DR2005116

Supplementary file proposed as GSA Data Repository

Table 1: Locations and bulk-rock compositions of South Peruvian potassic and ultrapotassic rocks.

A- Western Altiplano (WA):

Sample number	1	2	3	4	5	6	7	8	9	10	11
Latitude W	70° 35' 23''	70° 36' 23''	70° 26' 25''	70° 31' 00''	70° 29' 25''	70° 36' 25''	71° 36' 23''	71° 36' 23''	70° 13' 32''	69° 44' 44''	70° 12' 37''
Longitude E	15° 03' 01''	15° 00' 25''	15° 00' 25''	15° 04' 00''	15° 05' 15''	15° 00' 25''	14° 02' 43''	14° 02' 43''	15° 31' 55''	15° 55' 11''	15° 47' 07''
Rock type	Leucitite	Leucite tephrite		Diopside theralite		Leucite phono-tephrite	Diopside trachybasalt			Olivine trachybasalt	
SiO_2 (wt %)	45.78	45.46	46.72	47.31	49.00	47.32	46.39	46.48	47.65	47.37	52.53
TiO_2	0.97	1.06	0.93	1.14	1.37	0.96	1.47	1.47	1.25	1.36	2.29
Al_2O_3	11.78	11.57	11.80	13.38	14.86	13.18	15.66	15.74	16.02	13.02	15.07
Fe_2O_3 t	11.65	12.60	10.49	11.68	12.00	10.99	10.70	10.57	10.86	8.56	9.35
MnO	0.18	0.20	0.17	0.18	0.17	0.17	0.17	0.18	0.18	0.13	0.12
MgO	7.91	7.25	7.58	5.80	4.88	6.05	6.49	6.08	7.41	10.30	3.90
CaO	11.29	11.08	11.07	10.76	6.77	9.44	10.10	10.49	10.20	8.54	6.79
Na_2O	3.65	4.16	3.97	1.64	3.39	4.62	2.96	3.22	2.50	1.77	4.30
K_2O	1.46	1.43	1.97	5.18	4.41	2.16	2.63	2.47	2.12	4.28	3.36
P_2O_5	0.86	0.86	0.76	0.68	0.97	0.81	0.66	0.65	0.42	0.87	1.08
L.O.I.	4.42	3.80	3.72	1.95	0.94	3.67	2.28	2.26	1.34	3.39	1.14
Sum	99.95	99.47	99.18	99.70	98.76	99.37	99.51	99.61	99.95	99.57	99.93
mg#	0.57	0.53	0.59	0.50	0.45	0.52	0.55	0.53	0.57	0.70	0.45
Cs (ppm)	2.9	n. d.	n. d.	n. d.	n. d.	n. d.	2.1	12.7	2.3	6.3	0.4
Ba	1734	1132	1871	1405	1157	1622	819	848	533	1922	1854
Sr	1468	1273	2336	1317	1240	1939	1177	1041	625	1527	1513
Rb	43	37	67	149	113	37	72	70	64	78	56
Pb	14	n. d.	n. d.	n. d.	n. d.	n. d.	11.3	11.8	6.7	12	8
Co	44	44	37	36	29	35	32	32	37	41	33
Ni	44	48	75	30	26	42	32	32	57	247	90
Cr	140	139	264	69	29	114	55	52	204	610	162
Sc	24	35	33	22	23	28	n. d.	n. d.	25	n. d.	13
V	301	335	270	260	311	291	265	265	313	189	183
Th	6	6	8	n. d.	n. d.	8	2.6	2.6	4	11	10
U	1.07	n. d.	n. d.	n. d.	n. d.	n. d.	1.19	1.32	0.83	2.5	1.6
Hf	2.40	n. d.	n. d.	n. d.	n. d.	n. d.	2.82	2.97	2.67	6.3	9.9
Nb	6.7	6.0	7.0	8.9	9.8	8.0	7.1	7.3	5.6	23	30
Ta	0.52	n. d.	n. d.	n. d.	n. d.	n. d.	0.51	0.55	0.42	1.28	1.84
Zr	99	95	108	135	157	110	113	119	106	287	434
La	25	22	24	23	29	26	17	18	24	107	112
Ce	48	41	47	48	61	49	38	39	52	205	219
Pr	6.3	n. d.	n. d.	6.0	7.8	n. d.	4.8	5.0	6.7	24	26
Nd	26	25	27	26	34	28	22	23	29	92	97
Sm	5.9	6.4	6.6	6.1	7.9	6.7	5.1	5.2	5.9	16	16
Eu	2.08	1.75	1.75	1.93	2.22	1.81	1.73	1.81	1.66	3.97	4.12
Gd	5.2	5.5	5.4	5.2	6.2	5.7	4.5	4.8	5.2	10	11
Tb	0.66	n. d.	n. d.	0.73	0.98	n. d.	0.67	0.69	0.75	1.39	1.37
Dy	3.64	4.04	3.74	4.38	5.2	4.03	3.71	3.80	4.33	6.3	6.6
Ho	0.64	n. d.	n. d.	0.94	1.05	n. d.	0.84	0.84	0.89	0.90	1.03
Er	1.65	1.71	1.58	2.12	2.55	1.76	1.95	2.03	2.26	2.33	2.44
Tm	0.24	n. d.	n. d.	0.29	0.37	n. d.	0.28	0.29	0.36	0.31	0.32
Yb	1.45	1.54	1.42	1.89	2.35	1.64	1.88	1.91	2.51	1.80	1.95
Lu	0.22	0.21	0.21	0.31	0.39	0.24	0.30	0.31	0.41	0.29	0.28
Y	19	22	20	23	27	22	21	22	26	30	29

B- Cusco and Vilcanota Fault System (CVFS):

