Supplemental Data Table 1

Crystallographic coordinates, occupancies, equivalent isotropic ($Å^2$) and anisotropic displacement parameters of the study micas

Sample EJ20_1

Site	Atom	*x/a*	*y/b*	*z/c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^+**	0	½	0	0.9398(5)	0.0306	0.0322(2)	0.0331(2)	0.0264(1)	0	0.0046(1)	0
M1	**Mg^{2+}**	0	0	½	0.8992(8)	0.0082	0.0064(1)	0.0073(1)	0.0111(1)	0	0.00201(7)	0
	Fe^{2+}	0	0	½	0.1010(5)	0.0082	0.0064(1)	0.0073(1)	0.0111(1)	0	0.00201(7)	0
M2	**Mg^{2+}**	0	0.33131(2)	½	0.9013(8)	0.0082	0.00641(8)	0.00704(8)	0.01116(9)	0	0.00193(5)	0
	Fe^{2+}	0	0.33131(2)	½	0.0987(6)	0.0082	0.00641(8)	0.00704(8)	0.01116(9)	0	0.00193(5)	0
T	**Si, Si^{4+}**	0.07587(2)	0.16665(1)	0.22726(1)	0.9713(9)	0.0083	0.00744(5)	0.00813(5)	0.00941(5)	0.00002(3)	0.00174(3)	0.00001(3)
O1	**O, O^{2-}**	0.32945(8)	0.22718(5)	0.16969(4)	0.9995(8)	0.0176	0.0161(1)	0.0230(2)	0.0141(1)	-0.0027(1)	0.0039(1)	-0.0062(1)
O2	**O, O^{2-}**	0.0112(1)	0	0.16960(6)	0.9997(8)	0.0176	0.0243(2)	0.0130(2)	0.0142(2)	0	-0.0005(2)	0
O3	**O, O^{2-}**	0.13078(6)	0.16660(3)	0.39143(3)	0.9973(8)	0.0101	0.0094(1)	0.0103(1)	0.0108(1)	-0.00015(8)	0.00213(8)	0.00004(7)
O4	**O, O^{2-}**	0.13246(8)	½	0.39915(5)	1.0002(7)	0.0102	0.0092(2)	0.0108(2)	0.0105(2)	0	0.0017(1)	0
	H	0.12121(8)	½	0.32529(5)	0.296(1)	0.0102	0.0092(2)	0.0108(2)	0.0105(2)	0	0.0017(1)	0

Sample EJ20_2

Site	Atom	*x/a*	*y/b*	*z/c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^+**	0	½	0	0.9401(6)	0.0312	0.0327(2)	0.0334(2)	0.0276(2)	0	0.0051(2)	0
M1	**Mg^{2+}**	0	0	½	0.8960(8)	0.0090	0.0072(2)	0.0074(1)	0.0126(2)	0	0.0026(1)	0
	Fe^{2+}	0	0	½	0.1038(5)	0.0090	0.0072(2)	0.0074(1)	0.0126(2)	0	0.0026(1)	0
M2	**Mg^{2+}**	0	0.33129(3)	½	0.8992(8)	0.0088	0.0070(1)	0.0071(1)	0.0126(1)	0	0.00233(8)	0
	Fe^{2+}	0	0.33129(3)	½	0.1009(6)	0.0088	0.0070(1)	0.0071(1)	0.0126(1)	0	0.00233(8)	0
T	**Si, Si^{4+}**	0.07589(3)	0.16666(2)	0.22730(2)	0.9730(9)	0.0090	0.00807(7)	0.00814(7)	0.01097(8)	0.00000(4)	0.00225(5)	0.00002(4)
O1	**O, O^{2-}**	0.3296(1)	0.22708(7)	0.16973(6)	0.9995(8)	0.0182	0.0167(2)	0.0231(2)	0.0156(2)	-0.0026(2)	0.0046(2)	-0.0063(2)
O2	**O, O^{2-}**	0.0109(2)	0	0.16969(8)	0.9993(8)	0.0182	0.0248(3)	0.0133(3)	0.0153(3)	0	0.0002(2)	0
O3	**O, O^{2-}**	0.13059(9)	0.16657(4)	0.39142(5)	0.9988(8)	0.0107	0.0099(2)	0.0097(2)	0.0126(2)	-0.0002(1)	0.0025(1)	0.0001(1)
O4	**O, O^{2-}**	0.1325(1)	½	0.39918(7)	1.0001(7)	0.0107	0.0096(2)	0.0107(2)	0.0119(2)	0	0.0023(2)	0
	H	0.1056(1)	½	0.32037(7)	0.413(1)	0.0107	0.0096(2)	0.0107(2)	0.0119(2)	0	0.0023(2)	0

Sample EJ20_3

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9463(6)	0.0310	0.0323(2)	0.0333(2)	0.0271(2)	0	0.0044(1)	0
M1	**Mg^{2+}**	0	0	½	0.8996(8)	0.0082	0.0063(2)	0.0069(2)	0.0117(2)	0	0.0018(1)	0
	Fe^{2+}	0	0	½	0.1003(5)	0.0082	0.0063(2)	0.0069(2)	0.0117(2)	0	0.0018(1)	0
M2	**Mg^{2+}**	0	0.33132(2)	½	0.8954(8)	0.0084	0.0064(1)	0.0070(1)	0.0118(1)	0	0.00155(8)	0
	Fe^{2+}	0	0.33132(2)	½	0.1045(6)	0.0084	0.0064(1)	0.0070(1)	0.0118(1)	0	0.00155(8)	0
T	**Si, Si^{4+}**	0.07591(3)	0.16664(2)	0.22727(2)	0.9746(9)	0.0086	0.00742(8)	0.00809(8)	0.01021(8)	-0.00010(4)	0.00152(5)	0.00000(4)
O1	**O, O^{2-}**	0.32958(9)	0.22730(6)	0.16974(5)	0.9996(8)	0.0177	0.0159(2)	0.0228(2)	0.0147(2)	-0.0029(2)	0.0039(1)	-0.0061(2)
O2	**O, O^{2-}**	0.0111(1)	0	0.16966(7)	0.9999(8)	0.0176	0.0235(3)	0.0132(2)	0.0147(3)	0	-0.0007(2)	0
O3	**O, O^{2-}**	0.13068(8)	0.16660(4)	0.39131(4)	0.9988(8)	0.0102	0.0094(2)	0.0097(2)	0.0114(2)	-0.0002(1)	0.0018(1)	0.0003(1)
O4	**O, O^{2-}**	0.1324(1)	½	0.39946(6)	1.0000(7)	0.0102	0.0092(2)	0.0110(2)	0.0101(2)	0	0.0011(2)	0
	H	0.1119(1)	½	0.34101(6)	0.922(1)	0.0102	0.0092(2)	0.0110(2)	0.0101(2)	0	0.0011(2)	0

Sample EJ25_2

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9628(9)	0.0271	0.0260(8)	0.0282(8)	0.0269(8)	0	0.0035(6)	0
M1	**Mg^{2+}**	0	0	½	0.9701(8)	0.0068	0.0023(7)	0.0039(7)	0.0143(9)	0	0.0018(6)	0
	Fe^{2+}	0	0	½	0.0299(7)	0.0068	0.0023(7)	0.0039(7)	0.0143(9)	0	0.0018(6)	0
M2	**Mg^{2+}**	0	0.3311(1)	½	0.9548(8)	0.0072	0.0029(5)	0.0049(5)	0.0137(6)	0	0.0012(4)	0
	Fe^{2+}	0	0.3311(1)	½	0.0451(8)	0.0072	0.0029(5)	0.0049(5)	0.0137(6)	0	0.0012(4)	0
T	**Si, Si^{4+}**	0.0755(1)	0.16669(7)	0.22698(8)	0.980(1)	0.0070	0.0048(3)	0.0062(3)	0.0102(4)	-0.0002(3)	0.0014(2)	-0.0003(2)
O1	**O, O^{2-}**	0.3309(4)	0.2250(2)	0.1696(2)	1.0000(8)	0.0166	0.0137(9)	0.020(1)	0.016(1)	-0.0024(9)	0.0031(8)	-0.0049(8)
O2	**O, O^{2-}**	0.0070(6)	0	0.1699(3)	1.0001(8)	0.0159	0.020(1)	0.013(1)	0.014(2)	0	-0.002(1)	0
O3	**O, O^{2-}**	0.1303(3)	0.1668(2)	0.3924(2)	1.0000(8)	0.0086	0.0069(8)	0.0056(7)	0.013(1)	0.0006(7)	0.0017(7)	0.0000(6)
O4	**O, O^{2-}**	0.1334(4)	½	0.4006(3)	1.0009(8)	0.0058	0.004(1)	0.009(1)	0.005(1)	0	0.0004(9)	0
	H	0.1289(4)	½	0.3220(3)	0.977(1)	0.0058	0.004(1)	0.009(1)	0.005(1)	0	0.0004(9)	0

