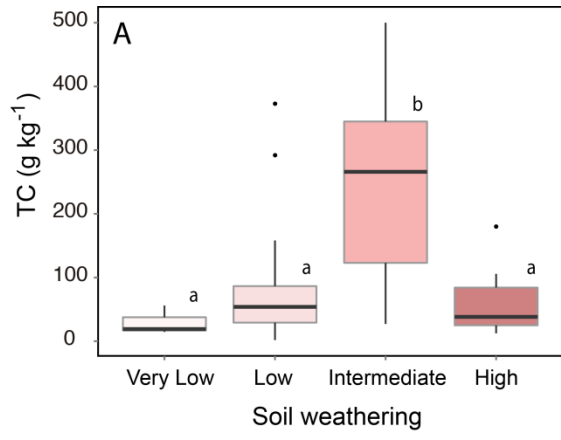


Fig S2 Soil weathering stages traits

Dependence of TC (A) and microbial C (B) on the amount of soil weathering (very low, low, intermediate and high). Boxplot show median values (solid horizontal line), 50th percentile values (box outline), 90th percentile values (whiskers), and outlier values. Letters represent the results of Tukey's post-hoc comparisons of group means.



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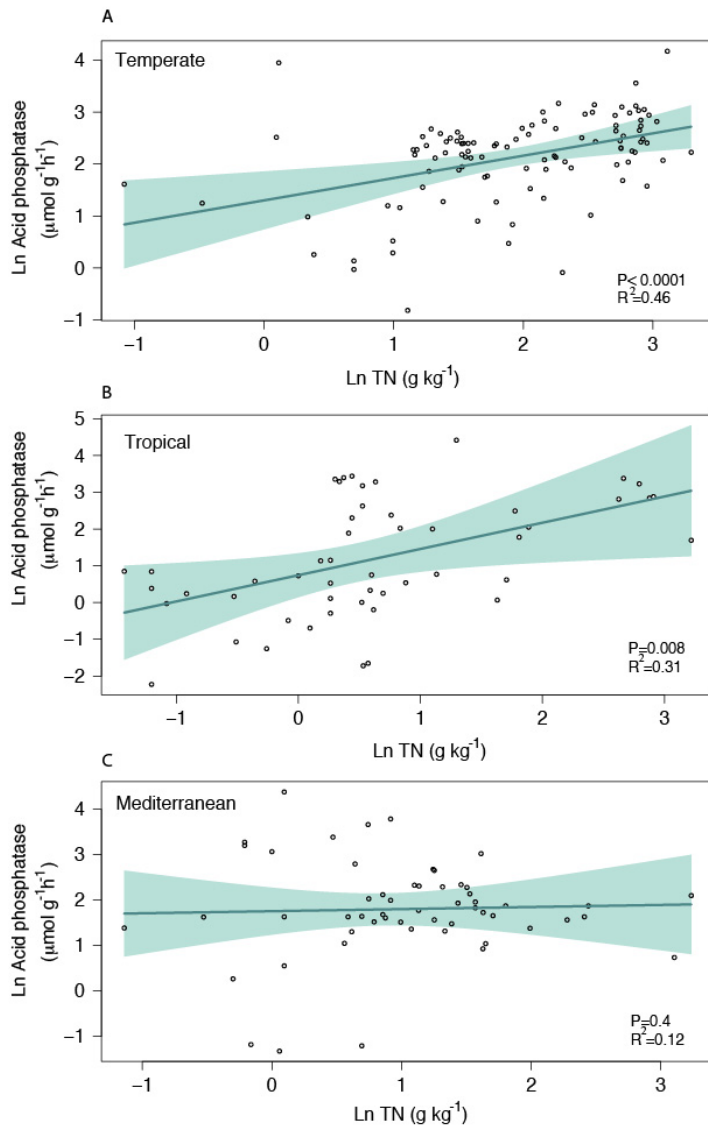
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45 **Fig S3 Effect of TN across biomes**

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47 Partial residual plot of the variability of global Ln phosphatase activity ($\mu\text{mol g}^{-1} \text{h}^{-1}$) explained by Ln TN (g kg^{-1})
48 (*visreg* R package) for temperate (A), tropical (B) and mediterranean (C) biomes.
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Fig S3 Effect of TN across vegetation type

Scatterplot showing the relationship between Acid Phosphatase and TN. Variables were Ln-transformed. Forest vs. Grassland communities are highlighted. Grassland category includes grasslands and pastures.

