

SAMPLE DESCRIPTION

Peridotite xenoliths entrained in the Sailipu ultrapotassic rocks are very small, with diameters always less than 1 centimeter (Fig DR1, a). They are mainly harzburgites comprising 70-85 % olivine, 10-25% orthopyroxene and less than 5% clinopyroxene+spinel; locally, up to 5% phlogopite may be present. Neither garnet nor kelyphite (i.e., the breakdown product of garnet at low pressures) has been observed in any of the xenoliths. The peridotite xenoliths display textures ranging from equigranular (Fig DR1, b) to porphyroclastic (Fig DR1, c and d). In samples displaying equigranular textures, olivine is generally larger than orthopyroxene, i.e., 500-800 vs. 300-500 μm , respectively. However, minerals in samples with porphyroclastic textures show curvilinear boundaries, in which olivine varies in size from 200 μm to 1 mm and orthopyroxene has a size of 200-600 μm . When present, clinopyroxene is interstitial between olivine and orthopyroxene and is commonly less than 300 μm in diameter. Phlogopite is the only hydrous mineral present in the Sailipu xenoliths, and commonly shows reactive textures with spinel (Fig DR1 e and f).

METHODS SUMMARY

Major elements were measured on individual minerals using a JEOL JXA-8100 electron microscope with an accelerating potential of 15 kV and sample current of 10 nA at the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGGCAS). Trace elements in clinopyroxene were analyzed using a laser ablation inductively coupled mass spectrometer (LA-ICPMS) at IGGCAS. The detailed method has been described in Liu et al. (2010). Isotopes were measured in peak-hopping mode. A spot size of 80 μm and repetition rate of 8 Hz were used for analyses. NIST 610 glass was used as an external calibration standard and isotope ^{43}Ca was selected as an internal standard to quantify the analyses. The CaO content of NIST 610 used in the calculation is 11.45 wt%. Reference values of NIST 610 are from (Pearce et al., 1997). The data were reduced using the GLITTER 4.0 program (van Achterbergh et al., 2001).

References

- Liu, C.Z., Wu, F.Y., Wilde, S.A., Yu, L.J., Li, J.L., 2010. Anorthitic plagioclase and pargasitic amphibole in mantle peridotites from Yungbwa ophiolite (southern Tibetan Plateau) formed by hydrous melt metasomatism. *Lithos* 114, 413-422.
- Pearce, N.J.G., Perkins, w.T., Westgate, J.A., Gorton, M.P., Jackson, S.E., Neal, C.R., Chillery, S.P., 1997. A compilation of new and published major and trace element data for NIST SRM 610 and NIST SRM 612 glass reference materials. *Geostandards Newsletter* 21, 115-144.
- van Achterbergh, E., Ryan, C., Jackson, S.E., Griffin, W.L., 2001. Appendix 3 data reduction software for LA-ICP-MS, in: Sylvester, P. (Ed.), *Laser-Ablation-ICPMS in the Earth Sciences*. Mineralogical Association of Canada, Short Course, pp. 239-243.

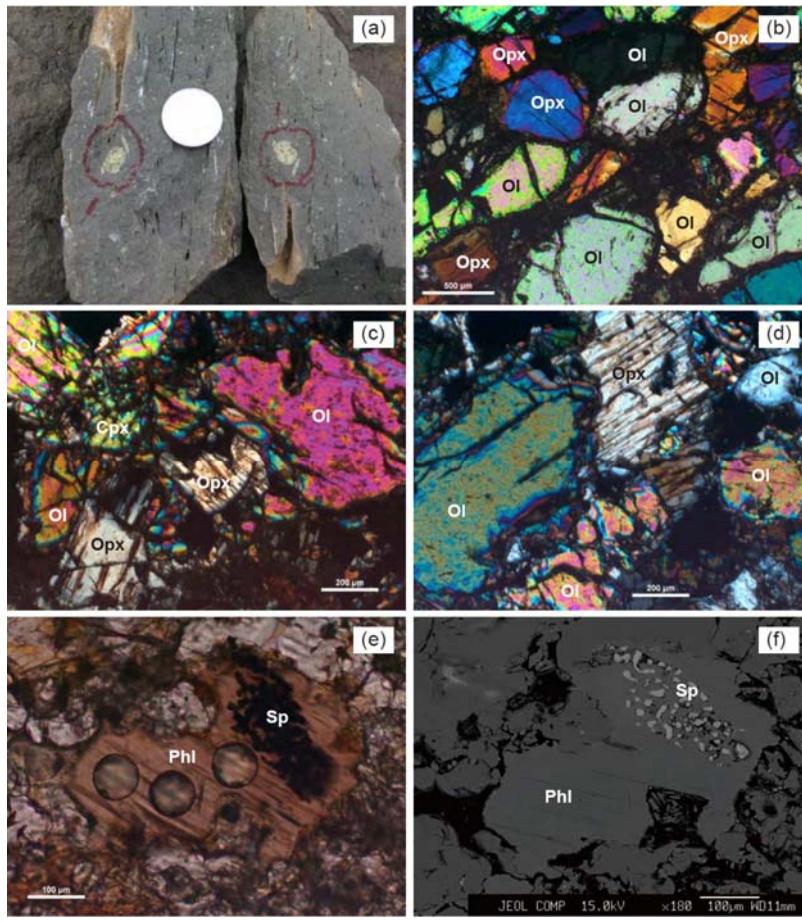


Fig DR1. Petrography of the Sailipu mantle xenoliths. (a): Photograph of the sample specimen, the coin with a diameter of 2 cm; (b)-(d): cross polar light image; (e): Plane polar light image; (f): Backscattered electron image. Ol: olivine; Opx: orthopyroxene; Cpx: clinopyroxene; Phl: phlogopite; Sp: spinel.

