A novel isotope pool dilution approach to quantify gross rates of key abiotic and biological processes in the soil phosphorus cycle

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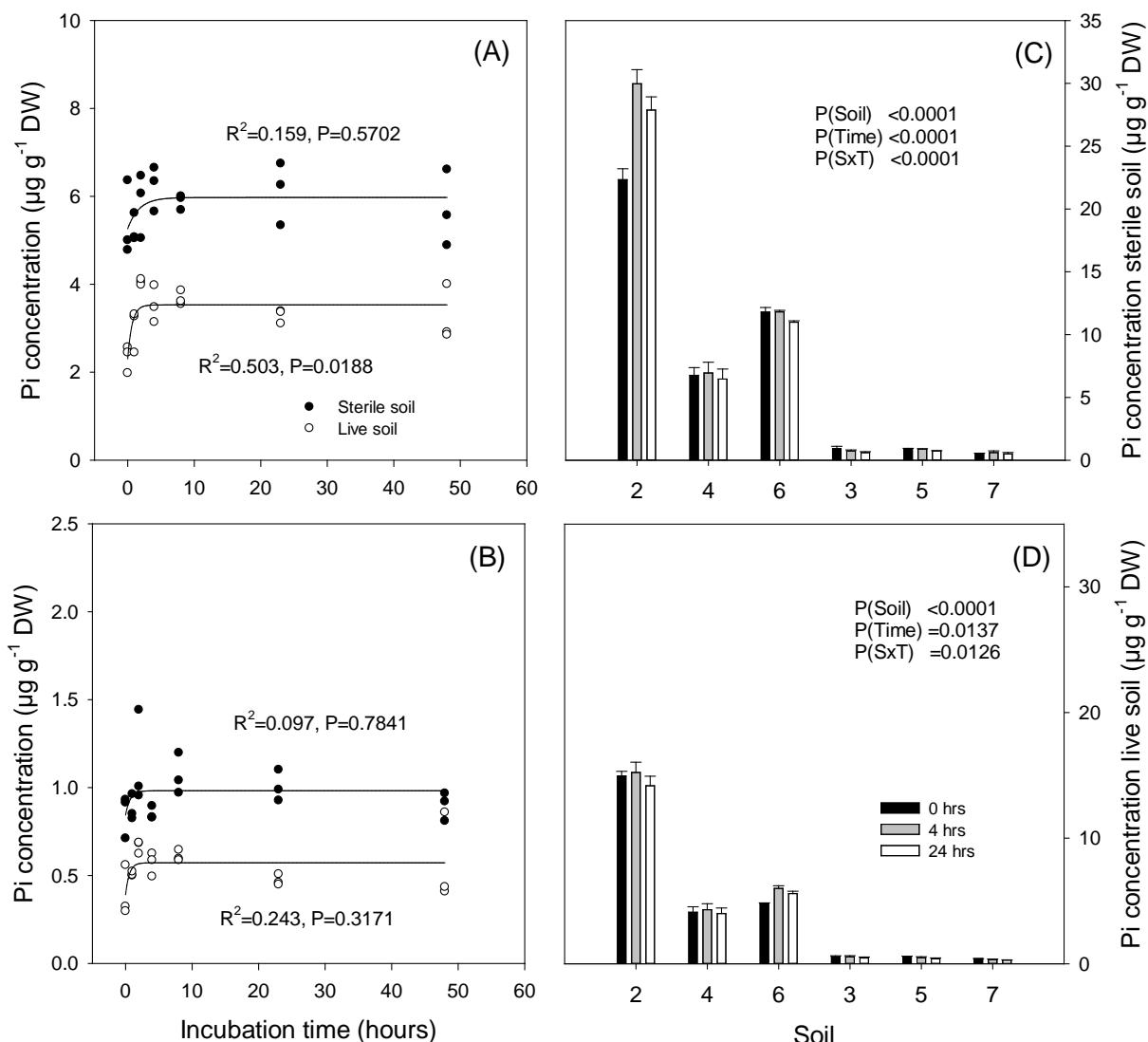
Supplementary Figure S1. P_i concentrations in live soils (open symbols) and sterile soils (closed symbols) measured for a temperate grassland (A) and a tropical forest (B) after 0, 1, 2, 4, 8, 24 and 48 hours and for six soils measured after 0, 4 and 24 hours (sterile soils, C; live soils, D). Three temperate grassland soils (2, 4, 6) and three tropical forest soils (3, 5, 7) were investigated (C, D). Curvilinear regressions following the function "exponential rise to maximum" were performed on the data in (A, B). Statistical analyses of data in (C, D) were run by two-way ANOVA for the factors soil and time (0, 4 and 24 hours after tracer addition), and the interaction of both factors.