Sample EJ25_3

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9601(8)	0.0331	0.0321(4)	0.0329(5)	0.0346(4)	0	0.0063(3)	0
M1	**Mg^{2+}**	0	0	½	0.9171(8)	0.0128	0.0089(3)	0.0102(4)	0.0199(4)	0	0.0041(3)	0
	Fe^{2+}	0	0	½	0.0832(6)	0.0128	0.0089(3)	0.0102(4)	0.0199(4)	0	0.0041(3)	0
M2	**Mg^{2+}**	0	0.33118(7)	½	0.9282(8)	0.0123	0.0084(2)	0.0098(3)	0.0191(3)	0	0.0036(2)	0
	Fe^{2+}	0	0.33118(7)	½	0.0718(7)	0.0123	0.0084(2)	0.0098(3)	0.0191(3)	0	0.0036(2)	0
T	**Si, Si^{4+}**	0.07581(7)	0.16665(4)	0.22714(4)	0.978(1)	0.0118	0.0095(2)	0.0099(2)	0.0163(2)	-0.0001(1)	0.0031(1)	0.0001(1)
O1	**O, O^{2-}**	0.3312(2)	0.2255(1)	0.1696(1)	0.9999(8)	0.0209	0.0181(4)	0.0232(5)	0.0224(5)	-0.0029(4)	0.0059(4)	-0.0055(4)
O2	**O, O^{2-}**	0.0081(4)	0	0.1696(2)	1.0001(8)	0.0212	0.0252(8)	0.0159(7)	0.0211(7)	0	0.0002(6)	0
O3	**O, O^{2-}**	0.1307(2)	0.1668(1)	0.3918(1)	0.9999(8)	0.0136	0.0111(4)	0.0114(4)	0.0187(4)	-0.0002(3)	0.0038(3)	0.0005(3)
O4	**O, O^{2-}**	0.1328(3)	½	0.4008(2)	1.0000(7)	0.0125	0.0108(5)	0.0120(5)	0.0148(6)	0	0.0027(4)	0
	H	0.1003(3)	½	0.3440(2)	0.984(1)	0.0125	0.0108(5)	0.0120(5)	0.0148(6)	0	0.0027(4)	0

Sample EJ42_2

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9824(5)	0.0305	0.0339(1)	0.0338(1)	0.0235(1)	0	0.00402(8)	0
M1	**Mg^{2+}**	0	0	½	0.9779(8)	0.0083	0.0072(1)	0.0069(1)	0.0110(1)	0	0.00208(8)	0
	Fe^{2+}	0	0	½	0.0221(5)	0.0083	0.0072(1)	0.0069(1)	0.0110(1)	0	0.00208(8)	0
M2	**Mg^{2+}**	0	0.33164(2)	½	0.9755(8)	0.0085	0.0073(1)	0.0070(1)	0.0113(1)	0	0.00200(6)	0
	Fe^{2+}	0	0.33164(2)	½	0.0248(6)	0.0085	0.0073(1)	0.0070(1)	0.0113(1)	0	0.00200(6)	0
T	**Si, Si^{4+}**	0.07618(2)	0.16668(1)	0.22831(1)	0.9759(9)	0.0085	0.00810(6)	0.00787(6)	0.00955(6)	-0.00005(2)	0.00169(4)	0.00001(2)
O1	**O, O^{2-}**	0.33082(6)	0.22610(4)	0.17048(3)	0.9991(8)	0.0175	0.0167(1)	0.0224(2)	0.0140(1)	-0.0028(1)	0.00404(9)	-0.0060(1)
O2	**O, O^{2-}**	0.0088(1)	0	0.17047(4)	0.9991(8)	0.0175	0.0244(2)	0.0128(2)	0.0140(2)	0	-0.0004(1)	0
O3	**O, O^{2-}**	0.13054(6)	0.16668(3)	0.39164(3)	0.9989(8)	0.0097	0.0094(10)	0.0094(1)	0.0105(1)	-0.00013(7)	0.00183(9)	0.00012(7)
O4	**O, O^{2-}**	0.13272(7)	½	0.39894(4)	1.0001(8)	0.0100	0.0096(1)	0.0099(1)	0.0104(1)	0	0.0015(1)	0
	H	0.11250(7)	½	0.32092(4)	0.392(1)	0.0100	0.0096(1)	0.0099(1)	0.0104(1)	0	0.0015(1)	0

Sample EJ42_3

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	K^{+}	0	½	0	0.9686(6)	0.0309	0.0341(2)	0.0346(2)	0.0238(1)	0	0.0042(1)	0
M1	Mg^{2+}	0	0	½	0.9225(8)	0.0083	0.0068(1)	0.0071(1)	0.0112(1)	0	0.00204(8)	0
	Fe^{2+}	0	0	½	0.0774(5)	0.0083	0.0068(1)	0.0071(1)	0.0112(1)	0	0.00204(8)	0
M2	Mg^{2+}	0	0.33199(2)	½	0.9238(8)	0.0084	0.00658(9)	0.00762(9)	0.0109(1)	0	0.00174(6)	0
	Fe^{2+}	0	0.33199(2)	½	0.0763(6)	0.0084	0.00658(9)	0.00762(9)	0.0109(1)	0	0.00174(6)	0
T	Si, Si^{4+}	0.07612(2)	0.16668(1)	0.22815(1)	0.9767(9)	0.0081	0.00729(6)	0.00784(5)	0.00920(6)	-0.00008(3)	0.00163(3)	0.00007(3)
O1	O, O^{2-}	0.32959(8)	0.22729(5)	0.17028(4)	0.9996(8)	0.0174	0.0163(2)	0.0228(2)	0.0137(1)	-0.0029(1)	0.0040(1)	-0.0062(1)
O2	O, O^{2-}	0.0113(1)	0	0.17047(5)	0.9998(8)	0.0174	0.0243(2)	0.0132(2)	0.0132(2)	0	-0.0005(2)	0.0000
O3	O, O^{2-}	0.13047(6)	0.16668(3)	0.39144(3)	0.9992(8)	0.0094	0.0090(1)	0.0091(1)	0.0100(1)	-0.00024(7)	0.00175(9)	0.00004(7)
O4	O, O^{2-}	0.13241(9)	½	0.39853(5)	1.0001(7)	0.0098	0.0092(1)	0.0100(1)	0.0103(2)	0	0.0017(1)	0
	H	0.10560(9)	½	0.30556(5)	0.431(1)	0.0098	0.0092(1)	0.0100(1)	0.0103(2)	0	0.0017(1)	0