Supplementary Data

Table DR1. Major element compositions of minerals in Sailipu mantle xenoliths (*in wt%*)

Sample	Min.	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	NiO	F	Cl	Total	Mg#	Cr#	T °C
SLP03	ol	40.20	0.01	0.01	0.03	12.23	0.15	47.33	0.07	0.01	0.00	0.44			100.49	0.87		
	opx	54.29	0.17	4.31	0.46	7.35	0.14	32.05	0.81	0.05	0.01	0.11			99.74	0.89		
SLP04-1	ol	40.51	0.02	0.01	0.03	11.25	0.13	48.32	0.09	0.01	0.00	0.37			100.74	0.88		1104
	cpx	52.12	0.35	3.52	0.96	3.62	0.11	17.28	20.65	0.35	0.01	0.07			99.06	0.89		
	opx	54.35	0.11	4.95	0.37	6.87	0.14	32.08	0.77	0.14	0.01	0.10			99.88	0.89		
SLP04-2	ol	40.40	0.01	0.02	0.02	10.56	0.14	48.48	0.05	0.01	0.00	0.37			100.07	0.89		
	sp	0.05	0.30	53.49	10.17	16.10	0.15	18.81	0.01	0.00	0.01	0.42			99.52	0.68	0.11	
	opx	53.74	0.12	4.95	0.38	6.76	0.14	31.95	0.75	0.14	0.00	0.10			99.03	0.89		
SLP07-1	ol	40.59	0.01	0.05	0.01	11.26	0.14	47.87	0.07	0.02	0.01	0.41			100.44	0.88		1224
	cpx	53.53	0.37	1.11	0.22	5.55	0.18	18.61	19.04	0.29	0.01	0.04			98.94	0.86		
	opx	54.97	0.16	3.09	0.31	7.73	0.15	31.50	1.13	0.06	0.00	0.15			99.25	0.88		
	phl	39.12	2.56	14.63	0.59	4.68	0.03	21.32	0.03	0.45	9.99	0.24	2.72	0.03	95.23	0.89		
SLP07-2	ol	40.18	0.01	0.02	0.02	10.61	0.13	47.71	0.06	0.02	0.01	0.40			99.16	0.89		1248
	cpx	53.06	0.45	2.26	0.15	5.82	0.14	16.93	20.48	0.45	0.01	0.02			99.77	0.84		
	opx	57.10	0.16	1.00	0.36	5.87	0.11	33.93	0.85	0.06	0.00	0.17			99.60	0.91		
SLP08-1	ol	40.30	0.01	0.01	0.01	12.27	0.16	46.85	0.07	0.01	0.01	0.39			100.08	0.87		
	opx	54.12	0.20	3.82	0.34	8.39	0.16	30.73	1.23	0.09	0.00	0.12			99.21	0.87		
	phl	39.49	2.92	14.64	0.50	5.14	0.03	20.94	0.03	0.46	9.91	0.22	2.64	0.04	95.84	0.88		
SLP08-2	ol	40.04	0.02	0.01	0.01	11.80	0.15	46.89	0.07	0.01	0.01	0.39			99.41	0.88		1183
	cpx	53.47	0.50	1.26	0.38	5.85	0.19	17.93	19.68	0.27	0.01	0.05			99.60	0.85		
	opx	54.74	0.16	3.43	0.38	8.07	0.16	31.15	1.07	0.12	0.00	0.10			99.39	0.87		
	phl	38.91	3.21	14.96	0.50	5.75	0.04	20.34	0.04	0.44	10.02	0.21	2.63	0.03	95.97	0.86		
SLP09	ol	40.17	0.01	0.02	0.02	11.41	0.13	47.29	0.09	0.02	0.01	0.40			99.57	0.88		1112
	cpx	53.13	0.36	2.22	0.73	3.93	0.10	17.89	20.80	0.32	0.01	0.07			99.56	0.89		
	opx	54.32	0.15	3.80	0.34	7.28	0.15	31.40	1.06	0.11	0.00	0.12			98.74	0.88		
	phl	38.55	3.01	15.70	0.34	5.21	0.04	20.66	0.12	0.50	9.78	0.07	6.15	0.03	97.54	0.88		
SLP11	ol	40.15	0.01	0.02	0.02	11.20	0.14	47.54	0.07	0.02	0.01	0.41			99.60	0.88		1195
	cpx	54.02	0.41	1.05	0.43	4.98	0.15	18.41	20.02	0.25	0.01	0.05			99.77	0.87		
	opx	55.20	0.18	1.54	0.46	9.34	0.18	30.62	1.17	0.06	0.02	0.12			98.88	0.85		
	phl	38.67	4.48	14.21	0.53	7.84	0.04	19.78	0.05	0.24	9.59	0.18	3.22	0.01	97.48	0.82		
SLP12	ol	40.50	0.01	0.02	0.02	11.30	0.15	47.57	0.07	0.01	0.00	0.41			100.05	0.88		1176