Sample number	12***	13***	14	15	16	17	18	19	20	21	22	23	24
Latitude W.	71° 52' 20''	71° 43' 35''	71° 43' 35''	71° 22' 16''	71° 22' 16''	71° 22' 16''	71° 53' 24''	71° 53' 24''	72° 07' 15''	72° 07' 15''	72° 07' 24''	72° 07' 15''	72° 07' 12''
Longitude E	13° 27' 15''	14° 41' 45''	14° 41' 45''	14° 05' 00''	14° 05' 00''	14° 05' 00''	13° 27' 42''	13° 27' 42''	13° 22' 33''	13° 22' 33''	13° 22' 27''	13° 22' 33''	13° 22' 22''
Rock type	Diopside phlogopite lamproite			Augite kersantite			Augite minette		Augite trachybasalt				
SiO_2 (wt %)	50.40	53.04	53.97	49.09	52.57	50.62	55.27	55.07	54.40	53.44	55.03	53.60	55.50
TiO_2	1.90	2.70	2.66	1.54	1.31	1.41	0.93	0.93	1.18	1.11	1.16	1.13	1.12
Al_2O_3	11.10	12.12	12.64	14.78	14.28	14.43	14.66	14.61	14.72	14.41	14.79	14.43	14.46
Fe_2O_3 t	7.45	6.80	6.50	8.44	7.61	8.41	5.99	5.94	7.62	7.45	7.47	7.48	7.43
MnO	0.09	0.06	0.06	0.12	0 .12	0.12	0.08	0.08	0.10	0.10	0.09	0.10	0.08
MgO	4.56	4.42	4.30	8.16	7.30	7.40	5.37	5.33	6.61	6.36	6.35	6.27	6.50
CaO	7.11	6.14	5.96	7.26	6.84	7.00	7.00	6.93	7.04	6.98	7.08	6.76	7.26
Na_2O	1.87	1.56	1.77	2.77	3.12	2.92	3.35	3.29	3.31	3.06	3.34	3.12	3.39
K_2O	8.02	7.98	8.12	4.60	4.87	4.50	4.44	4.37	3.34	3.21	3.40	3.25	3.22
P_2O_5	2.46	1.79	1.79	1.25	1.27	1.25	1.04	1.04	0.87	0.79	0.83	0.78	0.83
L.O.I.	3.97	2.35	2.20	0.41	0.61	0.68	0.55	0.54	0.77	0.61	0.41	1.22	0.38
Sum	98.93	98.96	99.97	98.42	99.90	98.74	98.68	98.13	99.96	97.52	99.95	98.14	100.17
mg#	0.55	0.56	0.57	0.66	0.65	0.64	0.64	0.64	0.63	0.63	0.63	0.62	0.63
Cs (ppm)	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	0.9	1.3	0.6	1.2	n. d.
Ba	12389	4580	4753	5043	4927	5167	5028	4938	3461	3688	3500	3623	3890
Sr	4562	3414	3466	2364	2686	2708	4550	4446	3026	3028	2985	2928	3430
Rb	152	219	194	132	168	152	136	127	63	73	71	77	79
Pb	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	18	19	15	19	n. d.
Co	19	59	21	22	27	24	18	17	26	24	25	21	24
Ni	57	67	91	90	126	110	43	41	151	185	173	128	183
Cr	65	225	121	346	327	355	85	86	305	293	288	278	308
Sc	13	16	12	21	19	21	15	15	13	13	13	13	17
V	103	127	124	156	133	144	125	125	139	135	124	137	137
Th	42	33	33	21	23	18	54	52	30	30	30	30	31
U	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	4.03	3.72	3.95	3.98	n. d.
Hf	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	6.4	6.7	6.1	6.5	n. d.
Nb	192	180	169	37	43	40	24	24	21	21	21	21	20
Ta	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	1.36	1.35	1.41	1.39	n. d.
Zr	746	472	466	372	291	413	292	292	290	295	282	288	281
La	226	206	205	107	125	122	286	291	231	233	241	234	248
Ce	426	366	368	219	253	222	475	485	427	427	449	425	413
Pr	52	n. d.	43	n. d.	n. d.	n. d.	n. d.	n. d.	45	48	50	47	n. d.
Nd	199	154	157	90	94	99	205	208	166	172	173	170	175
Sm	30	19	20	16	17	17	30	30	22	23	23	21	26
Eu	9.4	5.3	5.4	4.27	4.26	4.36	7.0	6.9	5.6	5.9	6.0	5.7	5.6
Gd	20	13	15	11	11	12	18	18	14	14	14	14	15
Tb	2.10	n. d.	1.33	n. d.	n. d.	n. d.	n. d.	n. d.	1.41	1.53	1.48	1.57	n. d.
Dy	9.6	5.2	5.9	6.1	5.8	6.1	7.0	7.1	6.9	6.9	6.8	7.6	6.4
Ho	1.26	n. d.	0.80	n. d.	n. d.	n. d.	n. d.	n. d.	0.83	0.97	0.84	0.94	n. d.
Er	3.48	2.17	1.93	2.62	2.64	2.53	2.86	2.95	2.49	2.72	2.71	2.80	2.71
Tm	0.36	n. d.	0.20	n. d.	n. d.	n. d.	n. d.	n. d.	0.28	0.31	0.31	0.30	n. d.
Yb	2.37	1.28	1.27	1.97	1.83	2.03	1.98	2.00	1.84	2.11	2.11	2.21	2.01
Lu	0.35	0.22	0.19	0.38	0.38	0.34	0.38	0.36	0.28	0.34	0.25	0.32	0.34
Y	36	19	18	28	27	28	29	30	25	28	27	27	28

C- Eastern Altiplano (EA):

