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Fresh tephra deposits from the Tajogaite Volcano boost thermophile proliferation and soil organic matter recovery

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Table S1: Soil characterization of the 2 mineral horizons (A, Bw). (C: carbon; N: Nitrogen, EC: electrical conductivity; CF: Coarse fragments; TCA: total content of aggregates; AS: aggregate stability BD: bulk density)

Horizon	C %	N %	pH	EC	Colour dry	Colour Moist	CF %	TCA %	AS %	BD $g.cm^{-3}$	Sand %	Silt %	Clay %	Texture class USDA[a]
A	17.6	1.6	7.6	393	10YR 3/3	10YR 2/2	12	50	69	0.4	65	23	12	Sandy loam
Bw	8.7	0.95	7.5	392	10YR 4/4	10YR 2/2	15	16	79	0.5	65	29	6	Sandy loam

[a]*sand: 2−0.05 mm; silt: 0.05−0.002; clay: <0.002 mm.*

Table S2: List of organic compounds identified by Py-GC/MS in the moss, moss substrate (MS), biofilm, and soil horizons (O, A, Bw) samples.

RT	Library/ID	Family	O/C	H/C	MOSS	MS	BIOFILM	HO	HA	HBw
2.11	Benzene	ARO	0.00	1.00			X		X	X
2.18	1-Decene	LIP	0.00	2.00			X			
2.23	Pyridine	PEP	0.00	1.00	X		X	X	X	X
2.36	2-Vinylfuran	POL	0.17	1.00						X
2.56	3-Furaldehyde	POL	0.40	0.80	X					
2.57	Benzene, methyl-	ARO	0.00	1.40	X		X	X	X	X
2.78	2-Furancarboxaldehyde	POL	0.33	1.00			X	X	X	X
2.85	2-Furanmethanol	POL	0.20	1.20	X					
2.87	Pyridine, 2-methyl-	PEP	0.00	1.17	X			X		
2.97	Furan, 2,5-dimethyl	POL	0.17	1.33			X			
3.03	1H-Pyrrole, 2-methyl-	POL	0.00	1.40			X	X	X	
3.08	4-Cyclopenten-1,3-dione	POL	0.40	0.80	X					
3.22	Xylene	ARO	0.00	1.25			X			
3.23	Pyridine, 4-methyl-	PEP	0.00	1.17					X	
3.24	Benzene, 1,3-dimethyl-	ARO	0.00	1.25						X
3.29	Ethanone, 1-(2-furanyl)-	POL	0.17	1.00	X					
3.31	1-Nonene	LIP	0.00	2.00			X	X		
3.34	3,4-Dihydropyran	POL	0.20	1.60	X					
3.41	Styrene	ARO	0.00	1.00	X		X	X	X	X
3.43	2(5H)-Furanone, 5-methyl-	POL	0.40	1.20	X					
3.50	Furan, 2,5-dimethyl	POL	0.17	1.33			X			
3.52	2,4-Hexadiene, 2,5-dimethyl-	LIP	0.00	1.75				X	X	
3.55	2,3,4-Trimethylfuran	POL	0.14	1.43			X			X
3.63	1H-Pyrrole, 2,3-dimethyl	POL	0.00	1.50					X	
3.64	3,4-Dihydropyran	POL	0.20	1.60				X		
3.74	2-Furancarboxaldehyde, 5-methyl-	POL	0.17	1.00	X					
3.74	1H-Pyrrole, 2,5-dihydro-1-nitroso-	POL	0.25	1.50				X		
3.86	Pyridine, 2,5-dimethyl-	PEP	0.00	1.29					X	X
