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Title of article Contemporaneous Calc-Alkaline and Alkaline Volcanism at Sanganguey Volcano, Nayarit, Mexico

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Table A

Modal Analyses

	<u>Basalt</u>	<u>Basaltic Andesites</u>			
Sample #	338	60	43	326	246
Locality	1	2	3	4	5
N. Latitude	21°26.29'	21°22.92'	21°23.79'	21°25.31'	21°24.65'
W. Longitude	104°45.11'	104°43.89'	104°46.08'	104°43.69'	104°43.19'
O1 Ph	2.4	1.0	0.1	1.3	0.7
O1 MP	2.1	4.0	1.8	0.9	1.5
Cpx Ph	0.3	-	-	0.1	1.1
Cpx MP	1.1	0.2	0.1	0.3	0.8
Opx Ph	-	-	-	-	-
Opx Mp	-	-	-	-	-
P1 Ph	3.6	6.2	1.6	15.5	14.5
P1 MP	10.4	15.5	27.1	19.0	16.7
Hb Ph	-	-	-	1.6	0.6
Hb MP	-	-	-	-	-
Ox Ph	-	-	-	-	0.1
Ox MP	-	0.4	0.9	1.8	1.2
Gdms	80.1	72.7	68.4	59.5	62.8

	<u>Andesites</u>				
Sample #	312	315	314	220	313
Locality	6	7	8	9	10
N. Latitude	21°27.09'	21°26.13'	21°26.12'	21°25.30'	21°26.20'
W. Longitude	104°43.19'	104°44.32'	104°44.59'	104°45.74'	104°44.85'
O1 Ph	-	-	-	-	-
O1 MP	-	-	-	-	-
Cpx Ph	1.4	1.0	0.9	1.6	3.3
Cpx MP	1.4	0.1	0.4	0.5	12.0
Opx Ph	1.6	2.7	2.8	1.6	2.1
Opx Mp	2.2	2.5	3.5	4.1	2.1
P1 Ph	21.0	22.9	23.8	24.2	18.7
P1 MP	6.6	10.2	6.0	7.6	7.3
Hb Ph	-	-	-	-	-
Hb MP	-	-	-	-	-
Ox Ph	0.2	-	0.1	-	1.1
Ox MP	0.6	2.0	1.5	1.6	1.7
Gdms	65.0	58.6	61.0	58.8	51.7

Table A (cont.)

	Andesites				
Sample #	311	235	339	320	52
Locality	11	12	13	14	15
N. Latitude	21°27.14'	21°24.97'	21°26.25'	21°24.84'	21°30.87'
W. Longitude	104°43.37'	104°45.13'	104°44.90'	104°43.80'	104°46.41'
O1 Ph	-	-	-	-	-
O1 MP	-	-	-	-	-
Cpx Ph	0.8	1.0	1.7	0.5	0.1
Cpx MP	0.6	1.4	0.9	0.7	0.2
Opx Ph	2.4	1.7	2.7	1.4	0.1
Opx Mp	1.8	1.6	3.1	3.3	0.1
P1 Ph	23.5	27.9	22.5	17.3	8.2
P1 MP	6.0	5.9	8.2	11.6	10.5
Hb Ph	-	-	-	-	0.5
Hb MP	-	-	-	-	0.4
Ox Ph	0.1	-	0.1	-	-
Ox MP	1.4	-	0.7	1.0	0.3
Gdms	63.4	60.5	60.1	64.2	79.6

	Andesites				
Sample #	218	200	207	243	241
Locality	16	17	18	19	20
N. Latitude	21°26.08'	21°25.31'	21°27.02'	21°27.00'	21°26.95'
W. Longitude	104°46.20'	104°41.28'	104°39.83'	104°44.08'	104°44.08'
O1 Ph	-	-	-	-	-
O1 MP	-	-	-	-	-
Cpx Ph	1.1	0.4	0.4	1.2	0.5
Cpx MP	0.6	0.5	0.8	1.1	1.5
Opx Ph	2.2	0.3	0.7	2.2	0.9
Opx Mp	2.4	2.4	2.7	3.0	2.3
P1 Ph	19.6	16.4	21.9	19.9	22.8
P1 MP	11.4	29.3	7.3	8.2	10.4
Hb Ph	-	0.5	-	-	-
Hb MP	-	-	-	-	-
Ox Ph	-	1.2	-	0.1	0.1
Ox MP	1.0	2.4	0.8	0.7	0.9
Gdms	61.7	56.6	65.4	63.6	60.6

Table A (cont.)