Sample number	12*	13**	14	15	16**	17	18	19**	20
Latitude W.	70° 37' 06''	70° 44'00''	70° 30' 06''	70° 37' 42''	70° 44' 10''	70° 37' 42''	70° 37' 40''	70° 37' 42''	72° 15' 00''
Longitude E	14° 19' 18''	14° 16' 0''	14° 19' 18''	14° 25' 54''	14° 11' 40''	14° 25' 54''	14° 25' 50''	14° 25' 54''	13° 07' 00''
Rock type	Sanidine phlogopite lamproite						Orthopyroxene phlogopite lamproite		Olivine minette
SiO_2 (wt %)	56.28	59.20	58.02	58.51	55.27	58.08	56.41	57.59	46.42
TiO_2	1.51	1.56	1.57	1.35	0.93	1.36	0.91	0.91	1.77
Al_2O_3	12.88	13.33	12.76	13.58	11.94	13.67	13.88	14.26	11.45
Fe_2O_3 t	6.15	5.20	5.40	5.08	7.31	5.08	6.80	6.59	8.35
MnO	0.08	0.03	0.04	0.04	0.06	0.04	0.09	0.06	0.12
MgO	7.58	5.50	7.11	7.06	9.26	7.07	4.77	4.39	10.42
CaO	3.43	2.09	1.90	1.78	2.91	1.88	3.98	3.74	5.52
Na_2O	1.48	0.83	1.01	0.49	0.08	0.60	2.60	2.70	3.62
K_2O	7.94	8.00	8.13	8.94	4.41	8.58	6.57	5.94	2.85
P_2O_5	1.16	1.34	0.92	1.28	1.18	1.27	0.87	0.83	1.51
L.O.I.	1.97	1.97	3.36	2.31	6.84	2.34	2.62	2.47	7.85
Sum	100.46	99.05	100.22	100.42	100.19	99.97	99.50	99.48	99.88
mg#	0.71	0.68	0.72	0.73	0.72	0.73	0.58	0.57	0.71
Cs (ppm)	32	n. d.	9.1	12	n. d.	12	11	n. d.	n. d.
Ba	5180	4126	3864	4042	2629	3617	8719	6552	5996
Sr	928	602	618	456	211	543	1322	1359	3020
Rb	658	709	658	913	408	839	375	405	200
Pb	67	n. d.	52	38	n. d.	45	150	n. d.	n. d.
Co	27	27	19	22	29	22	22	15	37
Ni	209	141	235	151	313	146	115	364	446
Cr	449	567	481	551	579	562	188	254	511
Sc	n. d.	11	n. d.	n. d.	15	n. d.	n. d.	18	14
V	113	125	97	88	97	90	93	102	145
Th	104	n. d.	93	98	63	103	75	61	42
U	20	n. d.	14	17	n. d.	18	17	n. d.	n. d.
Hf	21	n. d.	22	19	n. d.	20	13	n. d.	n. d.
Nb	34	38	36	29	27		24	26	32
Ta	2.48	n. d.	2.46	2.19	n. d.	2.25	1.73	1.62	2.00
Zr	755	779	789	678	431	703	499	502	539
La	88	95	99	73	58	76	71	69	75
Ce	223	237	214	191	130	195	153	131	164
Pr	31	35	32	27	n. d.	28	19	n. d.	20
Nd	130	160	134	123	91	127	77	71	82
Sm	26	33	24	25	24	26	16	16	17
Eu	4.67	5.4	4.30	4.62	4.33	4.49	3.95	3.48	4.64
Gd	15	18	13	16	15	15	11	10	11
Tb	1.79	2.01	1.74	1.75	n. d.	1.90	1.41	n. d.	1.42
Dy	7.6	8.8	7.6	7.7	6.2	7.6	6.8	5.7	6.7
Ho	1.06	1.33	1.10	1.13	n. d.	1.11	1.04	n. d.	1.00
Er	2.78	2.96	2.79	2.77	2.63	2.59	2.45	2.34	2.48
Tm	0.38	0.38	0.35	0.32	n. d.	0.33	0.33	n. d.	0.30
Yb	2.18	2.58	2.31	2.19	2.00	2.22	2.32	1.96	1.68
Lu	0.30	0.36	0.35	0.34	0.33	0.34	0.33	0.33	0 .24
Y	32	34	28	31	24	31	29	24	28

mg# = Mg /Mg+Fe^{2+}).*: after Carlier and Lorand (2003); **: after Carlier et al. (1997); ***: after Carlier and Lorand (1997)

Analyses were obtained at the CRPG in Nancy France. Detailed analytical procedures are available at website http://www.crpg.cnrs-nancy.fr/SARM

Table 2: Radiometric ages of South Peruvian potassic and ultrapotassic rocks.

K/Ar dating:

Sample number	Group	Rock type	Coordinate longitude (W)	Coordinate latitude (S)	material	K_2O (wt %)	^{40}Ar rad (%)	^{40}Ar rad (µl/g)	Age (Ma ± 2 σ)	References
4	WA	diopside theralite	70° 31' 00''	15° 04' 00''	amphibole	2.49	67.5	2.27	28.8 ± 3.0	Bonhomme et al. 1985
4	WA	diopside theralite	70° 31' 00''	15° 04' 00''	biotite	8.42	83.1	7.55	27.8 ± 1.2	Bonhomme et al. 1985
4	WA	diopside theralite	70° 31' 00''	15° 04' 00''	K-feldspar	11.68	77.5	9.86	26.1 ± 1.4	Bonhomme et al. 1985
5	WA	diopside theralite	70° 29' 25''	15° 05' 15''	Whole rock	3.7	69.0	3.30	28.1 ± 2.0	Bonhomme et al. 1985
5	WA	diopside theralite	70° 29' 25''	15° 05' 15''	plagioclase	4.58	69.2	4.2	28.4 ± 1.0	Bonhomme et al. 1985
5	WA	diopside theralite	70° 29' 25''	15° 05' 15''	K-feldspar	8.4	60.3	7.84	28.7 ± 3.0	Bonhomme et al. 1985
7	WA	diopside trachybasalt	71° 36' 23''	14° 02' 43''	Whole rock	2.031	38.0	2.38	29.9 ± 1.1	This work (1)
11	WA	olivine trachybasalt	69° 54' 18''	15° 52' 54''	Whole rock	2.07	45.32	39.8	5.63 ± 0.08	Kaneoka et al. 1984