3.93	Bicyclo[3.3.1]non-2-en-9-ol	LIP	0.11	1.56			X			
3.97	5-methyl-furfural	POL	0.33	1.00				X		
3.99	2-Furancarboxaldehyde, 5-methyl-	POL	0.17	1.00					X	
4.01	Benzaldehyde	ARO	0.14	0.86			X			X
4.07	2,4-Dimethylfuran	POL	0.17	1.33				X		
4.08	2-Cyclopenten-1-one, 3-methyl-	LIP	0.17	1.33					X	
4.09	2,3-Dimethyl-1,2,5,6-tetrahydropyrazine	PEP	0.00	2.00	X					
4.15	Phenol	ARO	0.17	1.00	X		X	X	X	
4.21	Benzonitrile	NIT	0.00	0.71					X	
4.24	Benzene, isocyano-	ARO	0.00	0.71						X
4.30	Bicyclo[2.2.1]heptan-2-ol, exo-	LIP	0.14	1.71				X		
4.31	Ethanone, 1-phenyl-	ARO	0.13	1.00						X
4.32	Indane	PEP	0.00	1.11			X			
4.35	Benzofuran	POL	0.13	0.75					X	X
4.38	1,2-Cyclopentanedione, 3-methyl-	POL	0.33	1.33	X					
4.60	Benzene, 1,4-diethyl	ARO	0.00	1.40					X	
4.61	Phenol, 2-methyl-	ARO	0.14	1.14	X					
4.62	Benzene, (1-methylethenyl)-	ARO	0.00	1.33						X
4.68	2-Cyclopenten-1-one, 2-hydroxy-3-methyl-	LIP	0.33	1.33				X		
4.76	4-Cyclopenten-1,3-dione, 4-propyl	LIP	0.25	1.25			X			
4.77	Benzene, 2-propenyl-	ARO	0.00	1.11						X

RT	Library/ID	Family	O/C	H/C	MOSS	MS	BIOFILM	HO	HA	HBw
4.77	2,3-Dimethyl-2-cyclopenten-1-one	LIP	0.14	1.43					X	
4.81	Furan, 2-methyl-5-(methylthio)	POL	0.17	1.33				X		
4.83	p-Cresol	ARO	0.14	1.14	X				X	
4.88	1H-Indene	PEP	0.00	0.89					X	X
4.93	Phenol, 2-methyl-	ARO	0.14	1.14	X		X	X		
4.94	Benzene, butyl	ARO	0.00	1.40						X
4.94	m-Cymene	ARO	0.00	1.40					X	
4.98	2-Furancarboxylic acid, methyl ester	POL	0.50	1.00	X					
5.06	Acetophenone	ARO	0.13	1.00				X		
5.15	p-Cresol	ARO	0.14	1.14				X		
5.15	3-Cyclohexen-1-carboxyldehyde, 3-methyl	POL	0.13	1.50	X					
5.23	1-Undecene	LIP	0.00	2.00			X		X	
5.25	1,4-Cyclohexadiene, 3-ethenyl-1,2-dimethyl-	LIP	0.00	1.40						X
5.30	Phenol, 2-methoxy-	LIG	0.29	1.14				X		
5.32	Undecane	LIP	0.00	2.18			X		X	X
5.32	Methyl 2-furoate	POL	0.50	1.00	X					
5.37	2-Cyclopenten-1-one, 3-ethyl-2-hydroxy-	POL	0.29	1.43	X					
5.38	Phenol, 3-methyl-	ARO	0.14	1.14			X			
5.50	Benzofuran, 7-methyl	POL	0.11	0.89					X	X
5.53	Phenol, 2,3-dimethyl-	ARO	0.13	1.25	X					
5.62	Benzoxazole, 2-methyl-	ARO	0.13	0.88					X	
5.63	Maltol	POL	0.50	1.00				X		
5.69	Benzene, 2-ethenyl-1,4-dimethyl-	ARO	0.00	1.20					X	
5.86	Benzyl nitrile	NIT	0.00	0.88	X			X		X