	sp	0.14	0.25	53.42	10.94	15.89	0.14	18.57	0.01	0.01	0.01	0.42			99.80	0.68	0.12	
	cpx	52.58	0.43	2.96	0.38	4.49	0.12	17.68	19.92	0.36	0.01	0.09			99.02	0.88		
	opx	55.14	0.19	2.29	0.43	8.38	0.16	31.26	1.29	0.06	0.00	0.11			99.32	0.87		
	phl	39.20	2.69	15.46	0.28	5.57	0.03	21.43	0.09	0.47	9.32	0.12	5.85	0.02	98.07	0.87		
	ol-c	40.67	0.01	0.02	0.02	10.99	0.14	47.81	0.06	0.02	0.01	0.38			100.13	0.89		
SLP13	ol-r	38.47	0.01	0.02	0.02	21.08	0.34	39.88	0.18	0.01	0.01	0.22			100.24	0.77		
	opx	54.50	0.16	4.98	0.40	6.88	0.13	31.60	0.76	0.16	0.00	0.09			99.67	0.89		
	ol	40.58	0.01	0.01	0.02	10.65	0.14	48.39	0.06	0.01	0.01	0.41			100.29	0.89		
SLP17	sp	0.07	0.58	36.07	25.31	23.50	0.26	14.01	0.01	0.01	0.03	0.31			100.15	0.52	0.32	
	opx	55.69	0.18	1.84	0.46	7.80	0.16	32.04	1.22	0.06	0.01	0.12			99.57	0.88		
	phl	38.72	2.46	14.91	0.69	5.76	0.04	22.28	0.11	0.42	9.23	0.17	5.72	0.02	98.11	0.87		
	ol	40.83	0.02	0.02	0.02	10.06	0.14	48.71	0.06	0.02	0.01	0.39			100.28	0.90		
SLP18-1	opx	55.26	0.07	3.60	0.58	6.30	0.14	32.51	0.73	0.12	0.01	0.11			99.43	0.90		
	ol	39.92	0.01	0.02	0.03	10.21	0.13	47.91	0.07	0.03	0.01	0.38			98.70	0.89		
SLP18-2	cpx	53.06	0.50	1.17	0.83	4.98	0.15	17.98	20.08	0.27	0.01	0.02			99.05	0.87		1232
	opx	55.79	0.16	1.55	0.49	6.57	0.11	32.59	1.16	0.08	0.01	0.13			98.64	0.90		
	ol	40.29	0.01	0.02	0.01	11.21	0.13	47.65	0.08	0.01	0.01	0.41			99.83	0.88		
SLP19	sp	0.06	0.26	52.67	12.19	15.43	0.13	18.41	0.01	0.01	0.02	0.40			99.57	0.68	0.13	1162
	cpx	52.57	0.48	3.26	0.13	5.00	0.13	17.70	19.91	0.37	0.01	0.09			99.66	0.86		
	opx	54.18	0.18	4.83	0.35	7.15	0.15	31.67	0.86	0.12	0.01	0.11			99.58	0.89		
	phl	38.88	2.85	14.66	0.49	5.72	0.04	22.41	0.09	0.44	9.18	0.18	5.84	0.02	98.34	0.87		
	ol	40.39	0.02	0.02	0.01	11.62	0.14	47.83	0.09	0.01	0.00	0.40			100.51	0.88		
SLP25	cpx	54.16	0.56	0.90	1.07	4.50	0.14	19.22	19.13	0.27	0.01	0.04			100.00	0.88		1219
	opx	55.15	0.17	3.99	0.32	7.29	0.13	31.96	1.05	0.09	0.01	0.13			100.28	0.89		
	phl	37.83	3.16	15.56	0.24	5.71	0.04	20.76	0.07	0.42	9.57	0.12	5.32	0.02	96.56	0.87		
	ol	39.33	0.01	0.01	0.04	16.79	0.25	43.75	0.16	0.01	0.00	0.21			100.56	0.82		
SLP26	sp	0.10	0.52	35.45	29.64	16.88	0.19	16.61	0.03	0.02	0.01	0.34			99.78	0.64	0.36	1174
	cpx	53.25	0.46	1.26	1.06	4.80	0.17	18.13	19.99	0.29	0.01	0.04			99.45	0.87		
	opx	55.11	0.14	3.07	0.48	7.67	0.16	31.57	1.14	0.06	0.00	0.11			99.52	0.88		
	ol	40.50	0.01	0.02	0.02	11.75	0.15	47.68	0.08	0.01	0.00	0.41			100.63	0.88		
SLP29	sp	0.06	0.28	54.00	9.42	17.08	0.13	17.80	0.02	0.04	0.01	0.50			99.35	0.65	0.10	1116
	cpx	53.09	0.40	1.73	0.60	4.99	0.14	17.46	20.47	0.33	0.01	0.07			99.29	0.86		
	opx	54.15	0.17	4.96	0.36	7.15	0.14	31.61	0.75	0.16	0.01	0.11			99.56	0.89		
	phl	42.72	0.92	11.77	0.17	2.86	0.02	24.61	0.05	0.55	9.81	0.12	8.10	0.08	98.36	0.94		
	ol	40.62	0.02	0.02	0.01	10.95	0.14	48.10	0.07	0.01	0.01	0.42			100.36	0.89		
SLP31	sp	0.03	0.12	54.65	11.08	13.06	0.13	19.49	0.01	0.01	0.01	0.39			98.97	0.73	0.12	1148