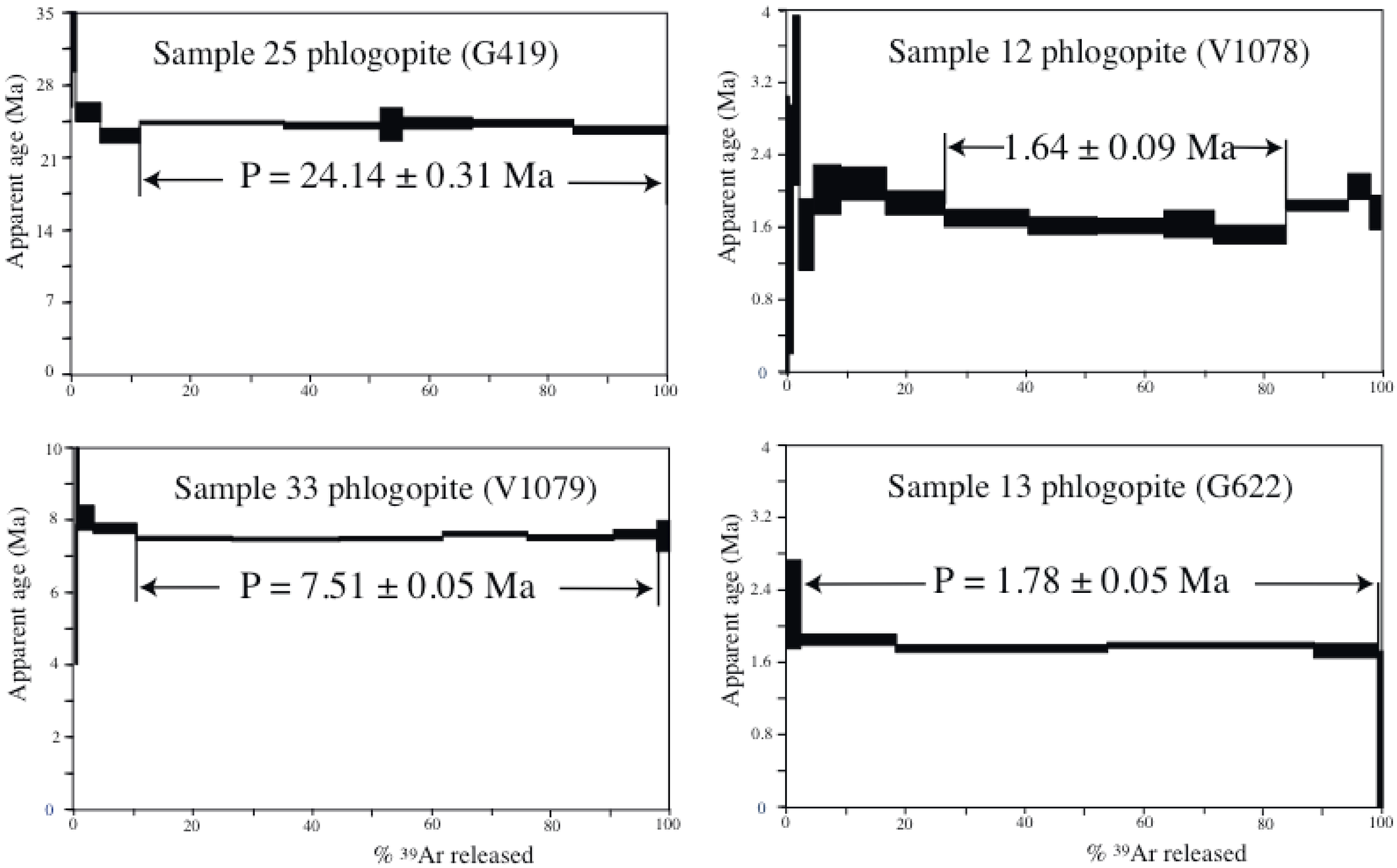
K /Ar analysis were performed at the Servicio Nacional de Geologia y Mineria de Chile Santiago Chile (1). Analytical techniques are given in Puig (1982). K/Ar ages were calculated using constants proposed by Steiger and Jäger (1977). The uncertainty in the calculated age represents two standard deviations (except for 11).