Sample EJ42_4

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	K^{+}	0	½	0	0.9758(6)	0.0315	0.0339(2)	0.0350(2)	0.0253(2)	0	0.0043(1)	0
M1	Mg^{2+}	0	0	½	0.9465(8)	0.0090	0.0069(2)	0.0075(2)	0.0128(2)	0	0.0024(1)	0
	Fe^{2+}	0	0	½	0.0534(5)	0.0090	0.0069(2)	0.0075(2)	0.0128(2)	0	0.0024(1)	0
M2	Mg^{2+}	0	0.33179(3)	½	0.9486(8)	0.0090	0.0067(1)	0.0078(1)	0.0126(1)	0	0.00204(9)	0
	Fe^{2+}	0	0.33179(3)	½	0.0515(6)	0.0090	0.0067(1)	0.0078(1)	0.0126(1)	0	0.00204(9)	0
T	Si, Si^{4+}	0.07611(3)	0.16669(2)	0.22822(2)	0.9815(9)	0.0089	0.00774(8)	0.00831(8)	0.01085(8)	-0.00009(4)	0.00194(5)	-0.00003(4)
O1	O, O^{2-}	0.3294(1)	0.22743(6)	0.17021(5)	0.9996(8)	0.0180	0.0163(2)	0.0229(2)	0.0153(2)	-0.0027(2)	0.0044(2)	-0.0061(2)
O2	O, O^{2-}	0.0118(2)	0	0.17033(7)	1.0005(8)	0.0181	0.0242(3)	0.0138(3)	0.0150(3)	0	-0.0002(2)	0
O3	O, O^{2-}	0.13042(8)	0.16666(4)	0.39134(5)	0.9994(8)	0.0099	0.0087(2)	0.0092(2)	0.0119(2)	-0.0002(1)	0.0023(1)	0.0001(1)
O4	O, O^{2-}	0.1327(1)	½	0.39878(6)	1.0000(7)	0.0100	0.0088(2)	0.0099(2)	0.0115(2)	0	0.0019(2)	0
	H	0.1053(1)	½	0.31745(6)	0.432(1)	0.0100	0.0088(2)	0.0099(2)	0.0115(2)	0	0.0019(2)	0

Sample EJ47_2

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9900(4)	0.0274	0.0297(1)	0.0301(1)	0.02233(9)	0	0.00388(7)	0
M1	**Mg^{2+}**	0	0	½	0.9399(8)	0.0080	0.0069(1)	0.0065(1)	0.0110(1)	0	0.00255(7)	0
	Fe^{2+}	0	0	½	0.0611(5)	0.0080	0.0069(1)	0.0065(1)	0.0110(1)	0	0.00255(7)	0
M2	**Mg^{2+}**	0	0.33221(1)	½	0.9338(8)	0.0082	0.00637(8)	0.00766(9)	0.01065(8)	0	0.00161(5)	0
	Fe^{2+}	0	0.33221(1)	½	0.0668(5)	0.0082	0.00637(8)	0.00766(9)	0.01065(8)	0	0.00161(5)	0
T	**Si, Si^{4+}**	0.07607(2)	0.166712(9)	0.22798(1)	0.9754(9)	0.0082	0.00779(5)	0.00778(5)	0.00904(5)	-0.00005(2)	0.00157(3)	-0.00001(2)
O1	**O, O^{2-}**	0.33444(6)	0.22255(3)	0.17091(3)	0.9991(8)	0.0170	0.0159(1)	0.0216(1)	0.0141(1)	-0.00335(9)	0.00431(8)	-0.00570(9)
O2	**O, O^{2-}**	0.00212(9)	0	0.17121(4)	1.0021(8)	0.0171	0.0234(2)	0.0123(2)	0.0140(2)	0	-0.0011(1)	0
O3	**O, O^{2-}**	0.13091(5)	0.16686(2)	0.39251(3)	0.9983(8)	0.0104	0.0105(1)	0.0103(1)	0.0103(1)	-0.00008(6)	0.00182(8)	0.00013(6)
O4	**O, O^{2-}**	0.13283(7)	½	0.39989(4)	1.0001(8)	0.0109	0.0106(1)	0.0121(1)	0.0100(1)	0	0.0015(1)	0
	H	0.10375(7)	½	0.31499(4)	0.307(1)	0.0109	0.0106(1)	0.0121(1)	0.0100(1)	0	0.0015(1)	0

Sample EJ4_2

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.963(3)	0.0324	0.036(2)	0.028(2)	0.034(2)	0	0.009(1)	0
M1	**Mg^{2+}**	0	0	½	0.984(4)	0.0132	0.014(2)	0.005(1)	0.022(2)	0	0.004(1)	0
	Fe^{2+}	0	0	½	0.016(3)	0.0132	0.014(2)	0.005(1)	0.022(2)	0	0.004(1)	0
M2	**Mg^{2+}**	0	0.3321(2)	½	0.962(4)	0.0142	0.012(1)	0.007(1)	0.024(1)	0	0.0060(9)	0
	Fe^{2+}	0	0.3321(2)	½	0.038(4)	0.0142	0.012(1)	0.007(9)	0.024(1)	0	0.0060(9)	0
T	**Si, Si^{4+}**	0.0750(3)	0.1668(1)	0.2251(2)	0.990(8)	0.0117	0.0113(7)	0.0054(5)	0.0186(6)	-0.0001(6)	0.0034(5)	0.0000(5)
O1	**O, O^{2-}**	0.3217(7)	0.2344(4)	0.1672(4)	1.000(7)	0.0214	0.024(2)	0.019(2)	0.023(2)	-0.000(2)	0.008(2)	-0.004(1)
O2	**O, O^{2-}**	0.026(1)	0	0.1674(6)	1.000(7)	0.0219	0.033(3)	0.009(2)	0.023(3)	0	0.005(2)	0
O3	**O, O^{2-}**	0.1310(6)	0.1670(3)	0.3909(3)	1.000(7)	0.0109	0.011(2)	0.003(1)	0.019(2)	-0.000(1)	0.004(1)	0.001(1)
O4	**F^{-}**	0.1311(9)	½	0.4017(4)	1.000(1)	0.0164	0.020(2)	0.011(2)	0.018(2)	0	0.004(2)	0

Sample EJ6_1

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	K^{+}	0	½	0	0.9418(9)	0.0356	0.0309(8)	0.0338(9)	0.042(1)	0	0.0050(7)	0
M1	Mg^{2+}	0	0	½	0.9887(8)	0.0142	0.0084(7)	0.0105(8)	0.024(1)	0	0.0029(7)	0
	Fe^{2+}	0	0	½	0.0112(7)	0.0142	0.0084(7)	0.0105(8)	0.024(1)	0	0.0029(7)	0
M2	Mg^{2+}	0	0.3324(1)	½	0.9609(8)	0.0154	0.0093(5)	0.0137(6)	0.0233(7)	0	0.0032(4)	0
	Fe^{2+}	0	0.3324(1)	½	0.0391(8)	0.0154	0.0093(5)	0.0137(6)	0.0233(7)	0	0.0032(4)	0
T	Si, Si^{4+}	0.0754(1)	0.16661(8)	0.22525(9)	0.995(1)	0.0137	0.0094(3)	0.0118(3)	0.0199(4)	0.0001(3)	0.0020(2)	-0.0003(2)
O1	O, O^{2-}	0.3196(4)	0.2357(3)	0.1667(2)	0.9999(8)	0.0224	0.0175(9)	0.025(1)	0.025(1)	-0.0008(9)	0.0036(8)	-0.0063(8)
O2	O, O^{2-}	0.0269(6)	0	0.1665(3)	0.9998(8)	0.0215	0.027(2)	0.015(1)	0.022(2)	0	-0.001(1)	0
O3	O, O^{2-}	0.1307(3)	0.1670(2)	0.3910(2)	1.0002(8)	0.0133	0.0080(7)	0.0106(7)	0.0211(9)	0.0007(7)	0.0018(6)	0.0001(6)
O4	F^{-}	0.1330(4)	½	0.4017(3)	0.9998(7)	0.0179	0.013(1)	0.015(1)	0.025(1)	0	0.0035(9)	0

