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Title of article Cenozoic Sedimentation and Paleotectonics of North-Central New Mexico: Implications for Initiation and Evolution of the Rio Grande Rift

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TABLE A Compositions (wt. %) and Barth-Niggli cation norms unless otherwise indicated. BDL = below detection level

Formation or Petrosome	Espinaso				Esquibel
Rock Type	high-K andesite	high-K basaltic andesite	nepheline latite	olivine tholeiite	high-K andesite
Sample	359	358	344	357	NM-84-7
SiO2	59.51	55.76	56.06	48.16	62.72
TiO2	0.66	0.83	0.35	1.60	0.93
Al2O3	16.64	19.20	20.90	13.65	13.91
Fe2O3	0.91	1.04	0.59	1.90	6.09
FeO	4.63+	5.30+	3.00+	9.67+	0.01
MnO	0.17	0.17	0.15	0.15	0.10
MgO	2.01	2.41	0.58	8.14	2.17
CaO	6.12	7.10	2.38	10.12	5.12
Na2O	4.54	3.56	5.91	3.00	3.59
K2O	2.46	3.04	6.53	0.80	3.37
P2O5	0.29	0.36	0.21	0.30	0.41
TOTAL	97.94	98.77	96.66	97.49	98.42
Srppm*	1082	874	591	431	915
Rb	50	40	154	3	89
V	94	98	56	203	82
Zr	180	194	257	119	351
Q	7.10	3.04	–	–	17.39
or	14.79	18.18	38.77	4.85	20.51
ab	41.50	32.36	31.64	27.66	33.20
an	18.08	27.77	10.49	21.99	12.25
ne	–	–	–	–	–
ac	–	–	–	–	–
ns	–	–	–	–	–
wo	–	–	–	–	–
di	8.72	4.41	–	22.04	6.62
hy	7.28	11.21	–	1.87	2.87
ol	–	–	4.21	16.62	–
mt	0.97	1.10	0.62	2.04	–
ilm	0.94	1.17	0.49	2.29	0.18
hm	–	–	–	–	4.37
sp	–	–	–	–	1.74
ap	0.62	0.76	0.44	0.64	0.88

continued

(cation %) of clasts, flows and basalt bomb from Oligocene and
(12 ppm for V). + = FeO calculated assuming Fe3+/total Fe =

high-K andesite NM-84-11	rhyo-dacite NM-84-10	rhyo-dacite NM-84-8	rhyo-dacite NM-84-4	rhyo-dacite NM-84-5	Abiquiu (Esquibel) rhyo-dacite NM-84-15C
59.70	63.98	65.04	65.01	65.35	66.73
0.66	0.54	0.64	0.58	0.61	0.59
15.26	15.15	14.70	15.31	13.91	14.68
5.86	2.30	3.91	3.21	4.21	1.82
0.13	2.09	0.72	0.83	0.42	1.23
0.10	0.08	0.08	0.05	0.08	0.05
3.95	2.10	1.68	1.85	1.62	1.98
5.57	3.88	3.59	3.29	3.61	3.51
3.99	4.45	3.82	4.06	3.56	4.34
2.56	3.41	4.04	3.97	3.52	3.48
0.28	0.24	0.25	0.22	0.22	0.27
98.06	98.22	98.47	98.38	97.11	98.68
843	870	649	802	659	850
61	61	138	102	84	78
98	70	84	80	77	57
299	308	308	355	315	308
11.09	14.22	17.98	16.67	21.90	18.38
15.42	20.47	24.41	23.88	21.66	20.80
36.53	40.60	35.07	37.11	33.30	39.43
16.49	11.48	11.28	12.04	12.06	10.42
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
6.72	5.19	4.21	2.49	3.92	4.33
7.77	4.32	2.64	3.96	2.70	3.37
–	–	–	–	–	–
–	2.44	0.54	0.85	–	1.76
0.37	0.76	0.91	0.82	0.81	0.83
4.16	–	2.43	1.71	3.06	0.11
0.86	–	–	–	0.11	–
0.60	0.51	0.53	0.47	0.48	0.57

Miocene strata of study area. Analyses by x-ray fluorescence. FeO by 0.15. *1sigma error for Sr, Rb, V and Zr is, respectively, 5, 3, 13