5.93	Phenol, 2,5-dimethyl	ARO	0.13	1.25	X			X		
6.06	Benzene, 1,3-diethyl-5-methyl	ARO	0.00	1.45						X
6.06	1H-Indene, 3-methyl-	PEP	0.00	1.00				X	X	
6.06	Benzene, (1-methylene-2-propenyl)	ARO	0.00	1.20			X			
6.09	5-Hydroxy methyl uracil	PEP	0.60	1.20	X					
6.15	Naphthalene	PAH	0.00	0.80						X
6.20	Phenol, 3-ethyl-	ARO	0.13	1.25				X		
6.22	4(1H)-Pyrimidinone, 2-(propylthio)	PEP	0.14	1.43	X					
6.30	4H-1,2,3,6,7,8,9,9A-Octahydroquinolizine-1,4,8	PEP	0.25	1.58	X					
6.39	1-Dodecene	LIP	0.00	2.00			X	X	X	
6.50	Dodecane	LIP	0.00	2.17			X		X	
6.51	Creosol	ARO	0.25	1.25				X		
6.52	1,2-Benzenediol	ARO	0.17	1.00	X					
6.56	Azulene	PAH	0.00	0.80					X	
6.61	Phenol, 2,3,5-trimethyl	ARO	0.11	1.33	X					
6.74	Phenol, 4-ethyl-2-methyl-	ARO	0.11	1.33	X					
6.82	3,4-Dimethyl-1H-indazole	PEP	0.10	1.00					X	
6.84	Benzofuran, 4,7-dimethyl	POL	0.10	1.00			X			
6.88	Benzofuran, 2,3-dihydro-	POL	0.13	1.00				X		
6.88	2-Cyclohexen-1-one, 4,4,5-trimethyl	POL	0.11	1.56	X					
6.90	Naphthalene, 1,2,3,4-tetrahydro-6-methyl-	PAH	0.00	1.27					X	
7.08	Benzenepropanenitrile	NIT	0.00	1.00				X	X	
7.31	Benzene, hexyl-	ARO	0.00	1.50			X			X
7.32	Bicyclo[6.4.0]dodeca-9,11-diene	LIP	0.00	1.50					X	
7.33	2,2-Dimethyl-1-indanol	PEP	0.09	1.27				X		

RT	Library/ID	Family	O/C	H/C	MOSS	MS	BIOFILM	HO	HA	HBw
7.38	1H-Inden-1-one, 2,3-dihydro-	PEP	0.11	0.89	X					
7.41	1H-Indene, 4,7-dimethyl-	PEP	0.00	1.09					X	
7.46	Naphthalene, 1,2-dihydro-3-methyl-	PAH	0.00	1.09					X	
7.48	Dodecane, 2,6,10-trimethyl	LIP	0.00	2.13						X
7.51	Indole	PEP	0.00	0.88	X					
7.57	Phenol, 4-ethyl-2-methoxy-	LIG	0.22	1.33				X		
7.59	1H-Indene, 1-ethylidene-	PEP	0.00	0.91						X
7.62	1-Tridecene	LIP	0.00	2.00	X		X	X		
7.63	1-Tridecene	LIP	0.00	2.00						
7.66	1H-Inden-1-one, 2,3-dihydro-	PEP	0.11	0.89				X	X	
7.66	6-Tridecene, 7-methyl	LIP	0.00	2.00			X			
7.67	Naphthalene, 2-methyl-	PAH	0.00	0.91						X
7.71	Tridecane	LIP	0.00	2.15			X	X	X	X
7.78	Indole	PEP	0.00	0.88				X	X	
7.79	Naphthalene, 1-methyl	PAH	0.00	0.91	X		X		X	X
8.03	2-Methoxy-4-vinylphenol	LIG	0.22	1.11				X		
8.12	Bicyclo[3.1.1]heptan-3-one, 2-ethyl-6,6-dimethyl	LIP	0.11	1.56				X		
8.27	Naphthalene, 1,2-dihydro-1,1,6-trimethyl-	PAH	0.00	1.23	X					
8.34	Cyclohexene, 1-phenyl-	ARO	0.00	1.17					X	