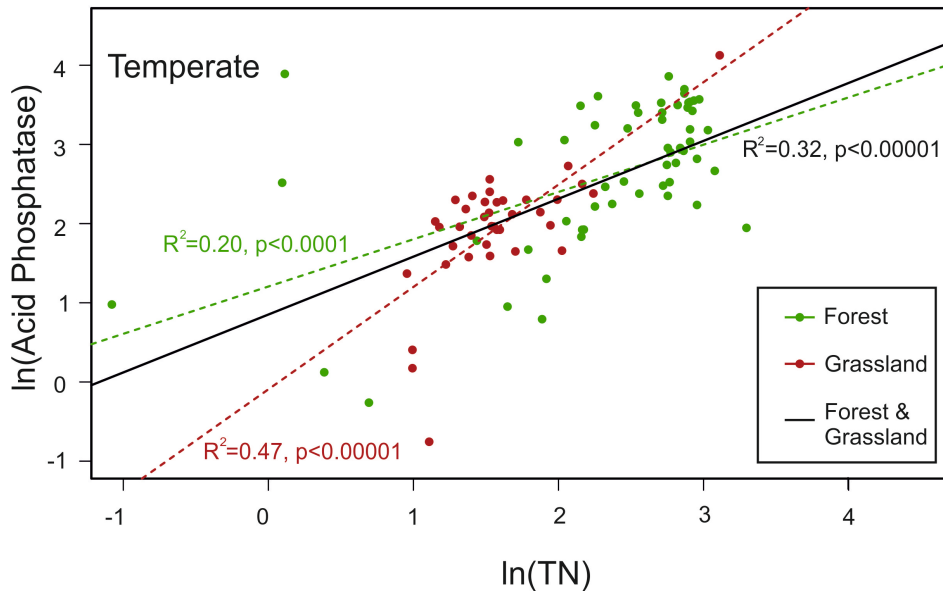
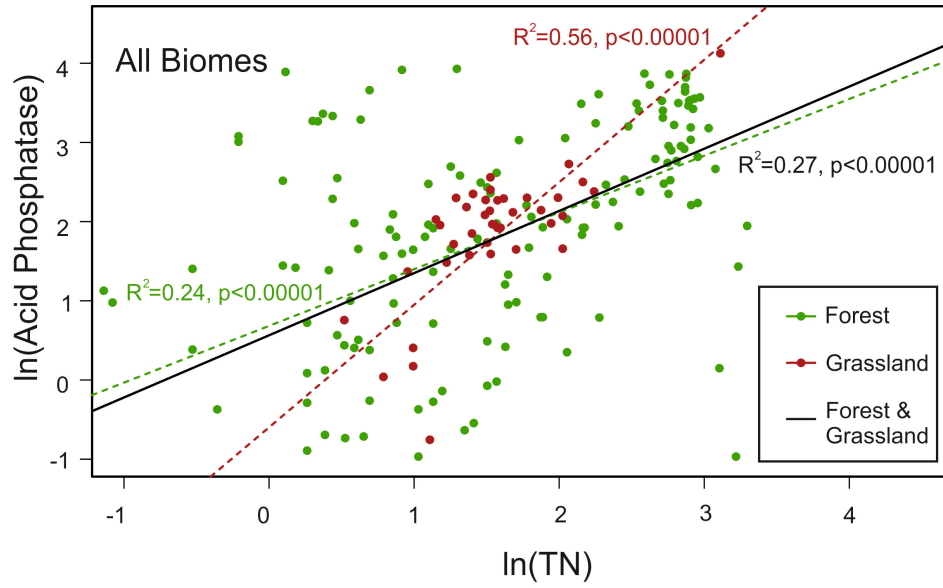


Table S1. Linear model with and without interactions combining TN, MAT, MAP and TN, MAT, MAP, TC and AMP as explanatory variables of acid phosphatase activity. Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘.’ 1