Ar/Ar dating:

Sample number	Group	Rock type	Coordinate longitude (W)	Coordinate latitude (S)	Material	Laboratory number	Age (Ma ± 2σ)	Steps	^{39}Ar %	Isochron age (Ma ± 2σ)	($^{40}Ar/^{36}Ar$) initial	MSWD	Total-gas age (Ma ± 2σ)	Irrad. N°
12	CVFS	diopside phlogopite lamproite	71° 52' 20''	13° 27' 15''	phlogopite	V1078	1.63 ± 0.08*	5 of 17	57	1 .81 ± 0.12	292.8 ± 1.5	2.1	1.73 ± 0.09	MC14
13	CVFS	diopside phlogopite lamproite	70° 43' 35''	14° 41' 45''	phlogopite	G622	1.78 ± 0.05*	4 of 6	97	1.73 ± 0.08	306 ± 8	0.6	1.83 ± 0.06	MC14
15#	CVFS	augite kersantite	70° 54' 45''	14° 08' 35''	sanidine	G372**				0.056 ± 0.002	285.9 ± 5	1.1		MC28
20	CVFS	augite trachybasalt	72° 07' 15''	13° 22' 33''	biotite	G262	0.606 ± 0.050							MC28
20	CVFS	augite trachybasalt	72° 07' 15''	13° 22' 33''	biotite	G318	0.607 ± 0.048							MC28
20	CVFS	augite trachybasalt	72° 07' 15''	13° 22' 33''	biotite	G319	0.610 ± 0.040							MC28
20	CVFS	augite trachybasalt	72° 07' 15''	13° 22' 33''	biotite	G356	0.651 ± 0.022							MC28
20	CVFS	augite trachybasalt	72° 07' 15''	13° 22' 33''	biotite	G360	0.606 ± 0.028							MC28
20	CVFS	augite trachybasalt	72° 07' 15''	13° 22' 33''	biotite	WM***	0.626 ± 0.017							MC28
25	EA	sanidine phlogopite lamproite	70° 37' 06''	13° 07' 00''	phlogopite	G419	24.14 ± 0.31*	6 of 10	88	24.10 ± 044	314 ± 0.44	1.03	24.23 ± 0.16	MC29
33	EA	olivine minette	72° 15' 00''	14° 07' 00''	Phlogopite	V1079	7.51 ± 0.05*	6 of 13	87	7.44 ± 0.08	316 ± 15	0.80	7.56 ± 0.07	MC23

$^{40}Ar/^{36}Ar$ analyses were performed at the Geoscience Azur Laboratory University of Nice-Sophia Antipolis using incremental laser heating technique (described in detail by Ruffet et al. 1991). The samples together with the Bern 4B biotite (17.25 Ma Hall et al. 1984) or the Fish Canyon sanidine (28.02 Ma Renne et al. 1998) as neutron flux monitor were irradiated in the 5C position at the McMaster in several batches of different durations according to the inferred age. Analyses were performed using a VG 3600 mass-spectrometer working with a Daily detector system. Ages were calculated from measured isotope ratios corrected for mass discrimination system blanks and potentially isotopes produced during irradiation. Ages were calculated using the decay constants proposed by Steiger and Jäger (1977).

* = plateau age (when presented it is the preferred age). Steps = number of temperature steps included in the plateau versus the total number of steps. ^{39}Ar % = pourcentage of total ^{39}Ar included in the plateau age. MSWD = mean square of weighted deviates (inverse isochron fitted to total points). Irrad. N° = irradiation number and duration. G327** = isochron constructed from the fusion of 17 individual grains of sanidine from a rhyolite including coeval kersantite. WM*** = Weighted Mean constructed from the fusion of single 5 biotite grains (2 biotites which yielded older ages at about 1 and 2 Ma were not included because they likely represent reworked or xenocrystic grains.



$^{40}Ar/^{39}Ar$ apparent ages spectra obtained on single grains of phlogopite. Plateau age indicated by P. Plateau ages are given at 2σ level whereas error bars for apparent ages are given at the 1σ level without error in the *J* parameter.

Table 2: Radiometric ages of South Peruvian potassic and ultrapotassic rocks (continue).

$^{40}Ar/^{39}Ar$ analytical data. Laser experiments.

Step	Laser power mW	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma ± 1σ)
W1078 : sample 12 phlogopite, MC14, 5Hrs, Bern B4J = 0.002027924						
1	60	100.00	0.15	18.810	-7.678	
2	100	100.00	0.14	28.644	-0.884	
3	150	99.64	0.44	6.857	0.373	0.837 ± 2.227
4	210	98.90	0.68	0.000	0.710	1.593 ± 1.374
5	260	95.17	1.07	0.000	1.345	3.017 ± 0.936
6	320	94.98	2.40	0.187	0.684	1.535 ± 0.391
7	400	89.28	4.53	0.273	0.905	2.030 ± 0.274
8	500	87.01	7.65	0.245	0.934	2.097 ± 0.182
9	600	87.13	9.87	0.096	0.839	1.883 ± 0.131
10*	710	87.89	14.04	0.038	0.765	1.716 ± 0.094
11*	800	87.34	11.46	0.100	0.727	1.632 ± 0.092
12*	920	87.37	11.26	0.200	0.726	1.630 ± 0.081
13*	1020	87.49	8.38	0.000	0.736	1.652 ± 0.146
14*	1200	86.33	12.12	0.057	0.685	1.537 ± 0.099
15	1420	69.72	10.35	0.096	0.827	1.855 ± 0.060
16	1765	49.11	3.70	0.386	0.920	2.065 ± 0.141
Fuse	5555	53.28	1.78	0.000	0.793	1.779 ± 0.185
G622 : sample 13 phlogopite, MC33, 2 Hrs with Cd, FCS J = 0.002563645						
1	395	86.70	2.39	0.010	2.803	2.238 ± 0.487
2*	485	52.65	16.05	0.005	2.317	1.850 ± 0.062
3*	585	47.25	35.49	0.010	2.192	1.751 ± 0.041
4*	700	38.83	34.64	0.002	2.241	1.790 ± 0.030
5*	830	42.94	10.62	0.000	2.164	1.727 ± 0.079
Fuse	1200	93.05	0.81	0.004	0.254	0.203 ± 1.519
G419 : sample 25 phlogopite, MC29, 25 Hrs, FCS J = 0.006262229						
1	250	62.59	0.17	0.204	4.361	48.613 ± 22.736
2	325	0.00	0.58	0.055	3.171	35.481 ± 6.180
3	435	4.83	4.11	0.014	2.260	25.363 ± 0.911
4	525	15.96	6.60	0.011	2.055	23.075 ± 0.708
5*	640	5.74	24.20	0.003	2.169	24.346 ± 0.169
6*	720	1.17	16.20	0.001	2.143	24.055 ± 0.313
7*	740	2.66	3.67	0.037	2.155	24.189 ± 1.584
8*	840	0.00	11.65	0.000	2.165	24.303 ± 0.566
9*	1020	0.00	17.04	0.001	2.165	24.297 ± 0.340
Fuse*	2222	0.23	15.77	0.001	2.105	23.634 ± 0.386
V1079 : sample 33 phlogopite, MC14, 5Hrs, Bern B4 J = 0.002022684						
1	70	91.47	0.15	0.001	4.898	10.936 ± 7.867
2	135	88.83	0.28	0.001	1.566	3.503 ± 4.390
3	210	87.43	0.27	12.282	3.831	8.559 ± 4.533
4	270	51.82	0.19	0.001	5.536	12.355 ± 4.226
5*	450	29.71	2.54	0.000	3.609	8.063 ± 0.341
6*	630	13.68	7.18	0.000	3.477	7.770 ± 0.142
7*	850	8.27	15.96	0.150	3.354	7.496 ± 0.057
8*	1040	7.49	18.09	0.050	3.341	7.466 ± 0.047
9*	1240	7.48	17.27	0.047	3.349	7.485 ± 0.052
10*	1450	6.02	14.25	0.040	3.408	7.616 ± 0.060
11*	1760	7.56	14.42	0.262	3.361	7.510 ± 0.074
12*	2060	6.41	7.35	0.678	3.403	7.605 ± 0.130
Fuse	5555	9.04	2.06	1.595	3.381	7.556 ± 0.427