Sample EJ12_3

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	K^{+}	0	½	0	0.9332(1)	0.0295	0.0299(4)	0.0293(4)	0.0294(4)	0	0.0057(3)	0
M1	Mg^{2+}	0	0	½	0.9854(1)	0.0102	0.0100(4)	0.0070(4)	0.0142(4)	0	0.0039(3)	0
	Fe^{2+}	0	0	½	0.0136(1)	0.0102	0.0100(4)	0.0070(4)	0.0142(4)	0	0.0039(3)	0
M2	Mg^{2+}	0	0.33224(7)	½	0.9689(1)	0.0104	0.0080(2)	0.0091(3)	0.0144(3)	0	0.0026(2)	0
	Fe^{2+}	0	0.33224(7)	½	0.0307(1)	0.0104	0.0080(2)	0.0091(3)	0.0144(3)	0	0.0026(2)	0
T	Si, Si^{4+}	0.07539(7)	0.16670(4)	0.22528(4)	0.9934(1)	0.0087	0.0082(1)	0.0070(2)	0.0113(2)	0.0002(1)	0.0024(1)	-0.0002(1)
O1	O, O^{2-}	0.3194(2)	0.2363(2)	0.1667(1)	1.0001(1)	0.0176	0.0160(4)	0.0220(5)	0.0152(5)	-0.0007(4)	0.0042(4)	-0.0067(4)
O2	O, O^{2-}	0.0275(4)	0	0.1669(2)	1.0005(1)	0.0177	0.0260(8)	0.0102(6)	0.0166(7)	0	0.0025(6)	0
O3	O, O^{2-}	0.1304(2)	0.1669(1)	0.3906(1)	1.0003(1)	0.0091	0.0083(3)	0.0085(4)	0.0108(4)	-0.0002(3)	0.0021(3)	0.0007(3)
O4	F^{-}	0.1331(2)	½	0.4020(1)	0.9992(1)	0.0118	0.0104(5)	0.0105(5)	0.0143(5)	0	0.0020(4)	0

Sample EJ13_1

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9414(1)	0.0348	0.0336(4)	0.0343(5)	0.0364(5)	0	0.0063(3)	0
M1	**Mg^{2+}**	0	0	½	0.9991(1)	0.0132	0.0100(4)	0.0100(4)	0.0199(4)	0	0.0035(3)	0
	Fe^{2+}	0	0	½	0.0001(1)	0.0132	0.0100(4)	0.0100(4)	0.0199(4)	0	0.0035(3)	0
M2	**Mg^{2+}**	0	0.33238(8)	½	0.9694(1)	0.0141	0.0100(3)	0.0124(3)	0.0200(3)	0	0.0031(2)	0
	Fe^{2+}	0	0.33238(8)	½	0.0308(1)	0.0141	0.0100(3)	0.0124(3)	0.0200(3)	0	0.0031(2)	0
T	**Si, Si^{4+}**	0.07526(7)	0.16666(4)	0.22509(4)	0.9963(1)	0.0132	0.0109(2)	0.0109(2)	0.0181(2)	-0.0002(1)	0.0032(1)	-0.0000(1)
O1	**O, O^{2-}**	0.3199(2)	0.2357(2)	0.1666(1)	1.0002(1)	0.0221	0.0186(5)	0.0253(6)	0.0227(5)	-0.0015(4)	0.0046(4)	-0.0062(4)
O2	**O, O^{2-}**	0.0263(4)	0	0.1666(2)	1.0001(1)	0.0220	0.0274(8)	0.0156(7)	0.0223(7)	0	0.0023(6)	0
O3	**O, O^{2-}**	0.1304(2)	0.1667(1)	0.3906(1)	1.0004(1)	0.0131	0.0107(4)	0.0110(4)	0.0178(4)	0.0000(3)	0.0030(3)	0.0003(3)
O4	**F^{-}**	0.1332(2)	½	0.4023(1)	0.9976(1)	0.0156	0.0126(5)	0.0134(5)	0.0210(6)	0	0.0033(4)	0

Sample EJ72_1

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9948(6)	0.0315	0.0329(2)	0.0320(2)	0.0295(2)	0	0.0050(1)	0
M1	**Mg^{2+}**	0	0	½	0.8114(8)	0.0100	0.0091(2)	0.0075(2)	0.0138(2)	0	0.0032(1)	0
	Fe^{2+}	0	0	½	0.1884(5)	0.0100	0.0091(2)	0.0075(2)	0.0138(2)	0	0.0032(1)	0
M2	**Mg^{2+}**	0	0.33462(3)	½	0.8037(8)	0.0109	0.0083(1)	0.0118(1)	0.0126(1)	0	0.00172(8)	0
	Fe^{2+}	0	0.33462(3)	½	0.1964(6)	0.0109	0.0083(1)	0.0118(1)	0.0126(1)	0	0.00172(8)	0
T	**Si, Si^{4+}**	0.07554(3)	0.16681(2)	0.22679(2)	0.9826(9)	0.0097	0.00927(8)	0.00846(8)	0.01140(8)	-0.00013(5)	0.00187(5)	0.00004(5)
O1	**O, O^{2-}**	0.3296(1)	0.22662(7)	0.16935(5)	0.9998(8)	0.0188	0.0178(2)	0.0237(3)	0.0155(2)	-0.0030(2)	0.0044(2)	-0.0065(2)
O2	**O, O^{2-}**	0.0095(2)	0	0.17000(8)	1.0002(8)	0.0188	0.0262(4)	0.0129(3)	0.0160(3)	0	-0.0003(3)	0
O3	**O, O^{2-}**	0.1309(1)	0.16735(5)	0.39166(5)	0.9997(8)	0.0114	0.0117(2)	0.0107(2)	0.0117(2)	-0.0001(1)	0.0022(1)	0.0002(1)
O4	**O, O^{2-}**	0.1318(1)	½	0.39890(7)	1.0001(7)	0.0121	0.0120(2)	0.0125(3)	0.0118(2)	0	0.0021(2)	0
	H	0.1059(1)	½	0.32195(7)	0.569(1)	0.0121	0.0120(2)	0.0125(3)	0.0118(2)	0	0.0021(2)	0

Sample EJ72_3

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	K^{+}	0	½	0	0.9904(7)	0.0338	0.0347(4)	0.0333(4)	0.0336(4)	0	0.0066(3)	0
M1	Mg^{2+}	0	0	½	0.8144(8)	0.0121	0.0107(3)	0.0081(2)	0.0183(3)	0	0.0046(2)	0
	Fe^{2+}	0	0	½	0.1863(6)	0.0121	0.0107(3)	0.0081(2)	0.0183(3)	0	0.0046(2)	0
M2	Mg^{2+}	0	0.33463(5)	½	0.8055(8)	0.0130	0.0097(2)	0.0127(2)	0.0169(2)	0	0.0032(1)	0
	Fe^{2+}	0	0.33463(5)	½	0.1948(7)	0.0130	0.0097(2)	0.0127(2)	0.0169(2)	0	0.0032(1)	0
T	Si, Si^{4+}	0.07553(6)	0.16682(3)	0.22689(3)	0.9832(9)	0.0120	0.0112(1)	0.0095(1)	0.0156(1)	-0.0000(1)	0.00333(9)	-0.00003(9)
O1	O, O^{2-}	0.3293(2)	0.2270(1)	0.1694(1)	1.0003(8)	0.0216	0.0200(4)	0.0250(4)	0.0206(4)	-0.0030(3)	0.0056(3)	-0.0065(3)
O2	O, O^{2-}	0.0106(3)	0	0.1700(1)	0.9998(8)	0.0212	0.0282(7)	0.0139(5)	0.0202(6)	0	0.0009(5)	0
O3	O, O^{2-}	0.1307(2)	0.16735(9)	0.39173(9)	0.9997(8)	0.0134	0.0130(3)	0.0114(3)	0.0161(3)	-0.0001(3)	0.0035(2)	0.0000(2)
O4	O, O^{2-}	0.1319(2)	½	0.3988(1)	1.0007(8)	0.0144	0.0141(5)	0.0137(4)	0.0156(5)	0	0.0034(4)	0
	H	0.1162(2)	½	0.3204(1)	0.729(1)	0.0144	0.0141(5)	0.0137(4)	0.0156(5)	0	0.0034(4)	0