	Estimate	SE	<i>t</i>	<i>P</i>	Sig. Code	βCoeff
Model 1: TN, MAP, MAT with interactions, Multiple R2: 0.27, adjusted R2: 0.26 <i>F</i> : 29.04 on 3 and 235 DF, <i>P</i> : 5.253e ⁻¹⁶ , No. observations in the fit: 239						
Intercept	-52.681	26.39	-1.97	0.0471	*	
Ln TN	0.765	0.091	8.398	4.31E-15	***	0.553
Ln MAP	0.079	0.166	0.477	0.634		0.03
Ln MAT	9.323	4.73	1.97	0.05	.	0.133
Model 2: TN, MAP, MAT with interactions, Multiple R2: 0.30, adjusted R2: 0.28 <i>F</i> : 16.4 on 6 and 232 DF, <i>P</i> : 9.472e ⁻¹⁶ , No. observations in the fit: 239						
Intercept	-754	249	-3.03	0.0027	**	-
Ln TN	0.8	20.9	0.038	0.9695		-
Ln MAP	100.43	35.9	2.8	0.0056	**	-
Ln MAT	133.2	43.9	3.04	0.0027	**	-
Ln TN:Ln MAP	0.053	0.14	0.38	0.71		-
Ln TN:Ln MAP	-0.076	3.75	-0.02	0.98		-
Ln MAT:Ln MAP	-17.7	6.34	-2.8	0.0056	**	-
Model 3 : TN, MAP, MAT, AMP, TC without interactions, Multiple R2: Multiple R2: 0.50, adjusted R2: 0.49 <i>F</i> : 21.02 on 5 and 104 DF, <i>P</i> : <1.798e ⁻¹⁴ No. observations in the fit: 110						
Intercept	-52.681	26.39	-1.97	0.0471	**	
Ln TN	0.765	0.091	8.398	4.31E-15	***	0.697
Ln MAP	-0.19	0.329	-0.578	0.564		-0.051
Ln MAT	27.53	7.988	3.446	0.0008	***	0.338
Ln TC	-0.012	0.1454	-0.083	0.933		-0.009
Ln Amp	-1.075	0.659	-1.633	0.1056		-0.161
Model 4 : TN, MAP, MAT, AMP, TC with interactions, Multiple R2: Multiple R2: 0.67, adjusted R2: 0.62 <i>F</i> : 12.81 on 15 and 94 DF, <i>P</i> : <2.2e ⁻¹⁶ No. observations in the fit: 110						
Intercept	2888.3565	1199.5565	2.408	0.017999	*	-
Ln TN	133.01929	93.06713	1.429	0.156238		-
Ln MAP	-210.50512	137.94625	-1.526	0.130369		-
Ln MAT	-507.95906	209.42456	-2.425	0.017197	*	-
Ln Amp	-56.13413	71.09077	-0.79	0.431742		-
Ln TC	-523.8962	135.09173	-3.878	0.000195	***	-
Ln TN:Ln MAP	1.04137	0.60578	1.719	0.088896	.	-
Ln TN:Ln MAP	-23.62698	15.47049	-1.527	0.130062		-
Ln MAT:Ln MAP	37.7051	23.88633	1.579	0.117805		-
Ln TN:Ln AMP	-0.09707	0.14196	-0.684	0.495789		-
Ln MAP:Ln AMP	-0.07585	0.36584	-0.207	0.836205		-
Ln MAT:Ln AMP	8.37083	11.9161	0.702	0.484115		-
Ln TN:Ln TC	-1.73328	1.30457	-1.329	0.187189		-
Ln MAP:Ln TC	-1.17335	1.16879	-1.004	0.318003		-
Ln MAT:Ln TC	92.04352	24.20831	3.802	0.000255	***	-
Ln Amp:Ln TC	3.12774	1.03766	3.014	0.003312	**	-

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Table S2. Linear model with and without interactions combining TN, MAT, MAP and TN, MAT, MAP, TC and AMP as explanatory variables of acid phosphatase activity for only temperate sites. Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘.’ 1