	Andesites				
Sample #	216	71	340	240	244
Locality	21	22	23	24	25
N. Latitude	21°28.71'	21°26.37'	21°26.36'	21°26.92'	21°27.41'
W. Longitude	104°42.52'	104°44.49'	104°44.60'	104°44.05'	104°44.20'
O1 Ph	-	-	-	-	-
O1 MP	-	-	-	-	-
Cpx Ph	1.2	-	0.3	0.9	0.8
Cpx MP	1.4	1.2	1.6	3.4	0.9
Opx Ph	2.1	0.8	1.5	1.1	1.5
Opx Mp	0.7	2.7	3.2	4.1	1.9
P1 Ph	23.5	19.4	20.6	22.8	25.5
P1 MP	5.6	7.6	6.1	12.1	6.0
Hb Ph	-	1.2	-	-	-
Hb MP	-	0.3	-	-	-
Ox Ph	-	-	-	-	-
Ox MP	1.1	1.2	0.1	0.3	0.3
Gdms	64.4	65.6	66.6	55.3	63.1

	Andesites				
Sample #	319	346	237	318	238
Locality	26	27	28	29	30
N. Latitude	21°26.00'	21°25.65'	21°27.05'	21°26.30'	21°26.79'
W. Longitude	104°43.82'	104°47.29'	104°43.98'	104°43.90'	104°43.98'
O1 Ph	-	-	-	-	-
O1 MP	-	-	-	-	-
Cpx Ph	1.3	0.4	2.3	0.3	0.7
Cpx MP	1.8	0.9	1.5	1.1	1.9
Opx Ph	0.7	1.5	1.9	0.7	0.7
Opx Mp	3.0	1.7	2.0	3.5	2.5
P1 Ph	18.4	23.5	25.3	19.0	19.4
P1 MP	11.4	6.9	17.0	10.4	9.6
Hb Ph	-	-	-	-	-
Hb MP	-	-	-	-	-
Ox Ph	0.3	0.1	0.1	-	-
Ox MP	0.7	1.9	1.0	0.9	0.7
Gdms	62.4	63.1	48.9	64.1	64.5

Table A (cont.)

	Andesites			Hornblende Dacites	
Sample #	239	316	343	224	68
Locality	30	32	33	34	35
N. Latitude	21°26.79'	21°26.12'	21°26.59'	21°29.82'	21°24.12'
W. Longitude	104°43.98'	104°44.09'	104°43.93'	104°44.44'	104°44.33'
Ol Ph	-	-	-	-	-
Ol MP	-	-	-	-	-
Cpx Ph	0.9	0.4	1.1	0.1	-
Cpx MP	2.6	0.3	0.9	-	-
Opx Ph	0.9	1.1	2.0	-	0.1
Opx Mp	2.2	3.0	2.3	0.3	0.1
Pl Ph	21.6	21.7	24.9	13.8	5.2
Pl MP	13.1	6.6	15.0	19.1	7.5
Hb Ph	-	-	-	4.2	1.2
Hb MP	-	-	-	-	0.3
Ox Ph	-	-	0.1	0.9	0.1
Ox MP	0.8	0.7	2.8	1.6	0.6
Gdms	57.9	66.2	50.9	59.6	84.9

	Hornblende Dacites			Glassy Dacites		
Sample #	212	56	303	74	337	
Locality	36	37	38	39	40	
N. Latitude	21°30.34'	21°29.35'	21°27.72'	21°26.50'	21°26.12'	
W. Longitude	104°46.08'	104°44.47'	104°43.42'	104°44.48'	104°45.32'	
Ol Ph	-	-	-	-	-	
Ol MP	-	-	-	-	-	
Cpx Ph	0.4	0.1	-	-	0.3	
Cpx MP	0.9	-	1.0	0.2	-	
Opx Ph	0.3	0.5	0.3	-	0.6	
Opx Mp	0.7	0.1	0.7	0.3	0.3	
Pl Ph	14.3	4.6	12.0	11.0	6.1	
Pl MP	9.6	14.0	20.6	12.3	4.5	
Hb Ph	1.2	0.4	0.3	1.6	-	
Hb MP	0.6	0.3	-	0.7	-	
Ox Ph	0.1	0.3	0.7	0.3	0.1	
Ox MP	0.3	1.1	1.8	0.5	0.9	
Gdms	71.6	78.6	62.6	72.5	87.2	

Table A (cont.)