Sample EJ72_4

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	K^{+}	0	½	0	0.9953(7)	0.0319	0.0318(3)	0.0322(3)	0.0314(3)	0	0.0050(2)	0
M1	Mg^{2+}	0	0	½	0.8054(8)	0.0099	0.0078(2)	0.0071(2)	0.0151(2)	0	0.0030(1)	0
	Fe^{2+}	0	0	½	0.1954(6)	0.0099	0.0078(2)	0.0071(2)	0.0151(2)	0	0.0030(1)	0
M2	Mg^{2+}	0	0.33476(4)	½	0.7975(8)	0.0107	0.0068(1)	0.0116(1)	0.0136(2)	0	0.00136(9)	0
	Fe^{2+}	0	0.33476(4)	½	0.2028(7)	0.0107	0.0068(1)	0.0116(1)	0.0136(2)	0	0.00136(9)	0
T	Si, Si^{4+}	0.07541(4)	0.16685(3)	0.22678(3)	0.9877(9)	0.0097	0.00839(9)	0.00818(9)	0.0126(1)	-0.00014(8)	0.00172(7)	-0.00013(8)
O1	O, O^{2-}	0.3289(2)	0.2272(1)	0.16921(8)	0.9999(8)	0.0189	0.0169(3)	0.0234(4)	0.0170(3)	-0.0027(3)	0.0043(2)	-0.0062(3)
O2	O, O^{2-}	0.0106(2)	0	0.1701(1)	1.0000(8)	0.0192	0.0259(5)	0.0129(4)	0.0173(4)	0	0.0000(4)	0
O3	O, O^{2-}	0.1307(1)	0.16735(7)	0.39169(7)	0.9999(8)	0.0110	0.0099(2)	0.0102(2)	0.0129(2)	-0.0001(2)	0.0021(2)	0.0001(2)
O4	O, O^{2-}	0.1319(2)	½	0.3988(1)	1.0004(8)	0.0120	0.0105(3)	0.0124(3)	0.0130(4)	0	0.0018(3)	0
	H	0.1068(2)	½	0.3205(1)	0.530(1)	0.0120	0.0105(3)	0.0124(3)	0.0130(4)	0	0.0018(3)	0

Sample EJ72_6

Site	Atom	*x*/*a*	*y*/*b*	*z*/*c*	Occupancy	$U_{iso/equiv}$	U_{11}	U_{22}	U_{33}	U_{23}	U_{13}	U_{12}
K	**K^{+}**	0	½	0	0.9873(8)	0.0326	0.0327(4)	0.0337(4)	0.0315(4)	0	0.0059(3)	0
M1	**Mg^{2+}**	0	0	½	0.7941(8)	0.0110	0.0088(2)	0.0092(2)	0.0157(3)	0	0.0042(2)	0
	Fe^{2+}	0	0	½	0.2060(6)	0.0110	0.0088(2)	0.0092(2)	0.0157(3)	0	0.0042(2)	0
M2	**Mg^{2+}**	0	0.33482(5)	½	0.7900(8)	0.0118	0.0076(2)	0.0136(2)	0.0142(2)	0	0.0022(1)	0
	Fe^{2+}	0	0.33482(5)	½	0.2101(7)	0.0118	0.0076(2)	0.0136(2)	0.0142(2)	0	0.0022(1)	0
T	**Si, Si^{4+}**	0.07549(6)	0.16678(3)	0.22679(3)	0.9842(9)	0.0104	0.0086(1)	0.0101(1)	0.0126(1)	-0.00020(9)	0.00252(9)	-0.00015(9)
O1	**O, O^{2-}**	0.3293(2)	0.2270(1)	0.1693(1)	1.0000(8)	0.0199	0.0172(4)	0.0256(5)	0.0174(4)	-0.0027(3)	0.0049(3)	-0.0060(3)
O2	**O, O^{2-}**	0.0107(3)	0	0.1700(1)	1.0000(8)	0.0199	0.0266(6)	0.0151(5)	0.0166(5)	0	0.0000(4)	0
O3	**O, O^{2-}**	0.1307(2)	0.16731(9)	0.39171(9)	1.0001(8)	0.0119	0.0109(3)	0.0120(3)	0.0131(3)	0.0001(2)	0.0032(2)	0.0003(2)
O4	**O, O^{2-}**	0.1322(2)	½	0.3988(1)	1.0005(8)	0.0127	0.0114(4)	0.0139(4)	0.0130(4)	0	0.0026(3)	0
	H	0.1126(2)	½	0.3283(1)	0.716(1)	0.0127	0.0114(4)	0.0139(4)	0.0130(4)	0	0.0026(3)	0

Supplemental Data Table 2
Selected bond distances (Å) of the study micas

	1631 Eruption								
	EJ20_1	**EJ20_2**	**EJ20_3**	**EJ25_2**	**EJ25_3**	**EJ42_2**	**EJ42_3**	**EJ42_4**	**EJ47_2**
T-O1	1.6598(4)	1.6596(6)	1.6584(5)	1.660(2)	1.660(1)	1.6617(3)	1.6604(4)	1.6605(5)	1.6623(3)
T-O1'	1.6597(4)	1.6599(6)	1.6600(5)	1.657(2)	1.661(1)	1.6620(3)	1.6611(4)	1.6612(5)	1.6623(3)
T-O2	1.6597(2)	1.6602(3)	1.6594(3)	1.657(1)	1.6597(8)	1.6622(2)	1.6604(2)	1.6605(3)	1.6614(2)
T-O3	1.6558(4)	1.6549(5)	1.6546(5)	1.666(2)	1.658(1)	1.6528(3)	1.6518(4)	1.6503(5)	1.6616(3)
<T-O>	1.6590(7)	1.659(1)	1.6580(9)	1.660(4)	1.660(2)	1.6600(6)	1.6580(7)	1.6580(9)	1.6620(6)
M1-O4(x2)	2.0466(4)	2.0459(6)	2.0453(6)	2.032(2)	2.037(1)	2.0470(4)	2.0503(5)	2.0481(6)	2.0397(4)
M1-O3(x4)	2.0846(3)	2.0843(4)	2.0848(4)	2.075(2)	2.081(1)	2.0839(3)	2.0856(3)	2.0858(4)	2.0767(2)
<M1-O>	2.0720(5)	2.0720(7)	2.0720(7)	2.061(3)	2.066(1)	2.0720(5)	2.0740(6)	2.0730(7)	2.0640(4)
M2-O4(x2)	2.0573(3)	2.0575(5)	2.0551(4)	2.049(2)	2.047(1)	2.0570(3)	2.0570(3)	2.0574(4)	2.0439(3)
M2-O3(x2)	2.0718(3)	2.0717(5)	2.0721(4)	2.058(2)	2.065(1)	2.0722(3)	2.0763(3)	2.0755(5)	2.0664(3)
M2-O3'(x2)	2.0823(3)	2.0826(5)	2.0830(4)	2.076(2)	2.079(1)	2.0838(3)	2.0853(3)	2.0858(5)	2.0752(3)
<M2-O>	2.0700(5)	2.0710(9)	2.0700(7)	2.061(3)	2.064(2)	2.0710(5)	2.0730(5)	2.0730(8)	2.0620(5)
<M-O>	2.0710(7)	2.071(1)	2.071(1)	2.061(4)	2.065(2)	2.0710(7)	2.0730(8)	2.073(1)	2.0630(7)
K-O1(x4)	2.9619(4)	2.9614(6)	2.9623(5)	2.938(2)	2.943(1)	2.9587(3)	2.9685(4)	2.9691(5)	2.9251(3)
K-O1'(x4)	3.3695(5)	3.3707(6)	3.3689(5)	3.379(2)	3.380(1)	3.3848(4)	3.3739(5)	3.3720(6)	3.4127(3)
K-O2 (x2)	2.9616(6)	2.9598(9)	2.9611(7)	2.937(3)	2.945(2)	2.9577(5)	2.9691(6)	2.9705(8)	2.9271(4)
K-O2'(x2)	3.3686(6)	3.3703(9)	3.3688(8)	3.384(3)	3.379(2)	3.3858(5)	3.3752(7)	3.3718(8)	3.4156(5)
$<K\text{-}O>_{inner}$	2.9620(7)	2.961(1)	2.9620(9)	2.938(4)	2.944(2)	2.9580(6)	2.9690(7)	2.9700(9)	2.9260(5)
$<K\text{-}O>_{outer}$	3.3690(8)	3.371(1)	3.3690(9)	3.381(4)	3.380(2)	3.3850(6)	3.3740(9)	3.372(1)	3.4140(6)
<K-O>	3.166(1)	3.166(2)	3.166(1)	3.160(5)	3.162(3)	3.1720(9)	3.172(1)	3.171(1)	3.1700(8)