8.39	Cyclohexanamine, N-cyclohexyl-N-methyl	PEP	0.00	1.92				X		
8.47	Phenol, 2,6-dimethoxy-	LIG	0.38	1.25				X		
8.55	Eugenol	LIG	0.20	1.20				X		
8.59	Benzene, heptyl-	ARO	0.00	1.54					X	X
8.81	Alpha-Terpinene	LIP	0.00	1.60	X					
8.82	Benzene, 1,3,5-trimethyl-2-(1,2-propadienyl)-	ARO	0.00	1.17					X	
8.85	2-Tetradecene	LIP	0.00	2.00	X		X	X	X	
8.90	1,1'-Biphenyl	ARO	0.00	0.83			X			
8.91	Naphthalene, 2,7-dimethyl	PAH	0.00	1.00	X					
8.95	Tetradecane	LIP	0.00	2.14			X	X	X	X
8.99	7-Methylindan-1-one	PEP	0.10	1.00	X					
9.01	1H-Indole, 4-methyl-	PEP	0.00	1.00	X				X	
9.11	1,1'-Biphenyl, 4-methyl	ARO	0.00	0.92			X			
9.14	dimethyl-naphthalene	PAH	0.00	1.00					X	X
9.16	Vanillin	LIG	0.38	1.00				X		
9.22	Naphthalene, 1,7-dimethyl-	PAH	0.00	1.00					X	
9.60	Pyridine, 4-phenyl-	PEP	0.00	0.82	X					
9.64	Tridecane, 4-methyl	LIP	0.00	2.14			X			
9.65	3,5-Dimethoxy-4-hydroxytoluene	LIG	0.33	1.33				X		
9.70	trans-Isoeugenol	LIG	0.20	1.20				X		
9.79	1-Pentadecene	LIP	0.00	2.00			X	X		
9.82	Benzonitrile, 2,4,6-trimethyl-	NIT	0.00	1.10	X					
9.85	1,4-Dimethylazulene	PAH	0.00	1.00					X	
9.93	1,6-Anhydro-.beta.-D-glucopyranose (levoglucosan)	POL	0.83	1.67	X					
10.07	1-Pentadecene	LIP	0.00	2.00	X				X	
10.14	Pentadecane	LIP	0.00	2.13	X		X	X	X	
10.22	1H-Indole, 2,5-dimethyl	PEP	0.00	1.10					X	
10.22	Ethanone, 1-(4-hydroxy-3-methoxyphenyl)	LIG	0.33	1.11				X		
10.60	1,1,4,5,6-pentamethyl-2,3-dihydroindene	PEP	0.00	1.43					X	
10.97	Naphthalene, 2,3,6-trimethyl-	PAH	0.00	1.08					X	
11.07	Phenol, 4-ethenyl-2,6-dimethoxy-	LIG	0.30	1.40				X		

RT	Library/ID	Family	O/C	H/C	MOSS	MS	BIOFILM	HO	HA	HBw
11.08	Benzene, nonyl-	ARO	0.00	1.60			X		X	
11.13	Naphthalene, 1,4,6-trimethyl-	PAH	0.00	1.08					X	
11.17	3-(2-Methyl-propenyl)-1H-indene	PEP	0.00	1.08					X	
11.24	1-Hexadecene	LIP	0.00	2.00			X	X	X	
11.33	Hexadecane	LIP	0.00	2.13			X	X	X	X
11.39	Fluorene	PAH	0.00	0.77					X	
11.40	9H-Fluorene	PAH	0.00	0.77				X		
11.62	1H-Phenalene	PAH	0.00	0.77					X	
12.25	Benzene, decyl-	ARO	0.00	1.63					X	
12.39	3-Heptadecene	LIP	0.00	2.00	X		X	X	X	
12.45	Heptadecane	LIP	0.00	2.12			X	X	X	X
12.61	Phenol, 2,6-dimethoxy-4-(2-propenyl)-	LIG	0.27	1.27				X		
12.78	9H-Fluorene, 2-methyl-	PAH	0.00	0.86					X	