Step	Laser power mW	Atmospheric contamination (%)	^{39}Ar (%)	$^{37}Ar_{Ca}/^{39}Ar_K$	$^{40}Ar^*/^{39}Ar_K$	Age (Ma ± 1σ)
G257 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	225	100.00	3.55	0.014	-0.584	
2	325	90.08	44.75	0.008	0.051	0.023 ± 0.019
3	440	100.00	9.45	0.012	-0.039	
Fuse	1500	66.99	42.25	0.009	0.084	**0.038 ± 0.017**
G258 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	337	86.26	23.32	0.007	0.073	0.033 ± 0.025
Fuse	1000	72.71	76.68	0.007	0.125	**0.056 ± 0.004**
G325 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	329	58.07	27.47	0.008	0.098	0.044 ± 0.011
Fuse	1333	18.58	72.53	0.008	0.119	**0.053 ± 0.006**
G328 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	300	83.32	14.40	0.008	0.073	0.033 ± 0.047
Fuse	1333	9.21	85.60	0.007	0.135	**0.060 ± 0.008**
G329 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	285	90.51	7.13	0.007	0.084	0.038 ± 0.017
Fuse	2555	41.44	92.87	0.007	0.124	**0.056 ± 0.002**
G361 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	270	84.68	44.73	0.008	0.086	0.039 ± 0.013
Fuse	1111	44.16	55.27	0.007	0.120	**0.054 ± 0.014**
G362 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	300	89.00	18.72	0.020	0.079	0.036 ± 0.017
Fuse	1555	48.07	81.28	0.011	0.112	**0.050 ± 0.003**
G363 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	290	91.39	4.94	0.000	0.243	0.109 ± 0.128
Fuse	1666	70.15	95.06	0.006	0.316	**0.061 ± 0.009**
G365 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	275	100.00	3.65	0.012	-0.191	
Fuse	2222	59.15	96.35	0.007	0.106	**0.048 ± 0.004**
G366 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	250	24.52	3.17	0.007	0.393	0.176 ± 0.151
Fuse	1222	24.12	96.83	0.007	0.128	**0.057 ± 0.004**
G367 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	345	62.15	11.69	0.013	0.171	0.077 ± 0.024
Fuse	1555	14.34	88.31	0.008	0.121	**0.054 ± 0.003**
G368 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	240	78.15	4.19	0.013	0.176	0.079 ± 0.132
Fuse	1111	20.57	95.81	0.007	0.118	**0.053 ± 0.006**
G369 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	325	100.00	9.50	0.027	-0.014	
Fuse	2222	36.88	90.50	0.007	0.143	**0.064 ± 0.007**
G370 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	315	97.35	13.04	0.007	0.023	0.010 ± 0.036
Fuse	1555	48.89	86.96	0.007	0.120	**0.054 ± 0.003**
G371 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	288	91.94	7.49	0.006	0.166	0.074 ± 0.074
Fuse	1555	29.28	92.51	0.007	0.126	**0.057 ± 0.005**
G372 : sample 15 sanidine, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	300	47.36	7.85	0.007	0.279	0.125 ± 0.081
Fuse	2222	37.15	92.15	0.007	0.124	**0.056 ± 0.006**
G262 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	285	91.94	1.46	0.048	3.730	1.671 ± 1.484
2	453	86.99	15.89	0.017	0.486	0.218 ± 0.126
Fuse	2000	65.52	82.65	0.021	1.367	**0.613 ± 0.025**
G318 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	265	97.54	1.10	0.057	2.115	0.948 ± 1.919
2	350	98.74	3.73	0.051	0.052	0.023 ± 0.424
Fuse	1222	68.85	95.18	0.004	1.349	**0.605 ± 0.029**
G319 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	300	99.93	1.51	0.044	0.044	0.020 ± 0.885
2	365	100.00	3.47	0.006	-0.413	
Fuse	2555	65.88	95.02	0.002	1.382	**0.619 ± 0.021**
G356 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	270	100.00	2.69	0.128	-1.380	
2	350	83.12	5.18	0.056	0.718	0.322 ± 0.144
Fuse	1444	63.79	92.13	0.010	1.452	**0.651 ± 0.012**
G360 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	270	99.62	2.30	0.127	0.477	0.214 ± 0.732
2	365	99.42	9.10	0.047	0.209	0.094 ± 0.254
Fuse	1222	74.04	88.60	0.021	1.354	**0.607 ± 0.016**
G358 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	270	72.824	1.30	0.000	10.701	4.790 ± 2.506
2	380	84.673	4.62	0.013	1.699	0.761 ± 0.705
Fuse	2555	43.404	94.09	0.001	4.627	**2.073 ± 0.045**
G359 : sample 20 phlogopite, MC28, 1Hrs with Cd, FCS J = 0.004604186						
1	258	98.612	0.83	0.000	1.144	0.513 ± 3.888
2	340	99.202	3.61	0.003	0.086	0.039 ± 0.739
Fuse	2222	48.729	95.56	0.003	2.131	**0.955 ± 0.029**