25 Supplementary Table S1. Results of correlation analysis for six soils investigated for gross and net P processes, as well as soil pH, texture, element contents, microbial biomass and phosphatase activity. P values <0.05 are given in red.

Parameter	Stats	Gross Pi influx		Gross Pi efflux		Net Pi immobilization		Biotic contribution		Enzyme
		Gross Po mineralization	Gross Pi desorption	Gross microbial Pi uptake	Gross abiotic Pi sorption	Abiotic Pi immobilization	Biotic Pi immobilization	Biotic in % of total Pi influx	Biotic in % of total Pi efflux	Phosphatase
Gross Po mineralization	r		0.8956	0.9320	0.9109	-0.9105	0.7403	-0.3423	-0.3228	-0.7760
	P		0.0158	0.0068	0.0115	0.0117	0.0924	0.5066	0.5326	0.0697
Gross Pi desorption	r	0.8956		0.7498	0.9963	-0.7872	0.4575	-0.5638	-0.5801	-0.7811
	P	0.0158		0.0861	0.0000	0.0631	0.3617	0.2439	0.2274	0.0666
Gross microbial Pi uptake	r	0.9320	0.7498		0.7486	-0.9863	0.9279	-0.3329	-0.1456	-0.8457
	P	0.0068	0.0861		0.0869	0.0003	0.0076	0.5191	0.7832	0.0339
Gross abiotic Pi sorption	r	0.9109	0.9963	0.7486		-0.7732	0.4507	-0.5185	-0.5685	-0.7491
	P	0.0115	0.0000	0.0869		0.0713	0.3698	0.2919	0.2391	0.0865
Net abiotic Pi immobilization	r	-0.9105	-0.7872	-0.9863	-0.7732		-0.9028	0.4531	0.2286	0.9021
	P	0.0117	0.0631	0.0003	0.0713		0.0137	0.3669	0.6631	0.0139
Net biotic Pi immobilization	r	0.7403	0.4575	0.9279	0.4507	-0.9028		-0.2078	0.0815	-0.7328
	P	0.0924	0.3617	0.0076	0.3698	0.0137		0.6928	0.8781	0.0975
biot%total Pi release	r	-0.3423	-0.5638	-0.3329	-0.5185	0.4531	-0.2078		0.8655	0.6330
	P	0.5066	0.2439	0.5191	0.2919	0.3669	0.6928		0.0259	0.1774
biot%total Pi efflux	r	-0.3228	-0.5801	-0.1456	-0.5685	0.2286	0.0815	0.8655		0.3492
	P	0.5326	0.2274	0.7832	0.2391	0.6631	0.8781	0.0259		0.4975