12.79	cis-2-Methyl-7-octadecene	LIP	0.00	2.00			X			
12.81	[1,1'-Biphenyl]-4,4'-diol	PAH	0.08	0.83				X		
12.85	Tetradecanoic acid	LIP	0.14	2.00	X			X		
13.07	Chamazulene	PAH	0.00	1.14					X	
13.38	Benzene, undecyl-	ARO	0.00	1.65				X	X	
13.45	1-Octadecene	LIP	0.00	2.00	X		X	X	X	
13.52	Octadecane	LIP	0.00	2.11			X	X	X	X
13.62	Phenanthrene	PAH	0.00	0.71					X	
13.67	Neophytadiene	LIP	0.00	1.90	X					
13.74	2-Hexadecene, 3,7,11,15-tetramethyl-	LIP	0.00	2.00	X					
13.88	Pentadecanoic acid	LIP	0.13	2.00	X					
13.93	Phenanthrene, 9,10-dihydro-1-methyl-	PAH	0.00	0.93					X	
14.03	2-Pentadecanone, 6,10,14-trimethyl	LIP	0.06	2.00				X		
14.46	Benzene, dodecyl-	ARO	0.00	1.67					X	
14.48	1-Nonadecene	LIP	0.00	2.00	X		X	X		
14.55	Nonadecane	LIP	0.00	2.11			X	X	X	X
14.59	Hexadecanenitrile	NIT	0.00	1.94					X	
14.65	2-Octylfuran	POL	0.08	1.67				X		
14.80	Phenanthrene, 2-methyl-	PAH	0.00	0.80					X	
14.96	METHYL-PHENANTHRENE	PAH	0.00	0.80					X	
15.07	Phenanthrene, 4-methyl-	PAH	0.00	0.80					X	
15.23	n-Hexadecanoic acid	LIP	0.00	2.00				X		
15.36	9-Eicosene	LIP	0.00	2.00					X	
15.48	Benzene-tridecyl	ARO	0.00	1.68					X	
15.48	1-Eicosene	LIP	0.00	2.00	X		X	X	X	
15.53	Eicosane	LIP	0.00	2.10			X	X	X	X
15.53	9H-Pyrido[3,4-b]indole	PEP	0.00	0.73	X					
16.16	Phenanthrene, 3,6-dimethyl-	PAH	0.00	0.88					X	
16.35	Henicos-1-ene	LIP	0.00	2.00				X		
16.35	Phytol	LIP	0.05	2.00	X					
16.40	1-Heneicosene	LIP	0.00	2.00	X		X	X	X	
16.46	Heneicosane	LIP	0.00	2.10	X		X	X	X	X
16.56	Octadecanenitrile	NIT	0.00	1.94					X	
16.57	Heptadecanenitrile	NIT	0.00	1.94				X		
16.62	9,12,15-Octadecatrienoic acid	LIP	0.06	1.67	X					
16.77	Octadecanoic acid	LIP	0.11	2.00	X					
16.98	Hexadecanamide	NIT	0.06	2.06	X					
16.98	Pyrene	PAH	0.00	0.63					X	
17.16	9,12-Octadecadienoic acid	LIP	0.11	1.78				X		
17.20	Ethanol, 2-(9-octadecenyloxy)	LIP	0.10	2.00	X					
17.32	1-Docosene	LIP	0.00	2.00	X		X	X	X	

RT	Library/ID	Family	O/C	H/C	MOSS	MS	BIOFILM	HO	HA	HBw
17.36	Docosane	LIP	0.00	2.09			X	X	X	X
17.56	Palmitoleic acid	LIP	0.13	1.88	X					
18.04	Arachidonic acid	LIP	0.10	1.60	X					
18.15	9-Tricosene	LIP	0.00	2.00	X		X	X	X	
18.22	Tricosane	LIP	0.00	2.09	X		X		X	
18.23	Octadecane	LIP	0.00	2.11				X		
18.30	Benzene, hexadecyl-	ARO	0.00	1.73					X	