	cpx	52.57	0.24	3.98	0.60	3.95	0.10	17.65	20.12	0.47	0.00	0.07			99.77	0.89		
	opx	54.02	0.08	4.78	0.37	6.61	0.13	31.92	0.73	0.10	0.00	0.11			98.85	0.90		
	phl	39.42	3.12	12.95	0.63	4.51	0.04	21.49	0.10	0.46	9.17	0.08	6.14	0.03	95.56	0.89		
SLP33	ol	40.16	0.01	0.02	0.02	10.73	0.14	47.70	0.07	0.01	0.00	0.42			99.28	0.89		
	opx	54.12	0.11	4.65	0.43	6.76	0.14	31.67	0.78	0.09	0.00	0.12			98.87	0.89		
	phl	38.32	2.64	15.08	1.34	5.37	0.03	21.63	0.11	0.55	9.15	0.11	5.86	0.02	97.72	0.88		
SLP34	ol	38.89	0.01	0.02	0.03	16.26	0.24	42.90	0.15	0.00	0.00	0.28			98.78	0.83		
	sp	0.21	0.32	54.71	9.39	16.36	0.14	17.74	0.01	0.01	0.03	0.42			99.35	0.66	0.10	
	opx	52.84	0.18	3.90	0.29	7.52	0.15	30.32	0.96	0.09	0.01	0.10			96.35	0.88		
SLP36	ol	40.72	0.01	0.02	0.03	11.09	0.12	48.01	0.07	0.02	0.00	0.39			100.49	0.89		
	sp	0.04	0.28	47.48	17.89	15.12	0.14	18.30	0.01	0.01	0.01	0.36			99.64	0.68	0.20	
	opx	54.77	0.14	4.45	0.53	6.87	0.12	31.85	0.84	0.11	0.01	0.11			99.79	0.89		
	phl	41.55	1.47	13.76	0.49	2.98	0.02	24.18	0.09	0.60	9.75	0.08	7.62	0.06	99.41	0.93		
SLP37-1	ol	40.47	0.01	0.02	0.01	10.45	0.12	48.12	0.07	0.01	0.01	0.40			99.69	0.89		
	opx	55.20	0.25	2.12	0.36	10.99	0.22	29.63	1.53	0.07	0.00	0.08			100.45	0.83		
SLP37-2	ol	40.50	0.01	0.02	0.01	10.34	0.14	48.28	0.07	0.01	0.01	0.39			99.77	0.89		1147
	cpx	51.98	0.35	4.63	0.80	4.06	0.10	17.18	20.09	0.46	0.01	0.06			99.71	0.88		
	opx	54.57	0.12	4.81	0.35	6.73	0.14	32.03	0.72	0.11	0.01	0.10			99.68	0.89		
	phl	38.40	2.16	15.87	1.46	4.56	0.03	21.35	0.14	0.55	9.73	0.11	6.51	0.01	98.13	0.89		
SLP38-1	ol	40.29	0.01	0.01	0.01	12.29	0.14	47.11	0.08	0.02	0.00	0.39			100.36	0.87		1069
	cpx	51.99	0.34	3.73	0.76	4.09	0.09	16.92	21.22	0.27	0.01	0.07			99.48	0.88		
	opx	54.32	0.13	4.99	0.34	7.24	0.14	31.47	0.75	0.14	0.01	0.11			99.63	0.89		
SLP38-2	ol	40.79	0.01	0.01	0.01	10.43	0.13	48.64	0.07	0.01	0.01	0.41			100.52	0.89		1187
	cpx	53.95	0.32	0.94	0.87	4.35	0.15	18.69	19.70	0.27	0.01	0.07			99.33	0.88		
	opx	55.00	0.10	4.49	0.42	6.48	0.14	32.35	0.72	0.10	0.01	0.10			99.90	0.90		
	phl	40.25	4.02	13.16	0.95	4.18	0.03	21.55	0.07	0.54	9.43	0.16	6.00	0.02	97.82	0.90		
SLP40	ol	40.67	0.01	0.02	0.01	10.63	0.14	48.39	0.06	0.01	0.01	0.39			100.34	0.89		1206
	cpx	52.70	0.32	3.63	0.86	4.06	0.10	18.24	19.05	0.42	0.01	0.08			99.48	0.89		
	opx	55.11	0.19	3.39	0.37	7.99	0.15	31.52	1.07	0.07	0.01	0.12			99.98	0.88		
	phl	37.68	2.70	15.63	0.29	4.95	0.03	21.35	0.20	0.49	9.30	0.10	6.29	0.02	96.39	0.88		
SLP42	ol	40.15	0.01	0.02	0.02	10.94	0.14	47.98	0.06	0.01	0.00	0.40			99.73	0.89		1154
	cpx	51.14	0.52	5.71	0.71	4.21	0.11	16.56	20.12	0.62	0.01	0.07			99.78	0.88		
	opx	54.03	0.19	5.03	0.34	7.46	0.15	31.17	0.81	0.14	0.00	0.10			99.42	0.88		
	phl	37.87	3.73	15.77	1.11	6.91	0.04	19.18	0.09	0.42	9.51	0.18	3.31	0.01	96.74	0.83		

Table DR2. Major element compositions of phlogopite phenocrysts in Sailipu ultrapotassic lavas (*in wt%*)