	Glassy Dacites				
Sample #	323	324	229	209	219
Locality	41	42	43	44	45
N. Latitude	21°27.17'	21°27.55'	21°24.86'	21°27.32'	21°25.75'
W. Longitude	104°41.22'	104°41.05'	104°42.16'	104°40.30'	104°46.17'
Ol Ph	-	-	-	-	-
Ol MP	-	-	-	-	-
Cpx Ph	-	-	0.3	-	0.1
Cpx MP	0.1	-	0.1	0.3	-
Opx Ph	0.3	-	-	0.4	0.6
Opx Mp	0.3	0.3	0.1	0.3	0.3
P1 Ph	2.3	4.0	3.3	4.1	4.8
P1 MP	8.3	9.6	4.0	4.4	12.0
Hb Ph	-	-	-	-	tr
Hb MP	-	-	-	-	-
Ox Ph	-	-	-	-	-
Ox MP	0.9	1.6	1.1	0.7	0.1
Gdms	87.9	84.5	91.0	89.8	82.1

	Glassy Dacites				
Sample #	217	342	201	69	248
Locality	46	47	49	50	51
N. Latitude	21°28.66'	21°26.49'	21°25.44'	21°24.62'	21°24.58'
W. Longitude	104°41.91'	104°44.20'	104°41.49'	104°43.99'	104°43.68'
Ol Ph	-	-	-	-	-
Ol MP	-	-	-	-	-
Cpx Ph	0.3	-	0.1	-	-
Cpx MP	0.3	-	0.3	-	-
Opx Ph	0.1	0.1	0.1	0.5	-
Opx Mp	0.5	0.8	0.3	0.8	-
P1 Ph	7.2	4.5	3.1	6.1	5.9
P1 MP	6.6	5.1	3.5	17.9	2.8
Hb Ph	-	-	-	-	tr
Hb MP	-	-	-	-	-
Ox Ph	-	0.5	-	0.5	0.5
Ox MP	0.3	1.8	0.1	0.1	0.9
Gdms	84.7	87.2	92.5	74.1	89.9

Table A (cont.)

¹Locality refers to number on map in Figure 2 of manuscript.
Abbreviations are as follows: Ol = olivine, Opx = orthopyroxene, Cpx = clinopyroxene, Pl = plagioclase, Hb = hornblende, Ox = opaque oxide, Gndms = groundmass, Ph = phenocrysts, Mp = microphenocrysts.
Phenocrysts are defined as grains with a maximum dimension greater than 0.3 mm, microphenocrysts between 0.3 and 0.03 mm, and groundmass taken as glass plus crystals smaller than 0.03 mm. All modes based on at least 1000 points counted.