Cordito

high-K andesite NM-84-15A	high-K andesite NM-84-15B	high-K andesite NM-86-22	rhyolite NM-88-1	rhyolite NM-84-14	rhyolite NM-84-13
60.30	55.34	59.34	77.29	77.31	79.53
0.69	0.80	0.70	0.13	0.22	0.10
15.69	16.75	15.97	10.69	9.99	11.15
5.48	2.57	0.93+	0.20+	1.32	0.81
0.00	2.74	4.76	1.02	0.15	0.00
0.07	0.11	0.07	0.08	0.04	0.05
2.15	3.74	2.54	0.00	0.33	0.06
4.63	4.74	4.63	0.08	1.22	0.32
3.79	4.12	3.35	3.73	3.07	4.85
3.65	3.72	3.24	4.44	3.37	4.16
0.29	0.35	0.36	0.00	0.05	0.01
96.74	94.98	95.89	97.66	97.07	101.04
970	947	765	19	208	24
51	78	68	132	100	141
64	108	90	BDL	BDL	BDL
341	378	198	335	179	115
12.79	2.56	11.60	36.73	42.99	35.00
22.40	22.88	20.04	27.22	20.97	24.44
35.36	38.52	31.50	33.33	29.04	36.09
15.61	16.90	19.87	-	3.71	-
-	-	-	-	-	-
-	-	-	0.58	-	2.25
-	-	-	0.21	-	1.33
-	-	-	-	-	0.38
3.26	4.17	1.38	0.33	1.83	0.33
4.54	10.24	12.79	1.41	0.04	-
-	-	-	-	-	-
-	2.80	1.02	-	-	-
0.11	1.16	1.02	0.19	0.31	0.08
3.97	-	-	-	0.97	-
1.33	-	-	-	0.02	0.09
0.63	0.76	0.79	-	0.11	0.02

spectrophotometric determination of ICI reaction (Bower, 1984), and 7 relative percent.

Chama - El Rito
(Plaza)

rhyo-dacite 327	rhyo-dacite 314	high-K andesite 222	latite 313	basanite 302
64.30	66.36	60.15	58.89	43.45
0.69	0.70	0.69	0.79	1.92
14.66	14.37	15.22	18.66	13.31
3.57	2.56	4.04	4.83	7.47
0.23	1.12	0.32	0.26	5.06
0.05	0.05	0.05	0.06	0.23
1.42	1.78	1.24	1.89	10.34
5.73	4.14	6.66	4.23	11.95
3.90	4.03	3.52	5.07	2.56
3.38	3.25	2.98	4.46	0.72
0.21	0.25	0.28	0.52	1.19
98.14	98.61	95.15	99.66	98.20
584	592	627	901	1166
65	70	36	81	22
33	34	43	61	182
156	156	162	201	200
17.11	20.06	15.74	2.28	-
20.47	19.56	18.67	26.17	4.34
35.90	36.86	33.52	45.22	12.34
12.83	11.74	17.96	14.89	23.17
-	-	-	-	6.67
-	-	-	-	-
-	-	-	-	-
1.40	-	2.02	-	-
8.04	6.02	7.26	0.87	23.52
-	2.00	-	4.75	-
-	-	-	-	23.42
-	1.28	-	-	1.27
0.45	0.99	0.61	0.49	2.73
2.55	0.96	2.99	3.34	-
0.81	-	0.62	0.90	-
0.45	0.53	0.62	1.08	2.54

continued

TABLE B Descriptions, locations, and ages of clasts, flows and basal

Formation or Petrosome	Espinaso		
Sample	359	358	344
Description and Location	Whole rock, groundmass, clast from middle Espinaso, 35°21.48'N 106°17.66'W	Whole rock, groundmass, clast from lower Espinaso, 35°22.99'N 106°18.81'W	Whole rock, groundmass, flow near top of Espinaso, 35°25.97'N 106°20.06'W
K-analyses (%K) individual	1.261	0.9444	5.655
	1.232	0.9426	5.672
	1.238	0.9414	5.614
	1.260	0.9456	5.593
mean	1.248	0.9435	5.633
Radiogenic 40Ar pm/g individual	76.49	56.84	261.8
	74.91	56.70	262.4
	75.02	56.50	261.2
	76.27		275.1
			259.3
			267.2
mean	75.67	56.68	264.5
Percent atm. 40Ar individual	16.9	15.2	14.7
	18.2	15.5	15.1
	17.9	15.9	15.5
	17.5		15.0
			14.9
			15.1
mean	17.6	15.5	15.1
Age in m.y.	34.6±0.7	34.3±0.8	26.9±0.6

continued

bomb from Oligocene and Miocene strata of study area. Constants used:

	Esquibel		
357	NM-84-7	NM-84-11	NM-84-10
Whole rock, groundmass, flow at base of Santa Fe Group, 35°26.30'N 106°20.24'W	Biotite, clast from Rio Los Pinos area, 36°57.3'N, 106°09'W	Biotite, clast from Cañada Biscara area, 36°41'N, 106°07'W	Biotite, clast from Cañada Biscara area, 36°41'N, 106°07'W
0.7288 0.7274 0.7268	6.477 6.585 6.536	7.015 7.043 7.069	7.016 7.000 6.999 7.074 7.006
0.7277	6.533	7.042	7.019
31.77 31.94	333.4 334.9 335.6 336.1 329.2	345.5 348.9 345.2 347.5	340.9 344.8 336.4
31.86	333.8	346.8	340.7
51.4 51.1	22.3 22.4 22.2 22.0 22.2	27.8 27.4 27.9 27.6	27.2 27.9 29.0
51.2	22.2	27.7	28.0
25.1±0.6	29.2±0.7	28.2±0.7	27.8±0.7

continued

$\lambda_\beta = 4.963 \times 10^{-10}\ yr^{-1}$		$\lambda_e = 0.581 \times 10^{-10}\ yr^{-1}$	
	Abiquiu (Esquibel)		Cordito
NM-84-8	NM-84-15C	NM-84-15A	NM-86-22
Biotite, clast from Rio Los Pinos area, 36°57.30'N 106°09'W	Biotite, clast from Arroyo del Cobre, 36°13.15'N 106°20'W	Biotite, clast from Arroyo del Cobre, 36°13.15'N 106°20'W	Hornblende, clast from roadcut, US highway 64, 36°04'N 106°07'W
7.030	7.083	7.010	0.770
6.987	7.072	7.018	0.759
	7.069	7.029	0.773
			0.766
			0.772
			0.762
7.008	7.075	7.019	0.767
337.5	348.6	330.7	37.31
335.2	341.2	335.5	37.34
334.5	348.4	334.4	37.22
339.2	347.4	335.1	37.08
336.6	346.4	333.9	37.23
31.7	28.5	15.5	17.3
31.4	24.3	15.3	16.6
32.2	27.6	15.4	17.0
31.8	28.0	15.6	17.1
31.8	27.1	15.4	17.0
27.5±0.7	28.0±0.7	27.2±0.6	27.79±0.32

$\lambda = 5.544 \times 10^{-10}\ yr^{-1}$ $\qquad$ $^{40}K/K = 1.167 \times 10^{-4}$ atom/atom

NM-88-1	NM-84-14	NM-84-13	Chama - El Rito (Plaza) 327
Sanidine, clast from roadcut, Petaca Road, 36˜29'N 106˜00'W	Biotite, clast from roadcut, US highway 64, 36˜40.2'N 106˜6.4'W	Groundmass feldspar concentrate, clast from roadcut, US highway 64, 36˜40.2'N 106˜06.4'W	Biotite, clast from Ojo Caliente Quadrangle, 36˜17.30'N 106˜2.58'W
3.147	7.408	5.104	7.253
3.110	7.408	5.098	7.295
3.118	7.278	5.164	7.316
3.164			7.308
3.096			7.342
			7.356
			7.383
			7.330
3.127	7.298	5.122	7.323
142.0	321.3	123.2	290.0
140.4	316.2	128.2	287.8
140.5	319.5	126.1	288.6
141.2	322.2		290.4
141.0	319.8	125.8	289.2
5.2	33.9	26.8	40.2
5.7	33.4	31.4	40.5
5.5	32.9	27.2	40.5
5.5	33.1		40.5
5.5	33.3	28.5	40.4
25.83±0.30	24.8±0.6	14.1±0.4	22.6±0.5

314	222	313	302
Biotite, clast from El Rito Quadrangle, 36°16.34'N 106°8.48'W	Biotite, clast from Lyden Quadrangle, 36°3.50'N 106°3.39'W	Biotite, clast from El Rito Quadrangle, 36°16.37'N 106°9.40'W	Groundmass, bomb from vent, Medanales Quadrangle, 36°14.20'N 106°11.50'W
6.860	7.211	7.370	0.4663
6.852	7.144	7.341	0.4660
6.816	7.117	7.350	0.4571
6.888	7.192	7.378	0.4567
6.866	7.149	7.365	0.4596
	7.196		
	7.122		
6.856	7.162	7.361	0.4611
269.5	272.3	277.5	12.20
268.4	272.3	277.0	12.40
268.3	272.6	278.2	12.37
268.3	272.4	280.1	12.06
266.8	272.5	279.4	12.25
268.3		278.4	
		280.3	
		279.0	
		279.0	
		277.9	
		278.4	
		279.0	
268.3	272.4	278.7	12.26
37.3	33.4	40.2	42.8
37.4	33.0	40.1	41.9
38.8	33.4	40.0	42.1
39.2	33.3	40.0	43.3
39.8	33.2	40.1	42.3
38.7		40.1	
		40.8	
		41.0	
		41.4	
		41.6	
		41.5	
		41.4	
		41.4	
40.7	33.3	40.7	42.5
22.4±0.5	21.8±0.5	21.7±0.5	15.27±0.39