18.35	Pyrene, 1-methyl-	PAH	0.00	0.71					X	
18.50	Eicosanoic acid	LIP	0.10	2.00	X					
18.92	Pyrene, 1,3-dimethyl-	PAH	0.00	0.78					X	
19.00	1-Tetracosene	LIP	0.00	2.00	X		X	X	X	
19.04	Tetracosane	LIP	0.00	2.08				X	X	
19.25	13-Eicosenoic acid	LIP	0.10	1.90	X					
19.71	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester	LIP	0.21	2.00	X					
19.80	1-Pentacosene	LIP	0.00	2.00	X		X	X	X	
19.83	Pentacosane	LIP	0.00	2.08				X	X	
20.02	Cyclopentadecane	LIP	0.00	2.00				X		
20.11	Docosanoic acid	LIP	0.09	2.00	X					
20.57	1-Hexacosene	LIP	0.00	2.00	X		X	X	X	
20.60	Hexacosane	LIP	0.00	2.08				X	X	
20.79	Benzene, nonadecyl	ARO	0.00	1.76					X	
20.83	22-Tricosenoic acid	LIP	0.09	1.91	X					
21.34	1-Heptacosene	LIP	0.00	2.00	X		X	X	X	
21.55	Tricosanenitrile	NIT	0.00	1.97					X	
21.57	Tetracosanoic acid, methyl ester	LIP	0.08	2.00				X		
21.61	Tetracosanoic acid	LIP	0.08	2.00	X					
22.03	1-Octacosene	LIP	0.00	2.00			X	X	X	
22.73	Nonacosane	LIP	0.00	2.07				X	X	X
22.74	Cholesta-3,5-diene	STR	0.00	1.63	X					
23.00	Hexacosanoic acid, methyl ester	LIP	0.07	1.93					X	
23.09	Ergosta-4,6,22-triene	STR	0.00	1.57	X					
23.46	C30	LIP	0.00	2.07				X	X	X
23.58	Campesterol, acetate	STR	0.07	1.67	X					
23.85	Stigmastan-3,5,22-trien	STR	0.00	1.59	X					
24.03	Ergosta-4,6,22-trien-3.beta.-ol	STR	0.04	1.57	X					
24.16	3.alpha.,5-cyclo-ergosta-7,22-dien-6-one	STR	0.07	1.66	X					
24.32	C31	LIP	0.00	2.06				X		X
24.36	Stigmasta-3,5-diene	STR	0.00	1.66	X	X		X	X	
24.55	Stigmastan-3,5,22-trien	STR	0.00	1.59						X
24.74	Ergosta-4,6,22-trien-3-ol	STR	0.04	1.57		X				X
24.92	Nonacos-1-ene	LIP	0.00	2.00	X					
25.27	C32	LIP	0.00	2.06						X
25.67	Campesterol	STR	0.04	1.71	X	X				
26.02	Stigmasterol	STR	0.03	1.66	X					
26.42	C33	LIP	0.00	2.06						X
26.73	gamma.-Sitosterol	STR	0.03	1.72	X	X				
27.47	Methyl 2-hydroxy-tetracosanoate	LIP	0.12	2.00		X				
28.66	Stigmast-4-en-3-one	STR	0.03	1.66		X				
28.68	Stigmasta-3,5-dien-7-one	STR	0.03	1.59					X	X
28.84	1,30-Triacontanediol	LIP	0.07	2.07		X				
30.88	Friedelan-3-one	STR	0.03	1.67						X

Unspecific aromatic compounds (ARO), polysaccharides (POL), peptides (PEP), lignin (LIG), lipids (LIP), nitrogen-containing compounds (NIT), polycyclic aromatic hydrocarbons (PAHs), and steranes (STR).