Sample	No.	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	NiO	Na ₂ O	K ₂ O	F	Cl	Total	Mg#
SLP09	1	37.23	8.56	12.55	0.00	13.69	0.14	12.05	0.08	0.07	0.48	8.95	2.74	0.03	95.41	0.61
	2	38.57	5.92	12.48	0.00	7.96	0.08	17.80	0.07	0.04	0.38	9.15	4.80	0.00	95.23	0.80
	3	37.79	7.64	12.65	0.00	10.29	0.05	15.76	0.08	0.01	0.48	9.19	3.60	0.03	96.05	0.73
	4	38.47	6.57	12.73	0.01	9.18	0.02	17.06	0.08	0.09	0.52	9.18	4.33	0.03	96.43	0.77
	5	36.98	7.80	13.30	0.00	10.56	0.06	15.41	0.04	0.03	0.43	8.36	4.01	0.04	95.31	0.72
	6	36.25	9.11	13.78	0.13	9.62	0.08	14.57	0.33	0.09	0.48	8.09	3.36	0.02	94.49	0.73
	7	37.38	8.37	12.70	0.04	9.38	0.10	15.31	0.90	0.07	0.48	7.87	3.53	0.02	94.64	0.74
	8	37.63	8.80	12.43	0.01	11.79	0.05	13.58	0.10	0.01	0.43	9.02	3.18	0.03	95.70	0.67
	9	38.05	8.15	12.56	0.00	11.48	0.13	14.32	0.08	0.04	0.54	9.20	3.47	0.05	96.58	0.69
	10	36.05	9.46	13.48	0.15	8.48	0.09	15.40	0.09	0.10	0.55	8.10	3.05	0.02	93.72	0.76
SLP29	1	37.27	9.34	13.17	0.10	10.98	0.09	14.47	0.07	0.03	0.48	8.61	3.13	0.01	96.43	0.70
	2	36.38	9.45	13.21	0.27	10.54	0.12	14.53	0.07	0.13	0.44	8.20	2.89	0.04	95.04	0.71
	3	36.29	9.25	13.08	0.24	10.21	0.04	14.81	0.07	0.11	0.43	8.36	3.20	0.01	94.75	0.72
	4	37.13	9.11	13.00	0.08	12.84	0.08	13.20	0.04	0.03	0.52	8.59	2.93	0.02	96.32	0.65
	5	36.43	9.19	13.29	0.23	9.68	0.12	14.90	0.09	0.00	0.42	8.24	3.02	0.01	94.35	0.73
	6	36.06	9.47	13.23	0.25	9.29	0.09	15.33	0.04	0.04	0.49	8.28	3.02	0.00	94.31	0.75
	7	36.65	9.39	13.00	0.06	8.97	0.05	15.09	0.05	0.03	0.44	8.60	2.96	0.02	94.04	0.75
	8	36.20	9.45	12.99	0.13	8.74	0.06	15.33	0.08	0.05	0.45	8.46	2.91	0.04	93.65	0.76
	9	36.48	9.00	13.62	0.34	9.17	0.10	14.29	0.10	0.06	0.41	7.96	2.93	0.01	93.22	0.74
	10	36.11	9.38	13.64	0.22	8.68	0.09	14.71	0.19	0.09	0.43	7.90	2.98	0.02	93.17	0.75
SLP31	1	35.31	9.12	13.10	0.21	10.07	0.05	14.10	0.11	0.14	0.41	8.20	2.99	0.01	92.53	0.71
	2	36.24	8.71	13.22	0.01	10.55	0.08	14.30	0.09	0.04	0.42	8.20	3.28	0.01	93.77	0.71
	3	36.20	9.05	13.36	0.27	9.04	0.05	15.59	0.09	0.04	0.38	8.17	3.45	0.02	94.25	0.75
	4	36.37	8.98	13.38	0.26	8.30	0.08	15.96	0.09	0.17	0.46	8.31	3.40	0.03	94.34	0.77
	5	36.17	8.73	13.34	0.04	8.12	0.09	15.68	0.12	0.11	0.38	8.21	3.31	0.01	92.91	0.77
	6	36.47	8.63	13.38	0.05	8.51	0.08	15.86	0.09	0.09	0.39	8.25	3.48	0.01	93.81	0.77
	7	36.48	8.89	13.13	0.23	8.70	0.06	15.86	0.31	0.03	0.44	8.31	3.49	0.04	94.50	0.76
	8	35.31	9.15	12.89	0.22	8.57	0.05	15.37	0.05	0.05	0.47	8.36	3.13	0.02	92.31	0.76
	9	36.48	8.77	13.20	0.10	8.81	0.06	16.01	0.03	0.05	0.39	8.25	3.66	0.01	94.29	0.76
	10	36.67	8.93	13.42	0.05	8.37	0.05	15.94	0.03	0.03	0.40	8.44	3.59	0.02	94.43	0.77
SLP33	1	36.10	9.50	13.02	0.15	9.14	0.05	15.50	0.10	0.11	0.46	8.19	3.17	0.02	94.18	0.75
	2	36.00	9.17	12.86	0.09	9.09	0.10	15.25	0.28	0.10	0.46	8.02	2.98	0.02	93.15	0.75
	3	35.52	9.19	13.20	0.21	9.68	0.07	14.98	0.07	0.06	0.38	8.32	3.27	0.01	93.57	0.73
	4	36.03	9.52	13.36	0.24	9.97	0.08	15.03	0.06	0.07	0.38	8.15	3.21	0.01	94.75	0.73