Supplemental Data Table 2
continuation

	1872 Eruption				1944 Eruption			
	EJ4_2	**EJ6_1**	**EJ12_3**	**EJ13_1**	**EJ72_1**	**EJ72_3**	**EJ72_4**	**EJ72_6**
T-O1	1.644(4)	1.651(2)	1.646(1)	1.647(1)	1.6619(6)	1.661(1)	1.6603(8)	1.661(1)
T-O1'	1.649(4)	1.646(2)	1.647(1)	1.648(1)	1.6615(6)	1.660(1)	1.6610(8)	1.662(1)
T-O2	1.647(2)	1.648(2)	1.6468(7)	1.6479(8)	1.6614(3)	1.6603(6)	1.6600(5)	1.6597(6)
T-O3	1.656(4)	1.656(2)	1.651(1)	1.652(1)	1.6630(5)	1.6633(9)	1.6632(7)	1.6620(9)
<T-O>	1.649(7)	1.650(4)	1.648(2)	1.649(2)	1.662(1)	1.661(2)	1.661(1)	1.661(2)
M1-O4(x2)	2.035(4)	2.029(2)	2.026(1)	2.025(1)	2.0531(7)	2.052(1)	2.0517(9)	2.051(1)
M1-O3(x4)	2.083(3)	2.082(2)	2.082(1)	2.081(1)	2.0908(5)	2.0892(8)	2.0900(7)	2.0893(8)
<M1-O>	2.067(5)	2.064(3)	2.063(1)	2.062(1)	2.0780(9)	2.077(1)	2.077(1)	2.077(1)
M2-O4(x2)	2.027(3)	2.029(2)	2.028(1)	2.026(1)	2.0364(5)	2.0364(9)	2.0365(7)	2.0358(9)
M2-O3(x2)	2.070(4)	2.071(2)	2.071(1)	2.074(1)	2.0836(5)	2.0831(8)	2.0831(6)	2.0836(9)
M2-O3'(x2)	2.073(3)	2.078(2)	2.079(1)	2.079(1)	2.0902(5)	2.0887(9)	2.0903(7)	2.0906(9)
<M2-O>	2.057(6)	2.059(3)	2.059(2)	2.060(2)	2.0700(9)	2.069(2)	2.070(1)	2.070(2)
<M-O>	2.060(8)	2.061(4)	2.060(2)	2.061(2)	2.073(1)	2.072(2)	2.072(2)	2.072(2)
K-O1(x4)	2.998(4)	3.007(3)	3.011(3)	3.006(1)	2.9584(6)	2.961(1)	2.9626(9)	2.960(1)
K-O1'(x4)	3.278(4)	3.264(2)	3.258(1)	3.263(1)	3.3762(6)	3.372(1)	3.3686(9)	3.371(1)
K-O2 (x2)	3.001(6)	3.007(3)	3.009(2)	3.002(2)	2.9598(8)	2.963(2)	2.963(1)	2.964(2)
K-O2'(x2)	3.276(6)	3.264(3)	3.263(2)	3.266(2)	3.3826(9)	3.376(2)	3.379(1)	3.377(2)
<K-O>$_{inner}$	2.999(7)	3.007(4)	3.010(4)	3.005(2)	2.959(1)	2.962(2)	2.963(1)	2.961(2)
<K-O>$_{outer}$	3.277(7)	3.264(4)	3.260(2)	3.264(2)	3.378(1)	3.373(2)	3.372(1)	3.373(2)
<K-O>	3.14(1)	3.136(6)	3.135(4)	3.135(3)	3.169(1)	3.168(3)	3.168(2)	3.167(3)

Supplemental Data Table 3
Selected distortion parameters derived from the structure refinements of the study micas

	Eruption 1631								
	EJ20_1	**EJ20_2**	**EJ20_3**	**EJ25_2**	**EJ25_3**	**EJ42_2**	**EJ42_3**	**EJ42_4**	**EJ47_2**
t_{tet} [Å]	2.236	2.235	2.235	2.243	2.238	2.237	2.236	2.236	2.237
BLD_T	0.110	0.121	0.116	0.181	0.040	0.214	0.218	0.244	0.031
$Volume_T$ [$Å^3$]	2.341	2.341	2.338	2.346	2.346	2.344	2.339	2.338	2.355
TQE	1.0003	1.0003	1.0003	1.0003	1.0003	1.0004	1.0004	1.0004	1.0002
TAV[°]	1.497	1.452	1.489	1.211	1.297	1.783	1.847	1.988	0.977
τ [°]	110.50	110.48	110.50	110.37	110.41	110.61	110.63	110.68	110.26
α[°]	8.97	9.02	8.96	9.76	9.61	9.42	8.95	8.89	10.76
Δz [Å]	-0.001	0.000	0.000	0.003	0.000	0.000	0.002	0.001	0.003
D.M. [Å]	0.542	0.544	0.542	0.584	0.577	0.545	0.529	0.528	0.604
$ψ_{M(1)}$ [°]	58.94	58.94	58.94	59.16	59.16	58.83	58.81	58.79	59.09
$ψ_{M(2)}$ [°]	58.91	58.92	58.91	59.16	59.11	58.82	58.76	58.78	59.04
$BLD_{M(1)}$	0.829	0.839	0.852	0.930	0.943	0.792	0.792	0.821	0.797
$ELD_{M(1)}$	5.052	5.054	5.054	5.311	5.306	4.927	4.897	4.880	5.222
$BLD_{M(2)}$	0.431	0.425	0.486	0.479	0.540	0.441	0.497	0.505	0.581
$ELD_{M(2)}$	5.018	5.029	5.014	5.305	5.245	4.910	4.843	4.864	5.164
$Shift_{M(2)}$ [Å]	-0.019	-0.019	-0.019	-0.020	-0.020	-0.016	-0.012	-0.014	-0.010
Volume $_{M(1)}$ [Å]	11.663	11.656	11.657	11.448	11.546	11.670	11.727	11.702	11.527
$OQE_{M(1)}$	1.011	1.011	1.011	1.013	1.013	1.011	1.011	1.011	1.012
$OAV_{M(1)}$[°]	37.034	37.022	37.093	40.736	40.882	35.096	34.625	34.463	39.380
Volume $_{M(2)}$ [$Å^3$]	11.638	11.638	11.628	11.446	11.500	11.658	11.686	11.691	11.483
$OQE_{M(2)}$	1.011	1.011	1.0113	1.013	1.012	1.011	1.010	1.011	1.012
$OAV_{M(2)}$[°]	37.146	37.310	37.186	41.500	40.782	35.431	34.364	34.779	38.959
$e_uM(1)/e_sM(1)$	1.106	1.107	1.107	1.112	1.112	1.104	1.103	1.102	1.110
$e_uM(2)/e_sM(2)$	1.106	1.106	1.106	1.112	1.111	1.103	1.102	1.102	1.109
t_{oct} [Å]	2.138	2.138	2.138	2.113	2.119	2.145	2.149	2.149	2.121
t_{int} [Å]	3.422	3.422	3.423	3.419	3.416	3.451	3.447	3.444	3.454
$Δ_{K-O}$ [Å]	0.407	0.410	0.407	0.443	0.436	0.427	0.406	0.403	0.487
t_{K-O4} [Å]	3.965	3.964	3.968	3.971	3.974	3.976	3.971	3.974	3.978

