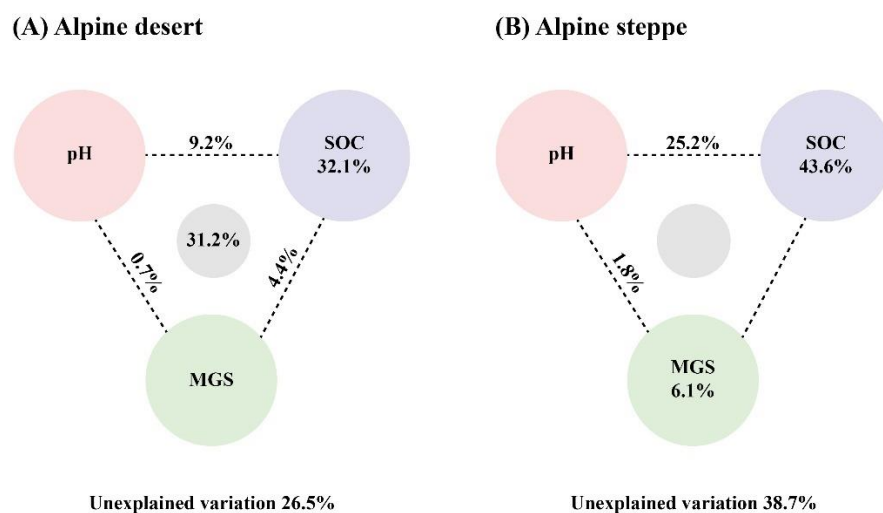


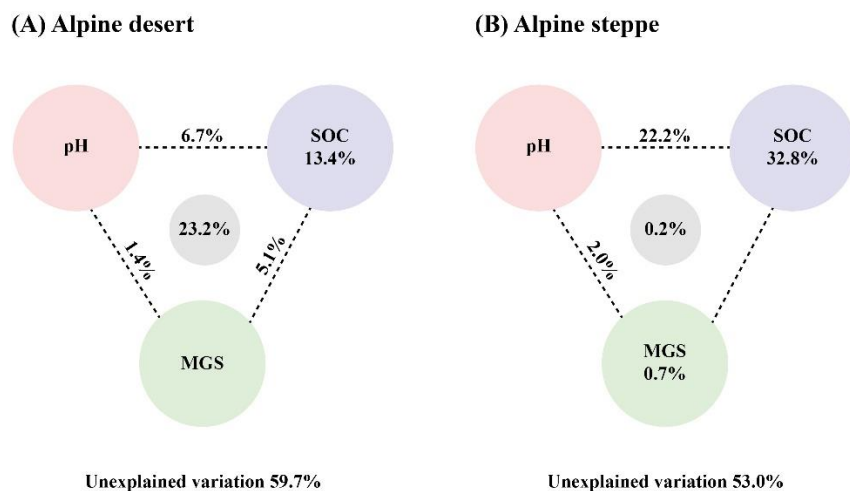
Supplementary Material

1 Supplementary Figures and Tables

1.1 Supplementary Figures



Supplementary Figure 1. Variation partitioning analysis for total PLFAs in the alpine desert (A) and alpine steppe (B).



Supplementary Figure 2. Variation partitioning analysis for fungal PLFAs in the alpine desert (A) and alpine steppe (B).

1.2 Supplementary Tables

Supplementary Table 1. Descriptive statistics of physicochemical properties of all the soil samples and different ecosystems.

		Elevation/m	pH	SWC/%	EC (μS/cm)	SOC/%	Quartz/%	K-Feldspar/%	Plagioclase/%	Calcite/%	Clay mineral/%	MGS (μm)	Coarse sand/%	Fine sand/%	Silt/%	Clay/%
Alpine desert	Min	4679.0	8.3	3.5	39.2	0.4	70.7	0.0	2.4	4.4	0.0	131.1	23.2	44.3	2.3	0.1
	Mean	4709.4	8.7	9.7	61.8	2.1	85.1	1.2	3.9	8.7	1.0	164.1	32.7	59.0	5.4	2.8
	Max	4758.0	9.0	23.4	89.4	8.3	89.2	5.5	5.6	20.4	8.3	187.4	41.0	74.2	15.0	11.8
Alpine steppe	Min	4666.0	8.3	6.7	43.8	1.4	55.5	0.0	3.9	3.5	0.0	75.8	1.5	50.0	2.4	0.2
	Mean	4675.5	8.5	15.2	67.7	4.1	76.1	2.6	7.9	9.3	2.8	123.2	15.6	75.5	8.2	0.8
	Max	4692.0	8.8	29.4	94.1	6.8	88.5	10.5	15.2	17.3	12.6	185.0	40.9	87.7	17.7	1.9

SWC: soil water content, EC: electrical conductivity, SOC: soil organic carbon, TN: total soil nitrogen, MGS: mean grain size.