	5	36.00	9.42	13.13	0.20	9.90	0.06	14.84	0.03	0.04	0.40	8.24	3.18	0.01	94.12	0.73	
	6	36.04	9.46	13.13	0.15	9.87	0.06	14.89	0.09	0.12	0.44	8.30	3.11	0.01	94.36	0.73	
	7	36.15	9.59	13.12	0.20	9.84	0.03	14.80	0.07	0.04	0.40	8.27	3.23	0.00	94.37	0.73	
	8	36.59	9.53	12.97	0.08	10.71	0.08	14.72	0.07	0.10	0.40	8.51	2.99	0.02	95.50	0.71	
	9	36.67	9.42	13.18	0.16	10.85	0.10	14.08	0.08	0.07	0.41	8.02	3.07	0.02	94.82	0.70	
	10	36.59	9.51	13.20	0.15	9.03	0.06	15.50	0.06	0.11	0.51	8.35	3.24	0.02	94.95	0.75	
SLP36	1	35.18	9.20	12.99	0.32	8.85	0.07	15.00	0.06	0.10	0.42	8.07	3.14	0.02	92.10	0.75	
	2	35.39	9.21	13.11	0.31	8.55	0.05	15.44	0.10	0.03	0.47	7.99	3.19	0.03	92.51	0.76	
	3	35.32	8.50	13.47	0.28	9.10	0.05	14.66	0.10	0.09	0.42	7.76	3.08	0.01	91.52	0.74	
	4	36.61	9.54	13.09	0.16	10.00	0.07	14.66	0.11	0.07	0.43	8.31	2.92	0.05	94.77	0.72	
	5	36.35	9.26	13.30	0.09	9.38	0.08	15.08	0.08	0.07	0.40	8.26	2.90	0.01	94.03	0.74	
	6	37.81	8.19	11.86	0.20	8.73	0.08	15.28	3.00	0.01	0.46	6.90	2.90	0.03	94.21	0.76	
	7	36.00	9.11	13.21	0.27	8.79	0.06	15.47	0.06	0.08	0.41	8.03	3.28	0.03	93.41	0.76	
	8	35.25	9.38	13.02	0.25	9.56	0.09	14.65	0.05	0.08	0.51	8.10	2.96	0.01	92.65	0.73	
	9	36.85	9.27	12.77	0.03	8.90	0.03	15.20	0.07	0.08	0.40	8.66	3.07	0.02	94.05	0.75	
	10	36.95	9.22	12.56	0.06	9.35	0.07	15.29	0.06	0.06	0.45	9.13	3.05	0.03	94.99	0.74	
SLP37-1	1	36.82	8.91	13.17	0.00	10.00	0.08	14.28	0.04	0.10	0.47	8.43	3.20	0.02	94.17	0.72	
	2	36.01	9.15	13.06	0.10	10.80	0.11	13.98	0.11	0.07	0.43	7.86	3.18	0.03	93.54	0.70	
	3	35.79	9.33	13.16	0.27	11.00	0.10	13.88	0.11	0.03	0.42	7.93	3.00	0.03	93.76	0.69	
	4	36.43	9.23	13.24	0.16	9.23	0.07	14.92	0.07	0.06	0.37	8.20	3.19	0.01	93.82	0.74	
	5	36.86	8.45	12.86	0.09	8.58	0.07	15.92	0.08	0.04	0.50	8.51	3.63	0.00	94.04	0.77	
	6	35.02	9.16	12.84	0.10	10.56	0.08	13.71	0.08	0.06	0.41	7.97	3.03	0.02	91.76	0.70	
	7	35.85	9.34	13.43	0.30	9.73	0.07	14.56	0.08	0.14	0.47	8.03	3.14	0.01	93.82	0.73	
	8	36.34	8.96	13.10	0.11	9.57	0.07	14.97	0.09	0.03	0.42	8.20	3.20	0.02	93.73	0.74	
	9	35.70	9.21	13.31	0.41	9.08	0.08	14.55	0.04	0.05	0.43	7.97	3.13	0.02	92.64	0.74	
	10	35.78	9.33	13.34	0.33	8.96	0.05	15.11	0.07	0.06	0.43	8.04	3.20	0.03	93.37	0.75	
SLP38-2	1	35.84	9.18	13.03	0.19	9.81	0.09	14.90	0.07	0.07	0.39	8.25	3.16	0.02	93.64	0.73	
	2	35.89	8.86	13.77	0.15	9.19	0.04	14.51	0.09	0.07	0.33	7.99	3.09	0.00	92.69	0.74	
	3	35.83	9.29	12.75	0.25	9.92	0.06	14.58	0.10	0.06	0.42	8.24	3.01	0.02	93.24	0.72	
	4	36.31	9.20	13.50	0.23	8.94	0.04	14.64	0.13	0.09	0.40	8.06	2.78	0.01	93.16	0.74	
	5	35.67	9.14	13.45	0.19	10.10	0.06	13.91	0.06	0.09	0.40	7.95	2.94	0.01	92.73	0.71	
	6	35.78	9.27	13.29	0.15	10.56	0.02	13.98	0.10	0.10	0.41	8.06	3.03	0.02	93.49	0.70	
	7	35.67	9.07	12.86	0.18	9.73	0.08	14.88	0.08	0.09	0.41	8.26	3.10	0.01	93.10	0.73	
	8	36.78	8.19	14.89	0.15	9.24	0.07	13.39	0.08	0.04	0.45	7.41	2.72	0.01	92.27	0.72	
	9	36.03	8.92	13.32	0.23	9.71	0.11	14.34	0.09	0.07	0.41	8.22	2.92	0.01	93.15	0.72	
	10	35.99	8.64	13.06	0.20	9.55	0.10	13.87	0.11	0.04	0.39	8.00	2.69	0.00	91.50	0.72	

