References for Data Repository Item 2002128

Aubouin, J. and von Huene, R., 1982, Initial Reports of the Deep Sea Drilling Project , Volume 67: Washington, D.C., U.S., Government Printing Office, 799 p.

Balzer, V.G., 1999, The late Miocene history of sediment subduction and recycling as recorded in the Nicaraguan volcanic arc [M.S. thesis]: Lawrence, University of Kansas, 151 p.

Carr, M.J., and Rose, W.I., Jr., 1987, CENTAM—A data base of Central American volcanic rocks: Journal of Volcanology and Geothermal Research, v. 33, p. 239–240.

Johnson, M.C., and Plank, T., 1999, Dehydration and melting experiments constrain the fate of subducted sediments: Geochemistry Geophysics and Geosystems, v. 1, p. 1999GC000014.

Mayer, L., Pisias, N., and Janacek, T., 1992, Proceedings of the Ocean Drilling Program, Initial reports, Volume 138: College Station, Texas, Ocean Drilling Program, 855 p.

Nyström, J-O., Levi, B., Troeng, B., Ehrenborg, J., and Carranza, G., 1998, Geochemistry of volcanic rocks in a traverse through Nicaragua: San Jose, Costa Rica, Revista Geologica de America Central, v. 8, p. 77–109.

Patino, L.C., Carr, M.J., and Feigenson, M.D., 2000, Local and regional variations in Central American arc lavas controlled by variations in subducted sediment input: Contributions to Mineralogy and Petrology, v. 138, p. 265.

Plank, T., and Ludden, J.N., 1992, Geochemistry of sediments in the Argo Abyssal Plain at ODP Site 765: A continental margin reference section for sediment recycling in subduction zones, *in* Ludden, J.N., and Gradstein, F., et al., Proceedings of the Ocean Drilling Program, Scientific results, Volume 123: College Station, Texas, Ocean Drilling Program, p. 167–189.

Taylor, S.R., and McLennan, S.M., 1985, The continental crust: Its composition and evolution: Oxford, Blackwell, 312 p.