Supplementary Table 2. Results of mixed effects model showing the effects of depth (0-5cm, 20-30cm and 50-60cm), ecosystems (alpine desert and alpine steppe), and their interactions on soil physicochemical properties, respectively. Asterisks indicate significant influence (** indicate $P < 0.01$; * indicate $P < 0.05$).

	pH	SWC	EC	SOC	Quartz	K-Feldspar	Plagioclase	Calcite	Clay mineral	MGS	Coarse sand	Fine sand	Silt	Clay
Depth	0.553	0.053	0.573	0.841	1.340	2.774	1.026	1.021	0.950	0.270	0.077	0.018	0.739	0.428
Ecosystem	7.352*	4.568*	0.921	5.103*	6.534*	2.984	19.943**	0.080	1.369	18.540**	25.390**	15.800**	2.298	2.565
Depth* Ecosystem	0.268	0.174	0.095	0.493	0.612	0.905	3.702*	0.174	1.080	0.134	0.026	0.045	0.165	0.484

Supplementary Table 3. Pearson correlation coefficients between soil physicochemical properties of different ecosystems.

	Elevation	pH	SWC	EC	SOC	Quartz	K-Feldspar	Plagioclase	Calcite	Clay mineral	MGS	Coarse sand	Fine sand	Silt	Clay	
Elevation	1	-0.619*	-0.532	0.205	0.673*	0.206	-0.118	0.396	-0.411	-0.243	-0.096	-0.264	0.378	-0.275	-0.306	Elevation
pH	0.660**	1	0.204	-0.358	-0.513	0.044	-0.002	-0.205	-0.057	0.124	0.174	0.215	-0.182	-0.038	0.053	pH
SWC	-0.722**	-0.580*	1	0.413	0.024	-0.257	-0.341	0.027	0.339	0.126	-0.542	-0.515	0.372	0.213	0.099	SWC
EC	-0.635*	-0.427	0.385	1	0.732**	-0.522	-0.191	0.333	0.452	0.430	-0.684*	-0.522	0.184	0.605*	0.510	EC
SOC	-0.308	-0.698**	0.214	0.451	1	-0.122	-0.303	0.365	-0.032	0.085	-0.605*	-0.603*	0.431	0.251	0.195	SOC
Quartz	0.091	0.066	0.232	-0.256	-0.050	1	-0.588*	-0.528	-0.730**	-0.751**	0.163	-0.068	0.368	-0.624*	-.0588*	Quartz
K-Feldspar	0.044	0.169	-0.417	-0.197	-0.178	-0.721**	1	0.305	0.270	0.414	0.587*	0.695*	-0.695*	0.115	0.183	K-Feldspar
Plagioclase	-0.061	-0.078	0.456	-0.131	-0.223	0.298	-0.388	1	-0.054	0.187	-0.054	-0.176	0.231	-0.139	-0.167	Plagioclase
Calcite	0.043	0.157	-0.335	0.109	-0.349	-0.875**	0.622*	-0.242	1	0.477	-0.225	0.122	-0.507	0.812**	0.732**	Calcite
Clay mineral	-0.198	-0.522*	0.146	0.364	0.932**	-0.098	-0.101	-0.317	-0.333	1	-0.238	-0.007	-0.305	0.630*	0.655*	Clay mineral
MGS	0.716**	0.653**	-0.534*	-0.516*	-0.633*	0.056	-0.001	0.056	0.271	-0.618*	1	0.909**	-0.591*	-0.497	-0.393	MGS
Coarse sand	0.745**	0.527*	-0.708**	-0.288	-0.280	-0.055	-0.001	-0.370	0.288	-0.248	0.830**	1	-0.872**	-0.096	0.013	Coarse sand
Fine sand	-0.313	0.078	0.496	-0.193	-0.402	0.165	0.031	0.678**	-0.138	-0.398	-0.148	-.650**	1	-0.404	-0.495	Fine sand
Silt	-0.185	-0.421	-0.070	0.502	0.573*	-0.296	0.089	-0.553*	0.135	0.529*	-.559*	-0.065	-.605*	1	.979**	Silt
Clay	-0.251	-0.567*	0.033	0.389	.769**	-0.009	-0.148	-0.426	-0.250	.752**	-0.396	-0.004	-.665**	0.502	1	Clay

SWC: soil water content, EC: electrical conductivity, SOC: soil organic carbon, TN: total soil nitrogen, MGS: mean grain size. * $P < 0.05$, ** $P < 0.01$