	1	35.47	9.85	13.36	0.17	10.26	0.06	13.91	0.10	0.11	0.45	8.04	2.73	0.00	93.34	0.71
	2	35.64	9.37	12.98	0.10	11.28	0.09	13.48	0.18	0.07	0.50	8.02	2.90	0.02	93.42	0.68
	3	37.11	9.12	12.80	0.11	9.94	0.05	15.25	0.07	0.13	0.51	8.84	3.08	0.01	95.71	0.73
	4	36.93	9.29	12.87	0.07	9.88	0.05	15.19	0.05	0.05	0.38	8.99	2.84	0.01	95.38	0.73
SLP42	5	36.37	9.97	12.83	0.06	11.52	0.04	14.16	0.08	0.08	0.51	8.66	2.69	0.02	95.84	0.69
	6	38.25	6.88	12.23	0.10	8.69	0.04	17.30	0.09	0.05	0.55	9.11	3.80	0.04	95.53	0.78
	7	34.57	9.63	13.03	0.15	11.17	0.06	13.64	0.07	0.05	0.44	8.00	2.85	0.02	92.46	0.69
	8	35.56	9.58	12.82	0.10	10.85	0.09	14.24	0.05	0.09	0.37	8.33	3.00	0.02	93.84	0.70
	9	36.16	9.44	12.72	0.06	9.95	0.09	14.47	0.09	0.11	0.60	8.35	2.86	0.01	93.70	0.72
	10	37.61	8.43	12.76	0.03	10.56	0.05	14.70	0.11	0.08	0.51	9.10	3.21	0.05	95.82	0.71

Table DR3. Major element compositions of olivine phenocrysts in Sailipu ultrapotassic lavas (*in wt%*)

Sample	No.	SiO ₂	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	FeO	MnO	MgO	CaO	NiO	Na ₂ O	K ₂ O	Total	Mg#
SLP7-1	1	38.24	0.10	0.23	0.04	24.36	0.33	36.68	0.30	0.24	0.03	0.02	100.57	0.73
	2	37.72	0.04	0.40	0.07	25.89	0.35	34.07	0.47	0.22	0.06	0.07	99.37	0.70
	3	38.65	0.06	0.19	0.07	24.60	0.28	36.34	0.35	0.20	0.02	0.01	100.77	0.73
	4	38.33	0.07	0.44	0.02	26.54	0.24	33.50	0.44	0.19	0.07	0.04	99.91	0.69
	5	38.22	0.05	0.23	0.04	24.78	0.32	36.69	0.28	0.22	0.04	0.01	100.87	0.73
	6	39.58	0.01	0.01	0.10	17.63	0.26	42.91	0.15	0.28	0.03	0.01	100.98	0.81
	7	39.36	0.01	0.00	0.08	19.42	0.29	41.39	0.21	0.16	0.01	0.05	100.99	0.79
	8	39.69	0.04	0.03	0.02	18.81	0.25	41.63	0.20	0.17	0.01	0.00	100.84	0.80
	9	39.35	0.04	0.19	0.04	21.93	0.24	38.54	0.26	0.16	0.04	0.01	100.81	0.76
	10	37.91	0.00	0.22	0.08	26.66	0.37	34.49	0.39	0.15	0.01	0.03	100.30	0.70
	11	38.23	0.00	0.03	0.01	22.48	0.36	39.38	0.20	0.19	0.03	0.00	100.91	0.76
	12	38.67	0.00	0.03	0.07	19.37	0.27	40.87	0.17	0.18	0.00	0.03	99.66	0.79
	13	36.56	0.02	0.16	0.00	27.78	0.33	33.98	0.44	0.17	0.03	0.05	99.51	0.69
	14	38.47	0.05	0.00	0.06	21.21	0.30	40.05	0.18	0.19	0.03	0.02	100.56	0.77
	15	38.23	0.00	0.02	0.00	22.21	0.33	39.21	0.16	0.16	0.00	0.00	100.33	0.76
	16	37.16	0.06	0.15	0.01	26.22	0.35	34.77	0.30	0.16	0.00	0.02	99.20	0.70
	17	38.48	0.07	0.01	0.04	21.17	0.35	39.68	0.18	0.16	0.01	0.00	100.16	0.77
	18	37.47	0.10	0.22	0.00	26.41	0.33	35.73	0.33	0.16	0.00	0.03	100.77	0.71
SLP13	1	38.93	0.00	0.00	0.00	21.55	0.28	39.45	0.17	0.19	0.00	0.01	100.59	0.77
	2	38.62	0.03	0.02	0.00	21.85	0.36	39.22	0.21	0.15	0.01	0.00	100.49	0.76
	3	38.33	0.00	0.04	0.09	21.71	0.33	39.83	0.15	0.19	0.01	0.00	100.67	0.77
	4	38.72	0.04	0.01	0.02	20.87	0.33	40.42	0.14	0.21	0.01	0.00	100.78	0.78
	5	37.71	0.03	0.11	0.00	23.83	0.34	37.98	0.29	0.16	0.03	0.00	100.48	0.74
	6	38.25	0.09	0.04	0.01	21.70	0.35	39.50	0.18	0.18	0.01	0.01	100.32	0.76
	7	38.37	0.00	0.08	0.03	21.83	0.36	39.51	0.19	0.19	0.02	0.00	100.58	0.76
	8	38.06	0.00	0.02	0.02	20.18	0.36	41.06	0.17	0.20	0.00	0.00	100.07	0.78
	9	38.06	0.00	0.02	0.02	20.18	0.36	41.06	0.17	0.20	0.00	0.00	100.07	0.81
	10	37.75	0.02	0.20	0.05	23.45	0.39	38.43	0.26	0.16	0.01	0.00	100.71	0.75
SLP36	1	37.49	0.03	0.29	0.02	24.92	0.44	36.58	0.24	0.16	0.01	0.03	100.21	0.72
	2	38.11	0.04	0.02	0.00	23.88	0.37	37.96	0.21	0.20	0.00	0.01	100.80	0.74
	3	37.85	0.03	0.01	0.01	23.20	0.35	38.08	0.14	0.21	0.00	0.00	99.89	0.75
	4	38.04	0.03	0.02	0.00	21.92	0.39	38.92	0.18	0.19	0.02	0.00	99.71	0.76
	5	37.83	0.02	0.09	0.00	21.76	0.29	38.99	0.15	0.21	0.01	0.00	99.36	0.76