Phosphatase activity	r	-0.7760	-0.7811	-0.8457	-0.7491	0.9021	-0.7328	0.6330	0.3492	
	P	0.0697	0.0666	0.0339	0.0865	0.0139	0.0975	0.1774	0.4975	
Soil pH	r	0.8269	0.7770	0.9262	0.7449	-0.9749	0.8454	-0.5619	-0.2767	-0.9370
	P	0.0423	0.0690	0.0080	0.0893	0.0009	0.0340	0.2459	0.5956	0.0058
Clay content	r	-0.3032	-0.0739	-0.4864	-0.0718	0.4475	-0.5961	-0.0642	-0.3720	0.5597
	P	0.5591	0.8894	0.3279	0.8925	0.3735	0.2118	0.9038	0.4677	0.2481
Silt content	r	-0.4032	-0.4568	-0.5923	-0.3905	0.7005	-0.6150	0.6434	0.2635	0.7050
	P	0.4280	0.3624	0.2154	0.4440	0.1212	0.1938	0.1681	0.6139	0.1177
Sand content	r	0.4677	0.4349	0.7010	0.3749	-0.7840	0.7597	-0.5529	-0.1054	-0.8271
	P	0.3497	0.3888	0.1207	0.4640	0.0649	0.0797	0.2551	0.8425	0.0423
Soil organic C	r	0.1643	0.3496	0.3353	0.2687	-0.4772	0.3364	-0.6613	-0.2594	-0.6486
	P	0.7558	0.4970	0.5159	0.6066	0.3386	0.5144	0.1526	0.6197	0.1635
Soil total N	r	0.1181	0.4512	0.1517	0.3765	-0.3109	0.0307	-0.7614	-0.5157	-0.5483
	P	0.8236	0.3692	0.7742	0.4620	0.5486	0.9539	0.0786	0.2950	0.2599
Soil total P	r	0.9329	0.9845	0.8396	0.9779	-0.8739	0.5911	-0.5949	-0.5458	-0.8625
	P	0.0066	0.0004	0.0365	0.0007	0.0228	0.2166	0.2129	0.2626	0.0271
Soil total organic P	r	0.6590	0.9210	0.4590	0.9059	-0.5364	0.1258	-0.6938	-0.7583	-0.6557
	P	0.1546	0.0091	0.3599	0.0129	0.2725	0.8122	0.1263	0.0806	0.1574
Soil total inorganic P	r	0.9790	0.8768	0.9740	0.8772	-0.9732	0.8227	-0.4347	-0.3144	-0.8729
	P	0.0007	0.2180	0.0010	0.0217	0.0011	0.0444	0.3891	0.5440	0.0232
Soil extractable Pi	r	0.9111	0.9899	0.7347	0.9982	-0.7516	0.4302	-0.4766	-0.5513	-0.7185
	P	0.0115	0.0002	0.0962	0.0000	0.0849	0.3945	0.3393	0.2568	0.1077

Relative contribution of organic to total soil P	r	-0.7997	-0.5520	-0.9537	-0.5462	0.9306	-0.9748	0.2137	-0.0704	0.8212
	P	0.0561	0.2561	0.0032	0.2621	0.0071	0.0009	0.6844	0.8946	0.0451
Soil C:N	r	0.3985	0.3044	0.6732	0.2471	-0.7409	0.7916	-0.4301	0.0343	-0.7319
	P	0.4338	0.5575	0.1427	0.6369	0.0920	0.0606	0.3946	0.9485	0.0982
Soil C:Po	r	-0.1261	-0.2992	0.2180	-0.3491	-0.2490	0.4998	0.0927	0.5250	-0.1558
	P	0.8118	0.5646	0.6781	0.4976	0.6343	0.3127	0.8614	0.2848	0.7682
Soil N:Po	r	-0.7246	-0.8533	-0.5625	-0.8561	0.6007	-0.2929	0.7197	0.7694	0.7356
	P	0.1033	0.0307	0.2452	0.0296	0.2073	0.5733	0.1068	0.0736	0.0956
Microbial biomass P	r	0.8250	0.6021	0.9728	0.5918	-0.9641	0.9842	-0.3271	-0.0545	-0.8260
	P	0.0433	0.2060	0.0011	0.2159	0.0019	0.0004	0.5268	0.9183	0.0428

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