^{39}Ar % = fraction of ^{39}Ar released for each step; $^{37}Ar_{Ca}/^{39}Ar_K$ = Ar isotopes produced by Ca and K neutron interferences; $^{40}Ar^*$ = radiogenic ^{40}Ar. The error bar is at the 1σ level and does not include the error of the J irradiation parameter. Correction factors for the interfering isotopes produced by nuclear reactions on potassium and calcium in the McMaster reactor were: $(^{39}Ar/^{37}Ar)$ Ca = 7.06 x 10^{-4} (± 4%), $(^{36}Ar/^{37}Ar)$Ca = 2.79 x 10^{-4} (± 3%) and $(^{40}Ar/^{39}Ar)$K = 2.79 x 10^{-2} (± 4%). For cadmium shielded irradiations $(^{40}Ar/^{39}Ar)$K = 1.00 x 10^{-3} (± 4%). Isotopic ratio was corrected for blank and mass discrimination. Irridiation monitors used to calculate the J-values were the Bern 4B biotite (17.25 Ma, Hall et al., 1984) or the Fish Canyon Sanidine (FCS) (28.02 Ma, Renne et al., 1998). Ages were calculated using the decay constant proposed by Steiger and Jager (1977).

* = steps included in the plateau age calculation. In « total fusion » procedure, atmospheric contamination is lowered by one or two low temperature steps.

Table 3: Sr and Nd isotopic compositions of south Peruvian potassic and ultrapotassic rocks.

Sample	Rock type	t Ma	Rb ppm	Sr ppm	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$	2 sigma	$^{87}Sr/^{86}Sr_i$	Sm ppm	Nd ppm	$^{147}Sm/^{144}Nd$	$^{143}Nd/^{144}Nd$	2 sigma	$^{143}Nd/^{144}Nd_i$	ε_{Ndi}	T_{DM} Ma
Western Altiplano (WA)																
2	leucite-bearing tephrite	28	37	1273	0.084	0.705385	0.000008	0.705350	6.37	25.22	0.15276	0.512546	0.000011	0.512517	-1.63	1241
3	leucite-bearing tephrite	28	67	2336	0.083	0.705207	0.000008	0.705172	6.56	27.20	0.14587	0.512549	0.000012	0.512520	-1.54	1123
4	diopside theralite	28	149	1317	0.327	0.705534	0.000008	0.705404	6.09	26.20	0.14058	0.512529	0.000007	0.512503	-1.93	1087
5	diopside theralite	28	113	1240	0.264	0.705661	0.000010	0.705556	7.89	34.12	0.13986	0.512431	0.000010	0.512405	-3.84	1259
6	leucite-bearing phonotephrite	28	37	1939	0.055	0.705516	0.000010	0.705492	6.65	28.13	0.14298	0.512549	0.000012	0.512521	-1.53	1082
7	diopside trachybasalt	30	72	1177	0.177	0.705047	0.000008	0.704972	5.08	21.66	0.14185	0.512651	0.000012	0.512623	0.46	873
8	diopside trachybasalt	30	70	1041	0.195	0.704894	0.000013	0.704811	5.24	22.69	0.13968	0.512658	0.000009	0.512631	0.61	837
10	olivine trachybasalt	6	75	925	0.235	0.706932	0.000010	0.706912	7.70	49.00	0.09504	0.512312	0.000013	0.512308	-6.28	958
11	olivine trachybasalt	6	56	1513	0.107	0.706592	0.000008	0.706583	16.44	97.41	0.10205	0.512385	0.000008	0.512381	-4.86	921
Cusco Vilcanota fault system (CVFS)																
12	diopside phlogopite lamproite	1	152	4562	0.096	0.705097	0.000010	0.705096	30.20	199.20	0.09169	0.512531	0.000009	0.512521	-2.06	678
13	diopside phlogopite lamproite	1	219	3414	0.186	0.705351	0.000008	0.705351	19.15	153.56	0.07542	0.512522	0.000011	0.512522	-2.25	612
15	augite kersantite	1	132	2364	0.162	0.705834	0.000009	0.705834	15.96	90.00	0.10725	0.512460	0.000014	0.512459	-3.46	864
18	augite minette	1	136	4550	0.086	0.705269	0.000015	0.705269	30.14	204.97	0.08894	0.512562	0.000011	0.512561	-1.13	628
23	augite trachybasalt	1	77	2928	0.076	0.706237	0.000010	0.706236	21.36	169.98	0.07600	0.512439	0.000008	0.512439	-3.15	701
24	augite trachybasalt	1	79	3430	0.067	0.706163	0.000010	0.706163	25.81	175.04	0.08918	0.512476	0.000010	0.512475	-2.81	728
Eastern Altiplano (EA)																
25	sanidine phlogopite lamproite	24	658	928	2.053	0.713134	0.000010	0.712405	25.89	129.91	0.12052	0.512167	0.000008	0.512147	-8.95	1414
26	sanidine phlogopite lamproite	25	709	602	3.411	0.716794	0.000011	0.715583	32.51	32.51	0.08292	0.512078	0.000008	0.512064	-10.56	1130
29	sanidine phlogopite lamproite	25	408	211	5.601	0.717889	0.000010	0.715900	23.71	91.15	0.15731	0.512050	0.000010	0.512024	-11.35	2485
32	orthopyroxene phlogopite lamproite	25	405	1359	0.863	0.710261	0.000013	0.709955	15.52	71.49	0.13129	0.512193	0.000008	0.512172	-8.47	1538
33	olivine minette	7.5	200	3020	0.192	0.713499	0.000009	0.713479	17.13	81.99	0.12636	0.512334	0.000011	0.512328	-5.86	1209