Table B
Chemical Analyses

Sample #	Basalt	Basaltic Andesites				Andesites				
		338	60	43	326	246	312	315	314	220
Locality ¹	1	1	2	3	4	5	6	7	8	9
SiO ₂	49.0	52.7	53.9	55.3	55.6	57.2	59.7	59.4	59.7	
TiO ₂	2.12	1.50	1.21	1.11	1.34	0.89	0.80	0.80	0.82	
Al ₂ O ₃ ²	16.7	17.7	20.3	18.1	18.0	18.3	17.9	18.1	17.6	
FeO	9.05	7.74	7.46	6.31	6.58	5.28	4.75	4.84	4.94	
MnO	0.17	0.14	0.15	0.13	0.13	0.10	0.09	0.10	0.08	
MgO	8.0	5.6	3.8	4.5	3.5	3.6	2.6	2.9	3.2	
CaO	8.70	8.29	6.58	7.97	7.70	6.92	6.36	6.02	5.96	
Na ₂ O	2.3	3.6	4.4	3.5	4.1	3.8	3.6	3.4	3.9	
K ₂ O	0.98	1.20	0.99	1.71	1.38	1.52	2.43	2.16	1.84	
P ₂ O ₅	0.34	0.37	0.42	0.30	0.32	0.15	0.11	0.11	0.12	
LOI	2.96	0.53	1.26	1.06	0.76	2.02	1.46	1.13	1.69	
Total	100.3	99.3	100.4	99.9	99.5	99.7	99.8	99.0	99.8	
Rb	15	10	4	15	16	22	33	30	28	
Sr	442	627	729	770	729	728	684	670	651	
Ba	259	nd	nd	601	587	708	784	836	776	
La	30	nd	nd	15	14	nd	13	22	11	
Ce	43	nd	nd	21	30	nd	24	26	28	
Y	30	21	23	21	22	22	21	23	22	
Zr	195	158	196	143	150	152	147	145	142	
Ni	134	64	27	46	29	26	21	25	18	
V	239	nd	nd	121	136	87	77	78	78	
Cu	49	nd	nd	25	30	19	19	25	22	
Zn	53	nd	nd	51	52	45	37	42	40	
Rb/Sr	0.034	0.016	0.005	0.019	0.022	0.030	0.048	0.045	0.043	
K/Rb	542	996	2055	946	716	574	611	598	546	

Table B (cont.)

	Andesites									
Sample #	313	311	235	339	320	52	218	200	207	
Locality	10	11	12	13	14	15	16	17	18	
SiO ₂	60.1	60.2	60.2	60.5	60.6	60.7	60.8	60.8	61.1	
TiO ₂	0.79	0.82	0.82	0.79	0.78	0.78	0.82	0.82	0.78	
Al ₂ O ₃	17.8	17.8	17.9	17.7	17.7	17.8	17.7	17.4	17.5	
FeO	4.65	4.66	4.60	4.38	4.61	4.82	4.68	4.89	4.63	
MnO	0.09	0.08	0.10	0.08	0.10	0.10	0.11	0.11	0.08	
MgO	3.3	2.4	2.6	2.3	2.5	2.2	2.6	2.3	2.9	
CaO	6.28	5.82	5.59	5.78	5.76	5.48	5.92	5.71	5.60	
Na ₂ O	3.5	3.9	3.8	4.2	4.1	3.7	3.6	4.3	3.7	
K ₂ O	2.01	2.20	2.10	2.21	1.80	2.38	2.38	1.78	2.07	
P ₂ O ₅	0.09	0.11	0.12	0.12	0.15	0.22	0.12	0.22	0.13	
LOI	1.59	1.57	1.58	1.18	2.00	nd	1.17	0.93	1.69	
Total	100.2	99.6	99.5	99.2	100.1	98.1	99.9	99.2	100.2	
Rb	28	29	30	30	30	30	29	28	32	
Sr	666	632	630	653	652	662	650	670	600	
Ba	876	787	863	869	791	890	825	864	878	
La	nd	10	22	nd	18	nd	18	15	25	
Ce	nd	24	26	nd	25	nd	28	28	33	
Y	22	21	24	21	22	17	25	21	29	
Zr	145	156	154	159	144	144	141	164	158	
Ni	21	22	25	22	24	22	24	16	18	
V	75	74	73	71	74	nd	75	79	71	
Cu	20	22	28	18	18	12	24	17	22	
Zn	36	36	44	30	32	60	37	45	40	
Rb/Sr	0.042	0.046	0.048	0.046	0.046	0.045	0.045	0.042	0.053	
K/Rb	596	630	581	612	498	659	681	528	537	

Table B (cont.)