Supplemental Data Table 3
continuation

	1872 Eruption				1944 Eruption			
	EJ4_2	**EJ6_1**	**EJ12_3**	**EJ13_1**	**EJ72_1**	**EJ72_3**	**EJ72_4**	**EJ72_6**
t_{tet} [Å]	2.234	2.242	2.236	2.236	2.240	2.241	2.241	2.239
BLD_T	0.221	0.188	0.096	0.093	0.042	0.062	0.063	0.042
$Volume_T$ [Å^3]	2.299	2.304	2.295	2.298	2.355	2.350	2.351	2.351
TQE	1.0004	1.0006	1.0006	1.0005	1.0002	1.0003	1.0003	1.0002
TAV[°]	1.641	2.472	2.362	2.230	1.090	1.221	1.200	1.122
τ [°]	110.54	110.49	110.79	110.75	110.32	110.38	110.37	110.33
α[°]	6.10	5.64	5.48	5.70	9.22	9.05	8.99	9.04
Δz [Å]	0.002	-0.002	0.002	0.000	0.006	0.006	0.009	0.007
D.M. [Å]	0.508	0.502	0.495	0.503	0.555	0.547	0.548	0.552
$\psi_{M(1)}$ [°]	58.36	59.31	59.26	59.30	59.07	59.03	59.05	59.06
$\psi_{M(2)}$ [°]	59.19	59.23	59.19	59.25	58.93	58.90	58.92	58.96
$BLD_{M(1)}$	1.026	1.115	1.208	1.206	0.805	0.813	0.827	0.812
$ELD_{M(1)}$	5.540	5.492	5.427	5.472	5.205	5.153	5.177	5.193
$BLD_{M(2)}$	0.973	0.979	1.003	1.092	1.073	1.054	1.091	1.096
$ELD_{M(2)}$	5.337	5.388	5.342	5.413	5.039	5.001	5.025	5.068
$Shift_{M(2)}$ [Å]	-0.011	-0.009	-0.010	-0.009	0.012	0.012	0.013	0.014
$Volume_{M(1)}$ [Å]	11.540	11.491	11.484	11.458	11.756	11.741	11.743	11.727
$OQE_{M(1)}$	1.014	1.014	1.013	1.0137	1.012	1.012	1.012	1.012
$OAV_{M(1)}$[°]	44.909	43.954	43.066	43.893	39.039	38.221	38.620	38.862
$Volume_{M(2)}$ [Å^3]	11.384	11.413	11.421	11.416	11.626	11.622	11.625	11.630
$OQE_{M(2)}$	1.013	1.013	1.013	1.0135	1.011	1.011	1.011	1.011
$OAV_{M(2)}$[°]	42.466	43.039	42.566	43.704	36.898	36.366	36.692	37.299
$e_uM(1)/e_sM(1)$	1.117	1.116	1.115	1.116	1.110	1.109	1.109	1.110
$e_uM(2)/e_sM(2)$	1.113	1.114	1.113	1.115	1.106	1.105	1.106	1.107
t_{oct} [Å]	2.107	2.107	2.110	2.106	2.136	2.138	2.137	2.135
t_{int} [Å]	3.341	3.330	3.331	3.325	3.421	3.423	3.419	3.417
Δ_{K-O} [Å]	0.277	0.257	0.249	0.259	0.420	0.411	0.409	0.412
t_{K-O4} [Å]	3.949	3.953	3.954	3.953	3.962	3.963	3.960	3.958

Notes. t_{tet}: tetrahedral sheet thickness calculated from z coordinates of basal and apical O atoms; TQE: tetrahedral quadratic elongation (Robinson et al. 1971); TAV: tetrahedral angle variance (Robinson et al. 1971); τ: tetrahedral flattening angle; α: tetrahedral rotation angle (Hazen and Burnham 1973); Δ*z*: departure from complanarity of the basal O atoms (Güven 1971)); D.M.: dimensional misfit between tetrahedral and octahedral sheets (Toraya 1981); ψ: octahedral flattening angles (Donnay et al. 1964a, 1964b); BLD: bond-length distortions (Renner and Lehmann 1986); ELD: edge-length distortion (Renner and Lehmann 1986); $Shift_{M(2)}$: off-center shift of the M2 cation defined as the distance between the refined position of cation and the geometrical center of M2 site (coordinates: x/a = 0.0, y/b = 0.8333, z/c = 0.5); OQE: octahedral quadratic elongation (Robinson et al. 1971); OAV: octahedral angle variance (Robinson et al. 1971); e_u, e_s: mean lengths of unshared and shared edges, respectively (Toraya 1981); t_{oct}: octahedral sheet thickness (Toraya 1981); t_{int} calculated from the z coordinates of basal O atoms; $\Delta_{K-O} = <K-O>_{outer}-<K-O>_{inner}$; t_{K-O4}: projection of K-O4 distance along c*.
Errors on distortion parameters, estimated by varying the refined positional parameters within one standard deviation are in the following ranges: < 0.5% for volumes, thicknesses, projected bond lengths, shifts; 0.1-13% for angles, bond/edge lengths distortions, sheet corrugations, D.M., Δ_{K-O}.

Supplemental Data Table 4

Mean atomic numbers (electrons, e^-) of cation sites, octahedral and tetrahedral mean distances (Å), as determined by structure refinements (X-ref) and chemical analyses (EPMA) of the study micas. Average error for mean atomic numbers is ± 0.5 e^-

	1631 Eruption								
	EJ20_1	**EJ20_2**	**EJ20_3**	**EJ25_2**	**EJ25_3**	**EJ42_2**	**EJ42_3**	**EJ42_4**	**EJ47_2**
e^- (M1) X-ref	13.42	13.45	13.40	12.42	13.17	12.31	13.08	12.74	12.87
e^- (M2) X-ref	13.38	13.41	13.46	12.63	13.01	12.35	13.07	12.72	12.94
e^- (M1+2M2) X-ref	40.18	40.31	40.32	37.68	39.19	37.01	39.22	38.18	38.75
e^- (M1+2M2) EPMA	41.30	40.76	41.18	37.87	38.59	37.85	40.79	39.13	39.48
K e^- X-ref	17.86	17.86	17.98	18.29	18.24	18.67	18.40	18.54	18.81
K e^- EPMA	18.33	18.44	18.25	19.16	18.33	18.95	18.19	18.38	19.24
T e^- X-ref	13.60	13.62	13.64	13.72	13.69	13.66	13.67	13.74	13.66
T e^- EPMA	13.71	13.72	13.72	13.70	13.70	13.73	13.72	13.70	13.68
Σ^+ EPMA	22.11	22.15	22.16	22.14	22.14	22.10	22.20	22.12	22.21
Σ^- EPMA	22.12	22.16	22.17	22.10	22.13	22.11	22.21	22.17	22.20
<M-O> X-ref	2.071	2.071	2.071	2.061	2.065	2.071	2.073	2.073	2.063
<M-O> EPMA	2.076	2.075	2.074	2.068	2.065	2.076	2.076	2.077	2.064
<T-O> X-ref	1.659	1.659	1.658	1.660	1.660	1.660	1.658	1.658	1.662
<T-O> EPMA	1.658	1.657	1.657	1.659	1.659	1.655	1.656	1.654	1.662

Supplemental Data Table 4
continuation

	1872 Eruption				1944 Eruption			
	EJ4_2	**EJ6_1**	**EJ12_3**	**EJ13_1**	**EJ72_1**	**EJ72_3**	**EJ72_4**	**EJ72_6**
$e^-_{(M1)\ X\text{-}ref}$	12.22	12.16	12.18	11.99	14.64	14.62	14.75	14.89
$e^-_{(M2)\ X\text{-}ref}$	12.53	12.55	12.43	12.43	14.75	14.73	14.84	14.94
$e^-_{(M1+2M2)\ X\text{-}ref}$	37.28	37.26	37.04	36.85	44.14	44.08	44.43	44.77
$e^-_{(M1+2M2)\ EPMA}$	36.36	37.03	36.36	37.00	44.39	44.30	44.45	44.69
$K\ e^-_{X\text{-}ref}$	18.30	17.89	17.73	17.89	18.90	18.82	18.91	18.76
$K\ e^-_{EPMA}$	17.05	19.13	17.05	17.70	19.04	18.48	19.34	18.40
$T\ e^-_{X\text{-}ref}$	13.86	13.93	13.91	13.95	13.76	13.76	13.83	13.78
$T\ e^-_{EPMA}$	13.77	13.75	13.77	13.76	13.69	13.70	13.70	13.70
Σ^+_{EPMA}	22.01	22.13	21.99	22.02	22.46	22.45	22.47	22.47
Σ^-_{EPMA}	22.00	22.14	22.00	22.04	22.44	22.46	22.48	22.46
$\langle M\text{-}O\rangle_{X\text{-}ref}$	2.060	2.061	2.060	2.061	2.073	2.072	2.072	2.072
$\langle M\text{-}O\rangle_{EPMA}$	2.070	2.065	2.069	2.066	2.069	2.068	2.067	2.069
$\langle T\text{-}O\rangle_{X\text{-}ref}$	1.649	1.650	1.648	1.649	1.662	1.661	1.661	1.661
$\langle T\text{-}O\rangle_{EPMA}$	1.650	1.653	1.650	1.651	1.660	1.659	1.659	1.659