$^{87}Sr/^{86}Sr$ initial ratio ($^{87}Sr/^{86}Sr_i$) and ε_{Ndi} are calculated at age t. Nd model ages (T_{DM}) were calculated using the depleted mantle parameters of Michard et al. (1985).
Sr- and Nd-isotope analyses were carried out in the Isotope Geology laboratory from the Africa Museum Tervuren except those marked by a * which were acquired in the Department of Geological Sciences Cornell University Ithaca NY USA. At Tervuren Sr isotopic compositions were measured on single Ta filament and Nd isotopic compositions on triple Ta-Re-Ta filament using a Micromass Sector 54 multi-collector mass spectrometer. Repeated measurements of Sr and Nd standards showed that between-run error is better than ± 0.000015. On each turret 4 standards are measured together with 16 samples. The means of the 4 standards were used to correct the bias relative to the recommended values (0.710250 for NBS987 and 0.511963 for the Renne standard corresponding to a La Jolla standard value of 0.511858). During this study the mean value of NBS987 for $^{87}Sr/^{86}Sr$ (normalized to $^{86}Sr/^{88}Sr$= 0.1194) was 0.710261 ± 0.000006 and the Renne Nd standard $^{143}Nd/^{144}Nd$ values (normalized to $^{146}Nd/^{144}Nd$= 0.7219) 0.511959 ± 0.000007. The error on the Rb/Sr and Sm/Nd ratios is <4%. Used decay constants are 1.42 x 10^{-11} a^{-1} (^{87}Rb) and 6.54 10^{-12} a^{-1} (^{147}Sm). In Ithaca Sr Nd isotopic compositions were measured with the method described in White et al. (1990).

References

Bonhomme, M.G., Audebaud, E., and Vivier, G., 1985, K-Ar ages of Hercynian and Neogene rocks along an east west cross section in Southern Peru: Comunicaciones, v. 35, p. 27-30.

Carlier, G. and Lorand, J.P., 1997, First occurrence of diopside sanidine phlogopite lamproites in the Andean Cordillera: the Huacancha and Morojarja dikes southern Peru: Canadian Journal of Earth Sciences, v. 34, p. 1118-1127.

Carlier, G. and Lorand, J.P., 2003, Petrogenesis of a zirconolite-bearing Mediterranean-type lamproite from the Peruvian Altiplano (Andean Cordillera): Lithos, v. 69, p. 15-35.

Carlier, G., Lorand, J.P., Audebaud E. and Kienast J. R., 1997, Petrology of an unusual orthopyroxene-bearing minette suite from southeastern Peru Eastern Andean Cordillera: Al-rich lamproites contaminated by peraluminous granites: Journal of Volcanology and Geothermal Research, v. 75, p. 59-98.

Hall G., Walter, R.C., Westgate, J.A. and York, D., 1984, Geochronology stratigraphy and geochemistry of cinder tuffs in Pliocene hominid-bearing sediments of the Middle Awawsh Ethiopia: Nature, v. 308, p. 26-31.

Kaneoka, I. and Guevara, C., 1984, K-Ar age determination of upper Tertiary and Quaternary Andean volcanic rocks southern Peru: Geochemical Journal, v. 18, p. 233-239.

Michard, A., Gurriet, P., Soudant, M., and Albarede, F., 1985, Nd isotopes in French Phanerozoic shales: external vs. internal aspects of crustal evolution: Geochimica et Cosmochimica Acta, v. 49, p. 601-610.

Puig, A., 1982, Instruccciones para obtencion de muestras para estudio geocronologico método K-Ar: Servicio Nacional de Geologia y Mineria, v. 1, 6p.

Renne, P.R., Swisher, C.C., Deino, A.L., Karner, D.B., Owens, T.L., and DePaolo, D.J., 1998, Intercalibration of standards absolute ages and uncertainties in $^{40}Ar/^{39}Ar$ dating: Chemical Geology, v. 145, p. 117-152.

Ruffet, G., Féraud, G. and Amouric, M., 1991, Comparison of ^{40}Ar-^{39}Ar conventional and laser dating of biotites from the North Trégor Batholith: Geochimica et Cosmochimica Acta, v. 55, p. 1675-1688.

Steiger, R.H. and Jäger, E., 1977, Subcommission on geochronology; Convention on the use of decay constants in geo and cosmochronology: Earth and Planetary Science Letters, v. 36, p. 359-362.

White, W.M., Cheatham, M.M., and Duncan, R.A., 1990, Isotope geochemistry of Leg 115 basalts and inferences on the history of the Réunion mantle plume: *in* Proceedings of the Ocean Drilling Program Scientific results, v. 115, p. 53-62.