	Estimate	SE	<i>t</i>	<i>P</i>	Sig. Code	βCoeff
Model 1: TN, MAP, MAT with interactions, Multiple R2: 0.41, adjusted R2: 0.39 <i>F</i> : 22.98 on 3 and 100 DF, <i>P</i> : 2.135e ⁻¹¹ , No. observations in the fit: 104						
Intercept	-131.89	52.032	-2.535	0.0128	*	
Ln TN	0.514	0.1081	4.751	6.78E-06	***	0.416
Ln MAP	0.6506	0.2279	2.855	0.00523	**	0.239
Ln MAT	22.77	9.21	2.47	0.015	*	0.199
Model 2: TN, MAP, MAT with interactions, Multiple R2: 0.46, adjusted R2: 0.42 <i>F</i> : 13.57 on 6 and 97 DF, <i>P</i> : 3.998e ⁻¹¹ No. observations in the fit: 104						
Intercept	-552	769	-0.717	0.475		-
Ln TN	-90	61.1	-1.47	0.144		-
Ln MAP	78.7	103	0.77	0.446		-
Ln MAT	98	137	0.718	0.475		-
Ln TN:Ln MAP	0.4329	0.34	1.26	0.21		-
Ln TN:Ln MAP	15.5	11	1.4	0.164		-
Ln MAT:Ln MAP	-13.9	18.3	-0.764	0.447		-
Model 3: TN, MAP, MAT, AMP, TC without interactions, Multiple R2: 0.50, adjusted R2: 0.56 <i>F</i> : 21.22 on 5 and 73 DF, <i>P</i> : <4.853e ⁻¹³ No. observations in the fit: 79						
Intercept	-191.5875	79.3329	-2.415	0.0182	*	
Ln TN	0.6765	0.162	4.176	8.11E-05	***	0.517
Ln MAP	0.8366	0.3351	2.496	0.0148	*	0.237
Ln MAT	33.79	13.94	2.424	0.017	*	0.2955
Ln TC	-0.1858	0.1472	-1.262	0.2108		-0.1947
Ln Amp	-1.0891	0.672	-1.621	0.1094		-0.1463
Model 4: TN, MAP, MAT, AMP, TC with interactions, Multiple R2: 0.84, adjusted R2: 0.80 <i>F</i> : 21.45 on 15 and 63 DF, <i>P</i> : <2.2e ⁻¹⁶ , No. observations in the fit: 79						
Intercept	3834.4786	2779.078	1.38	0.17254	***	-
Ln TN	6.3961	137.9777	0.046	0.96317	***	-
Ln MAP	3.3291	315.9972	0.011	0.99163		-
Ln MAT	-666.9843	492.8147	-1.353	0.18076		-
Ln Amp	-120.9173	92.7636	-1.303	0.19715		-
Ln TC	-1150.3699	344.781	-3.337	0.00143	**	-
Ln TN:Ln MAP	0.2948	0.9338	0.316	0.75325		-
Ln TN:Ln MAT	-1.3264	23.8159	-0.056	0.95576		-
Ln MAT:Ln MAP	-2.3051	55.4016	-0.042	0.96694		-
Ln TN:Ln AMP	-0.4588	0.1509	-3.041	0.00343	**	-
Ln MAP:Ln AMP	0.6284	0.809	0.777	0.4402		-
Ln MAT:Ln AMP	20.9023	15.639	1.337	0.18618		-
Ln TN:Ln TC	0.6802	1.6586	0.41	0.68315		-
Ln MAP:Ln TC	2.2726	3.3639	0.676	0.50178		-
Ln MAT:Ln TC	200.6906	62.6777	3.202	0.00214	**	-
Ln Amp:Ln TC	-0.2184	1.4342	-0.152	0.87947		-

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73**Table S3.** Linear model with interactions and including TN, MAT, MAP and pH as explanatory variables of alkaline phosphatase activity. Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

	Estimate	SE	<i>t</i>	<i>P</i>	Sig. Code
Model alkaline: TN, MAP, MAT and pH with interactions, Multiple R2: 0.56, adjusted R2: 0.42 <i>F</i> : 4.246 on 15 and 51 DF, <i>P</i> : 5.099e ⁻⁰⁵ , No. observations in the fit: 67					
Intercept	21061.3	5784.8	3.64	0.000635	***
Ln TN	-8225.5	5729.4	-1.44	0.157205	
Ln MAP	-2817.6	784.7	-3.59	0.000741	***
Ln MAT	-3717	1022.5	-3.64	0.000645	***
Ln pH	-10376.5	2839.8	-3.65	0.00061	***
Ln TN:Ln MAP	1283.4	801	1.60	0.115289	
Ln TN:Ln MAT	1437.5	1012.1	1.42	0.161562	
Ln MAT:Ln MAP	497.1	138.6	3.59	0.00075	***
Ln TN:Ln pH	5271.1	2966.6	1.78	0.081567	.
Ln MAP:Ln pH	1391.9	391.6	3.55	0.000828	***
Ln MAT:Ln pH	1831.6	501.9	3.65	0.000619	***
Ln TN:Ln MAP:Ln MAT	-224.5	141.4	-1.59	0.118556	
Ln TN:Ln MAP:Ln pH	-810.3	422.8	-1.92	0.060913	.
Ln TN:Ln MAT:Ln pH	-922.4	523	-1.76	0.084282	.
Ln MAP:Ln MAT:Ln pH	-245.5	69.1	-3.55	0.000838	***
Ln TN: Ln MAP:Ln MAT:Ln pH	141.9	74.6	1.90	0.062919	.

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78 **Database literature**

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