	Andesites								
Sample #	243	241	216	71	340	240	244	319	346
Locality	19	20	21	22	23	24	25	26	27
SiO ₂	61.2	61.2	61.3	61.3	61.3	61.3	61.5	61.5	61.6
TiO ₂	0.78	0.78	0.78	0.78	0.78	0.77	0.77	0.75	0.77
Al ₂ O ₃	17.3	17.4	17.4	17.2	17.2	17.3	17.5	17.6	17.3
FeO*	4.51	4.60	4.59	4.55	4.50	4.47	4.42	4.37	4.56
MnO	0.07	0.09	0.08	0.09	0.09	0.08	0.07	0.07	0.10
MgO	2.4	2.6	2.2	2.4	2.7	2.8	2.0	2.1	2.4
CaO	5.49	5.52	5.47	5.22	5.79	5.49	5.74	5.52	4.91
Na ₂ O	4.4	4.2	4.3	4.4	4.0	4.2	4.2	4.0	4.5
K ₂ O	1.90	2.20	1.90	2.15	2.04	2.14	1.90	2.04	2.05
P ₂ O ₅	0.12	0.13	0.13	0.16	0.16	0.13	0.11	0.14	0.14
LOI	0.68	1.03	1.00	1.15	1.14	1.11	1.14	0.73	1.88
Total	98.9	99.7	99.1	99.4	99.8	99.8	99.3	98.9	100.2
Rb	33	34	33	37	33	33	33	23	35
Sr	624	614	655	596	614	605	633	673	598
Ba	819	834	1015	857	836	824	822	867	1102
La	12	20	22	17	17	nd	12	nd	nd
Ce	29	30	26	33	28	nd	28	nd	nd
Y	20	22	22	23	23	22	22	22	20
Zr	152	162	152	169	170	164	150	174	169
Ni	28	28	25	22	18	22	26	20	20
V	71	72	73	72	71	70	71	79	73
Cu	25	23	19	21	22	26	22	22	17
Zn	35	40	33	42	45	42	33	43	41
Rb/Sr	0.053	0.055	0.050	0.062	0.054	0.055	0.052	0.034	0.059
K/Rb	478	537	478	482	513	538	478	736	486

Table B (Cont.)

Sample #	Andesites						Hornblende Dacites		
	237	318	238	239	316	343	224	68	212
Locality	28	29	30	30	32	33	34	35	36
SiO ₂	61.6	61.6	61.7	61.8	61.8	62.3	63.2	63.8	64.0
TiO ₂	0.76	0.75	0.79	0.78	0.79	0.70	0.76	0.70	0.65
Al ₂ O ₃	17.1	17.8	17.0	17.0	17.4	17.1	16.6	17.2	16.5
FeO	4.37	4.40	4.35	4.54	4.50	4.43	3.86	3.56	3.50
MnO	0.08	0.08	0.09	0.07	0.10	0.06	0.12	0.14	0.09
MgO	2.1	2.0	2.3	2.6	2.0	2.4	1.7	1.1	1.3
CaO	5.32	5.53	5.32	5.29	5.50	5.37	4.27	3.07	3.71
Na ₂ O	4.7	4.2	3.9	4.4	4.1	4.0	4.3	5.4	4.1
K ₂ O	2.07	2.04	2.22	2.10	2.01	2.05	2.76	2.48	3.00
P ₂ O ₅	0.12	0.15	0.15	0.16	0.14	0.15	0.28	0.16	0.15
LOI	0.79	1.30	1.69	1.00	1.10	1.28	1.77	1.16	3.00
Total	99.0	99.9	99.5	99.7	99.4	99.9	99.6	98.8	100.0
Rb	33	35	34	35	35	33	32	32	44
Sr	623	618	615	602	625	621	568	536	492
Ba	842	866	890	837	901	829	876	1194	969
La	nd	nd	nd	23	28	nd	20	30	14
Ce	nd	nd	nd	32	31	nd	38	59	46
Y	21	22	23	23	23	21	27	24	22
Zr	151	165	169	166	152	154	196	231	181
Ni	22	20	21	25	21	22	11	3	8
V	70	69	69	70	72	69	62	55	54
Cu	25	21	16	20	18	19	11	12	10
Zn	33	35	38	40	34	34	46	74	40
Rb/Sr	0.053	0.057	0.055	0.058	0.056	0.053	0.056	0.060	0.089
K/Rb	521	484	542	498	477	516	716	643	566

Table B (cont.)