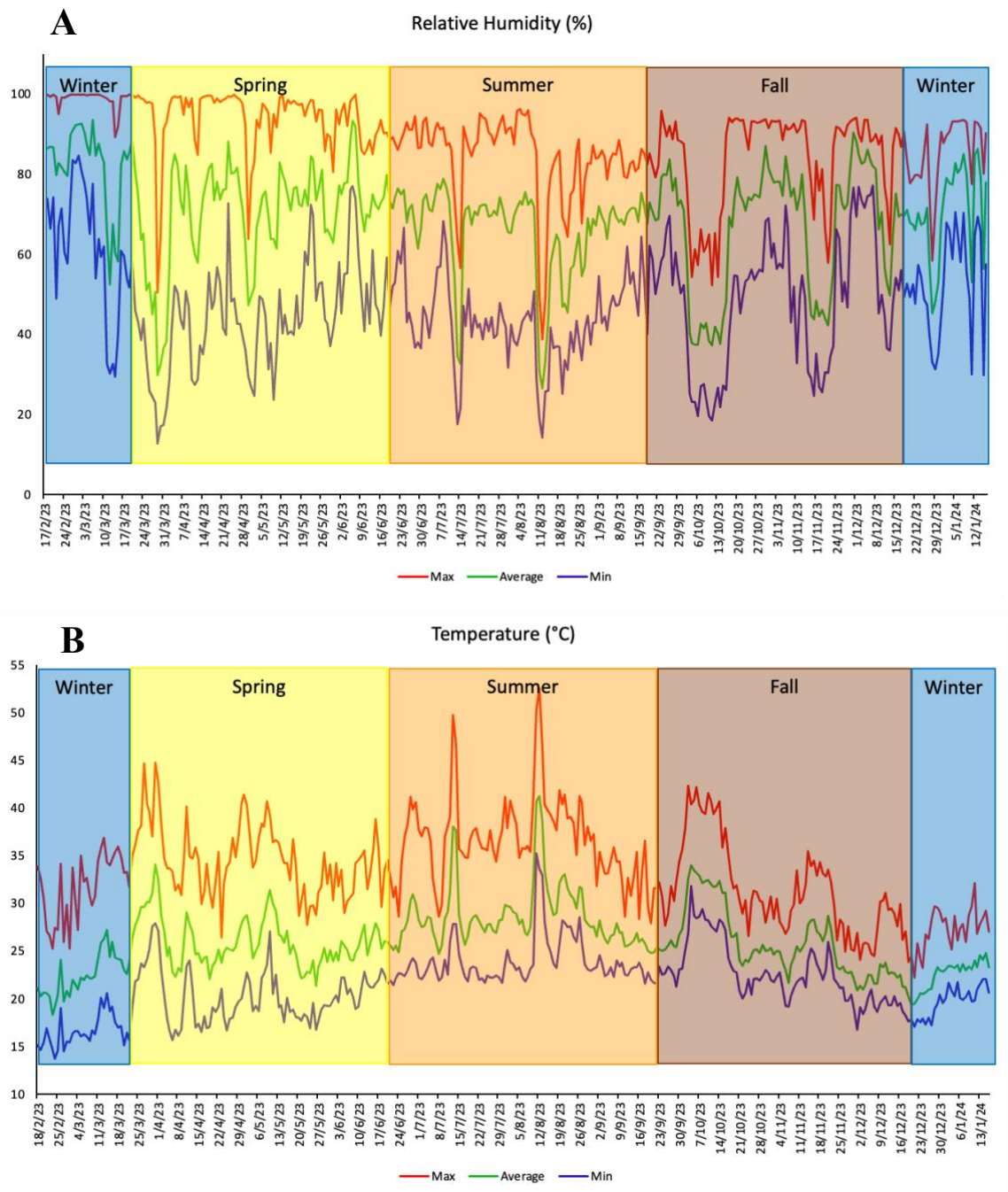


Figure S1: Relative humidity (A) and temperature (B) of water vapour emitted by the fumarole vent and measured by a HOBO MX2301A sensor.