Notes: Σ^+ and Σ^- are sum of positive and negative charges, respectively

Supplemental Data Table 5
Structural formulas of the study micas

	Interlayer	Octahedral site	Tetrahedral site	Anionic site
1631 Eruption				
EJ20_1	$(K_{0.93}Na_{0.06})_{\Sigma=0.99}$	$(Mg_{2.49}Al_{0.14}Fe^{2+}_{0.21}Fe^{3+}_{0.14}Mn_{0.02})_{\Sigma=3.00}$	$(Si_{2.84}Al_{1.16})_{\Sigma=4.00}$	$O_{10.12}OH_{1.28}F_{0.60}$
EJ20_2	$(K_{0.93}Na_{0.07})_{\Sigma=1.00}$	$(Mg_{2.51}Al_{0.16}Fe^{2+}_{0.19}Fe^{3+}_{0.12}Mn_{0.02})_{\Sigma=3.00}$	$(Si_{2.87}Al_{1.13})_{\Sigma=4.00}$	$O_{10.16}OH_{1.25}F_{0.59}$
EJ20_3	$(K_{0.92}Na_{0.07})_{\Sigma=0.99}$	$(Mg_{2.48}Al_{0.16}Fe^{2+}_{0.20}Fe^{3+}_{0.14}Mn_{0.02})_{\Sigma=3.00}$	$(Si_{2.87}Al_{1.13})_{\Sigma=4.00}$	$O_{10.17}OH_{1.27}F_{0.56}$
EJ25_2	$(K_{0.95}Na_{0.05}Ba_{0.01})_{\Sigma=1.01}$	$(Mg_{2.65}Al_{0.25}Fe^{2+}_{0.06}Fe^{3+}_{0.04}Ti_{0.01})_{\Sigma=3.01}$	$(Si_{2.79}Al_{1.21})_{\Sigma=4.00}$	$O_{10.10}OH_{1.08}F_{0.82}$
EJ25_3	$(K_{0.93}Na_{0.06})_{\Sigma=0.99}$	$(Mg_{2.57}Al_{0.26}Fe^{2+}_{0.09}Fe^{3+}_{0.06}Ti_{0.01}Mn_{0.01})_{\Sigma=3.00}$	$(Si_{2.81}Al_{1.19})_{\Sigma=4.00}$	$O_{10.13}OH_{1.06}F_{0.81}$
EJ42_2	$(K_{0.98}Na_{0.03})_{\Sigma=1.01}$	$(Mg_{2.76}Al_{0.09}Fe^{2+}_{0.07}Fe^{3+}_{0.05}Ti_{0.02})_{\Sigma=2.99}$	$(Si_{2.93}Al_{1.07})_{\Sigma=4.00}$	$O_{10.11}OH_{1.60}F_{0.29}$
EJ42_3	$(K_{0.94}Na_{0.03})_{\Sigma=0.97}$	$(Mg_{2.50}Al_{0.16}Fe^{2+}_{0.18}Fe^{3+}_{0.12}Ti_{0.03}Mn_{0.01})_{\Sigma=3.00}$	$(Si_{2.89}Al_{1.11})_{\Sigma=4.00}$	$O_{10.21}OH_{1.57}F_{0.22}$
EJ42_4	$(K_{0.95}Na_{0.03})_{\Sigma=0.98}$	$(Mg_{2.65}Al_{0.12}Fe^{2+}_{0.12}Fe^{3+}_{0.08}Ti_{0.02})_{\Sigma=2.99}$	$(Si_{2.92}Al_{1.08})_{\Sigma=4.00}$	$O_{10.17}OH_{1.58}F_{0.25}$
EJ47_2	$(K_{0.96}Na_{0.04}Ba_{0.01})_{\Sigma=1.01}$	$(Mg_{2.42}Al_{0.35}Fe^{2+}_{0.12}Fe^{3+}_{0.08}Ti_{0.02}Mn_{0.01})_{\Sigma=3.00}$	$(Si_{2.72}Al_{1.28})_{\Sigma=4.00}$	$O_{10.20}OH_{1.57}F_{0.23}$
1872 Eruption				
EJ4_2	$(K_{0.88}Na_{0.03})_{\Sigma=0.91}$	$(Mg_{2.83}Fe^{3+}_{0.05}Ti_{0.05}[\ ]_{0.07})_{\Sigma=3.00}$	$(Si_{3.09}Al_{0.91})_{\Sigma=4.00}$	$O_{10.00}F_{1.82}OH_{0.17}Cl_{0.01}$
EJ6_1	$(K_{0.96}Na_{0.03}Ba_{0.01})_{\Sigma=1.00}$	$(Mg_{2.81}Al_{0.05}Fe^{2+}_{0.03}Fe^{3+}_{0.03}Ti_{0.05}[\ ]_{0.02})_{\Sigma=2.99}$	$(Si_{3.00}Al_{1.00})_{\Sigma=4.00}$	$O_{10.14}F_{1.85}Cl_{0.01}$
EJ12_3	$(K_{0.88}Na_{0.03})_{\Sigma=0.91}$	$(Mg_{2.83}Fe^{3+}_{0.05}Ti_{0.05}[\ ]_{0.07})_{\Sigma=3.00}$	$(Si_{3.07}Al_{0.93})_{\Sigma=4.00}$	$O_{10.00}F_{1.94}OH_{0.05}Cl_{0.01}$
EJ13_1	$(K_{0.92}Na_{0.02})_{\Sigma=0.94}$	$(Mg_{2.83}Fe^{2+}_{0.01}Fe^{3+}_{0.09}Ti_{0.02}[\ ]_{0.04})_{\Sigma=2.99}$	$(Si_{3.05}Al_{0.95})_{\Sigma=4.00}$	$O_{10.04}F_{1.95}Cl_{0.01}$
1944 Eruption				
EJ72_1	$(K_{0.92}Na_{0.04}Ba_{0.02})_{\Sigma=0.98}$	$(Mg_{2.18}Al_{0.19}Fe^{2+}_{0.28}Fe^{3+}_{0.19}Ti_{0.15}Cr_{0.01})_{\Sigma=3.00}$	$(Si_{2.77}Al_{1.23})_{\Sigma=4.00}$	$O_{10.44}OH_{1.43}F_{0.12}Cl_{0.01}$
EJ72_3	$(K_{0.92}Na_{0.04}Ba_{0.01})_{\Sigma=0.97}$	$(Mg_{2.18}Al_{0.20}Fe^{2+}_{0.28}Fe^{3+}_{0.19}Ti_{0.14}Cr_{0.01})_{\Sigma=3.00}$	$(Si_{2.79}Al_{1.21})_{\Sigma=4.00}$	$O_{10.46}OH_{1.39}F_{0.14}Cl_{0.01}$
EJ72_4	$(K_{0.93}Na_{0.05}Ba_{0.02})_{\Sigma=1.00}$	$(Mg_{2.16}Al_{0.19}Fe^{2+}_{0.29}Fe^{3+}_{0.20}Ti_{0.14}Cr_{0.01})_{\Sigma=2.99}$	$(Si_{2.79}Al_{1.21})_{\Sigma=4.00}$	$O_{10.48}OH_{1.37}F_{0.14}Cl_{0.01}$
EJ72_6	$(K_{0.91}Na_{0.05}Ba_{0.01})_{\Sigma=0.97}$	$(Mg_{2.16}Al_{0.19}Fe^{2+}_{0.29}Fe^{3+}_{0.19}Ti_{0.15}Ni_{0.01}Cr_{0.01})_{\Sigma=3.00}$	$(Si_{2.80}Al_{1.20})_{\Sigma=4.00}$	$O_{10.46}OH_{1.41}F_{0.12}Cl_{0.01}$