6	36.86	0.05	0.21	0.00	24.27	0.29	37.91	0.21	0.18	0.02	0.00	100.00	0.74
7	38.07	0.02	0.05	0.00	22.07	0.38	38.59	0.17	0.13	0.01	0.02	99.51	0.76
8	37.88	0.01	0.21	0.04	23.94	0.35	37.37	0.26	0.16	0.03	0.02	100.26	0.74
9	37.96	0.03	0.29	0.03	26.04	0.36	35.31	0.42	0.17	0.04	0.03	100.66	0.71
10	38.59	0.05	0.02	0.01	21.48	0.40	39.64	0.16	0.13	0.02	0.01	100.51	0.77

Table DR4. Clinopyroxene trace element compositions of the Sailipu mantle xenoliths (*in ppm*)

Element	SLP04	SLP07-1	SLP08-2	SLP09-2	SLP11	SLP12	SLP19	SLP31	SLP37-2	SLP42	Detection limit
Sc	55	43	46	43	46	78	62	48	61	46	<0.05
Ti	2337	2401	3400	2895	2923	5888	5058	2973	2615	3439	<1
V	217	107	145	170	128	236	213	187	226	238	<0.02
Cr	7189	1439	2914	3772	2912	4249	2319	4293	4877	4207	<2
Mn	769	1160	1368	910	1376	2458	1277	826	900	790	<0.5
Ga	7.68	2.93	9.41	6.11	4.94	17.92	27.64	25.42	6.32	4.99	<0.02
Rb	13.66	1.34	18.93	5.65	7.26	36.44	46.83	73.94	6.20	3.14	<0.01
Sr	93	113	122	135	124	133	154	142	115	88	<0.04
Y	13.8	12.9	16.0	17.2	13.2	28.7	22.7	14.9	19.6	11.7	<0.02
Zr	27.9	19.7	58.8	55.3	31.0	269.2	83.9	76.4	51.4	33.3	<0.04
Nb	0.28	0.16	2.07	0.84	0.56	10.91	2.02	1.38	0.42	0.29	<0.01
Cs	0.69	0.11	1.29	0.63	0.52	4.23	3.09	2.40	0.46	0.45	<0.02
La	4.41	5.07	12.31	9.47	6.78	24.32	11.25	9.16	8.12	4.17	<0.005
Ce	23.5	25.8	40.7	47.0	31.5	69.4	50.7	43.9	39.9	17.5	<0.005
Pr	5.18	5.60	7.65	9.21	6.38	14.83	10.44	9.22	7.94	3.07	<0.005
Nd	32.6	36.5	43.7	56.3	39.9	86.3	65.7	54.1	46.3	17.0	<0.01
Sm	9.4	11.3	11.5	15.6	11.8	23.0	19.1	13.6	12.7	4.6	<0.01
Eu	1.79	1.90	1.96	2.63	1.91	3.50	3.18	2.20	2.23	1.06	<0.01
Gd	5.48	6.88	7.07	9.30	6.91	13.70	11.58	7.79	7.56	3.39	<0.05
Tb	0.63	0.70	0.77	0.92	0.70	1.43	1.17	0.79	0.85	0.44	<0.005
Dy	3.22	3.33	3.65	4.49	3.48	6.95	5.73	3.64	4.44	2.57	<0.03
Ho	0.57	0.51	0.64	0.69	0.52	1.11	0.89	0.60	0.80	0.45	<0.005
Er	1.35	1.18	1.60	1.58	1.27	2.68	2.15	1.38	1.99	1.11	<0.03
Tm	0.17	0.15	0.21	0.19	0.16	0.37	0.25	0.18	0.26	0.15	<0.005
Yb	1.02	0.90	1.25	1.19	0.90	2.15	1.62	1.10	1.64	0.85	<0.02
Lu	0.12	0.12	0.17	0.15	0.12	0.32	0.21	0.14	0.23	0.10	<0.005
Hf	1.17	0.96	1.99	2.57	1.33	9.08	3.60	3.01	2.06	1.07	<0.005
Ta	0.02	0.01	0.12	0.05	0.04	0.43	0.11	0.08	0.04	0.02	<0.005
Th	0.80	1.07	15.26	5.90	4.12	33.92	7.85	3.79	2.58	1.90	<0.002
U	0.11	0.11	1.31	0.55	0.32	1.20	0.52	0.31	0.24	0.15	<0.002