	Hb Dacite		Glassy Dacites						
Sample #	56	303	74	337	323	324	229	209	219
Locality	37	38	39	40	41	42	43	44	45
SiO ₂	64.7	64.7	65.4	64.1	65.8	65.9	66.2	66.2	66.3
TiO ₂	0.60	0.59	0.55	0.94	0.73	0.72	0.72	0.73	0.50
Al ₂ O ₃	16.9	16.4	16.2	16.5	16.3	16.2	16.2	16.1	16.2
FeO	3.36	3.38	3.70	4.21	3.32	3.17	3.23	3.28	3.09
MnO	0.11	0.09	0.08	0.14	0.13	0.14	0.13	0.13	0.12
MgO	1.1	1.5	2.2	0.6	0.5	0.9	1.1	1.1	0.5
CaO	3.08	3.78	4.16	2.69	2.55	2.76	2.82	2.77	2.23
Na ₂ O	4.8	4.1	4.2	4.8	5.1	4.9	5.4	5.5	5.1
K ₂ O	2.83	2.93	2.55	2.89	2.78	3.33	2.65	2.66	3.51
P ₂ O ₅	0.12	0.08	0.20	0.26	0.18	0.18	0.16	0.16	0.13
LOI	1.35	2.24	nd	1.56	2.05	1.84	0.56	0.56	1.73
Total	99.0	99.8	99.1	98.7	99.5	99.9	99.2	99.2	99.5
Rb	36	42	39	45	45	43	42	42	55
Sr	469	499	509	428	461	462	460	459	367
Ba	1332	1065	904	996	1265	971	921	933	1193
La	28	24	23	44	47	42	nd	24	nd
Ce	79	47	34	71	84	61	nd	57	nd
Y	23	21	25	38	35	38	28	28	33
Zr	175	175	170	262	245	240	246	241	285
Ni	1	9	25	11	3	2	7	5	6
V	51	52	54	14	52	51	51	52	47
Cu	9	16	15	61	3	6	7	6	7
Zn	52	38	39	nd	44	58	67	61	61
Rb/Sr	0.077	0.084	0.077	0.105	0.098	0.093	0.091	0.092	0.150
K/Rb	653	579	543	533	513	643	524	526	530

Table B (cont.)

	Glassy Dacites					
Sample #	217	342	33	201	69	248
Locality	46	47	48	49	50	51
SiO ₂	66.5	66.9	67.3	67.4	68.5	68.6
TiO ₂	0.80	0.77	0.83	0.56	0.45	0.44
Al ₂ O ₃ *	15.9	16.6	15.5	15.8	15.9	15.6
FeO	3.41	2.65	3.80	2.97	2.62	2.55
MnO	0.09	0.03	0.13	0.08	0.09	0.10
MgO	0.8	0.6	0.9	0.5	0.8	0.7
CaO	2.51	2.17	3.28	2.21	2.68	2.07
Na ₂ O	5.2	5.3	3.8	5.2	5.0	4.9
K ₂ O	2.90	3.00	3.31	3.05	2.56	3.11
P ₂ O ₅	0.15	0.13	0.26	0.12	0.12	0.08
LOI	1.30	0.92	nd	1.26	1.51	1.38
Total	99.6	99.0	99.1	99.0	100.1	99.5
Rb	45	46	37	53	42	42
Sr	412	394	425	385	584	344
Ba	1095	984	1005	1028	1011	1097
La	nd	nd	nd	nd	nd	nd
Ce	nd	nd	nd	nd	nd	nd
Y	34	29	26	26	16	22
Zr	255	260	240	246	191	261
Ni	5	3	8	6		1
V	54	44	nd	47	43	42
Cu	8	4	nd	7	7	8
Zn	54	12	84	38	36	41
Rb/Sr	0.109	0.117	0.087	0.138	0.072	0.122
K/Rb	535	541	743	478	506	615

¹Locality refers to numbers on map in Figure 2 of manuscript, latitude and longitude listed in Table A.

All analyses by x-ray fluorescence spectrometer. Major elements in weight %, trace elements in ppm. nd = not determined, FeO* = total Fe as FeO.

Estimated errors in analyses based on counting uncertainties and precision in reproducing USGS standards are as follows, expressed as a percentage of the amount present: SiO₂ (0.8%), TiO₂ (2%), Al₂O₃ (2%), FeO* (0.9%), MnO (5%), MgO (3%), CaO (0.7%), Na₂O (3%), K₂O (0.6%), P₂O₅ (3%), Rb (8%), Sr (5%), Ba (5%), La (12%), Ce (10%), Y (10%), Zr (4%), Ni (10%), V (4%), Cu (5%), Zn (10%).