Table DR1: Chemical analyes of ODP 844 and 845 sediments

Leg138-		844B	844B	844B	844B	844B	844B	844B	844B	845A	845A	845A	845A	845A	845A	845A	845A
Core-sec		2H-1	3H-2	4H-4	6H-6	9H-1	14H-4	21X-6	30X-6	1H-1	3H-5	7H-4	10H-2	16H-3	18H-5	25X-5	31X-4
cm interval		46-47	00-102	56-57	02-104	66-67	00-102	00-102	45-150	30-32	40-42	96-98	01-103	10-112	00-102	00-102	70-72
Subunit #		IA	IA	IB	IB	IIA	IIA	IIB	IIB	IA	IA	IA	IB	IIA	IIB	IIB	IIC
Depth (mcd)		6.1	18.76	20.02	55.13	80.32	138.8	212.14	299.21	0.31	24.37	65.43	94.6	162.44	185.89	258.74	314.34
Depth (mbsf)		4.96	16.5	28.6	51.03	71.77	124	193.5	280.6	0.31	23.51	60.6	86.1	144.71	166.61	233.51	289.11
Age (Ma)		0.45	1.82	2.05	7.74	10.53	12.18	14.41	17.07	0.0103	0.9912	3.8708	5.7857	10.215	11.67	15.061	16.751
ICP-ES:																	
SiO2		40.77	54.28	57.84	62.68	53.75	6.22	34.06	31.38	48.41	56.18	55.72	46.81	30.11	12.95	10.29	10.76
TiO2		0.421	0.640	0.527	0.403	0.053	0.009	0.008	0.017	0.379	0.427	0.543	0.387	0.118	0.062	0.029	0.057
Al2O3		8.18	12.89	13.04	7.55	1.18	0.36	0.37	0.44	8.46	9.66	11.94	8.75	3.67	0.84	0.79	1.09
Fe2O3		5.82	6.98	5.17	3.10	0.86	0.22	0.16	0.53	6.52	6.15	6.89	7.49	7.39	2.57	3.11	3.47
MnO		0.246	0.201	0.225	0.210	0.114	0.056	0.053	0.181	0.321	0.302	0.653	1.023	1.209	0.274	0.262	1.207
MgO		3.06	3.53	2.50	2.06	0.93	0.32	0.34	0.57	3.73	3.61	3.65	4.00	2.36	1.00	1.08	2.11
CaO		12.98	1.49	2.53	4.24	19.11	50.67	33.68	36.65	3.72	3.03	1.57	7.07	26.30	43.19	44.88	43.61
NaO		5.17	6.38	4.99	5.93	3.79	1.31	1.84	1.83	8.77	6.38	5.81	6.31	3.83	2.02	1.44	1.13
K2O		1.16	1.67	2.44	1.51	0.45	0.21	0.19	0.21	1.55	1.42	1.76	1.36	0.85	0.35	0.36	0.24
P2O5		0.187	0.262	0.236	0.224	0.136	0.089	0.045	0.048	0.174	0.171	0.365	0.402	0.430	0.151	0.177	0.189
LOI		21.53	10.56	9.70	11.03	19.00	40.23	28.91	27.81	17.37	11.86	10.16	15.45	22.93	36.15	37.21	35.76
H20-		8.36	15.31	8.11	10.01	8.89	3.01	4.30	3.56	15.90	14.92	14.43	12.31	9.33	4.45	3.34	5.13
Sr		554	434	369	563	830	1605	1091	1211	361	372	346	556	1197	1753	1502	1299
Ba		4285	10671	7634	10269	5361	1428	2378	2159	5578	7766	9094	8915	6998	2637	2254	2430
shipboard:																	
CaCO3 %		19.5	0.1	2.2	5.9	28.1	90.3	74.3	68.6	5.08	4.25	0.67	10.92	47.84	75.59	79.09	76.59
Org. C %		0.9	0.4	0.3	0.2	0.5	na	na	na	2.27	0.94	0.35	0.64	0.52	na	na	na
ICP-MS:	iso																
Li	7	45.43	59.96	46.20	18.08	10.76	4.01	1.64	10.32	39.14	50.27	55.32	45.27	21.48	8.92	10.50	40.63
Be	9	1.068	1.551	1.515	1.545	0.767	0.149	0.446	0.335	1.204	1.387	1.780	1.726	1.459	0.380	0.474	0.402
Sc	45	20.67	25.30	19.98	13.96	7.02	1.57	2.38	2.49	24.25	23.83	25.30	19.89	9.06	3.03	2.79	4.77
V	51	316.8	132.9	97.9	69.4	48.6	11.3	9.0	14.7	166.5	222.8	101.1	242.6	35.2	58.8	26.1	34.2
Cr	52	41.80	67.79	40.49	16.10	6.30	1.27	2.19	3.75	35.13	39.00	60.00	36.14	9.48	6.46	5.26	3.13
Co	59	67.19	49.72	32.03	41.33	7.28	2.49	3.47	3.85	39.18	50.92	78.22	74.12	19.91	4.43	5.78	7.41
Ni	60	704.0	480.4	260.2	422.2	111.0	10.3	10.2	10.5	445.1	486.7	573.7	706.6	77.8	20.9	26.4	32.1
Cu	63	336.1	303.8	410.5	241.9	145.8	32.4	223.5	44.0	299.0	444.2	1017.6	1415.0	271.6	119.5	81.5	149.6
Zn	66	503.3	451.9	233.5	267.7	128.6	20.8	20.9	21.7	608.3	579.3	405.9	505.0	148.5	41.0	54.6	65.6
Ga	71	12.67	21.85	17.86	13.42	3.33	0.94	1.56	1.30	13.85	17.35	22.22	16.03	10.05	2.10	1.94	2.11
Rb	85	27.05	43.50	69.71	31.59	5.38	0.93	1.18	2.68	34.93	37.26	46.85	41.46	42.58	7.65	8.69	5.36
Sr	88	558	441	376	570	817	1580	1078	1201	366	379	352	560	1159	1749	1478	1281
Y	89	34.1	65.1	59.5	48.1	22.2	11.5	8.2	8.8	38.1	41.3	80.6	95.4	64.6	26.5	17.6	20.8
Zr	90	85.2	150.7	151.2	128.8	40.6	7.4	15.9	12.2	109.9	111.5	131.4	121.2	78.3	19.4	18.9	21.5
Nb	93	4.584	7.908	7.755	8.067	0.853	0.163	0.173	0.354	4.537	5.108	6.139	5.325	3.989	0.524	0.570	0.887
Cs	##	1.813	2.475	3.484	1.020	0.180	0.033	0.036	0.085	2.232	2.649	3.030	2.136	1.907	0.240	0.218	0.123
Ba	##	4256	10505	7506	10157	5453	1450	2407	2178	5498	7626	8948	8855	7236	2643	2291	2466
La	##	16.73	30.89	32.73	25.32	9.93	3.65	3.23	3.96	21.47	21.88	41.92	55.11	39.84	12.49	8.32	11.40
Ce	##	25.02	38.65	46.14	31.69	4.54	0.84	0.89	1.44	27.23	29.97	42.49	36.35	22.91	3.76	3.08	3.84
Pr	##	4.00	7.75	7.99	6.32	2.11	0.60	0.62	0.81	5.16	5.62	10.80	12.48	8.77	2.40	1.60	2.55
Nd	##	16.96	33.08	32.50	26.48	9.11	2.64	2.67	3.46	21.73	24.00	45.98	52.90	36.46	10.35	6.88	10.74
Sm	##	3.86	7.34	6.88	6.15	1.95	0.53	0.57	0.73	4.74	5.42	10.28	11.19	7.17	2.08	1.41	2.26
Eu	##	1.059	2.034	1.781	1.715	0.335	0.152	0.131	0.177	1.291	1.466	2.731	2.980	1.638	0.545	0.373	0.594
Gd	##	4.593	8.787	7.787	7.118	2.55	0.81	0.79	0.98	5.596	6.328	11.961	13.574	9.08	2.84	1.93	2.83
Tb	##	0.797	1.533	1.352	1.222	0.431	0.140	0.134	0.170	0.978	1.099	2.064	2.297	1.557	0.481	0.329	0.485
Dy	##	4.66	8.88	7.77	7.02	2.58	0.89	0.80	1.00	5.60	6.26	11.60	13.12	9.11	2.85	1.95	2.75
Ho	##	1.057	1.991	1.724	1.558	0.590	0.222	0.186	0.226	1.237	1.359	2.498	2.895	2.013	0.645	0.447	0.592
Er	##	3.12	5.78	5.00	4.48	1.72	0.68	0.54	0.65	3.56	3.84	7.09	8.16	5.73	1.86	1.31	1.67
Yb	##	3.12	5.71	4.89	4.25	1.64	0.65	0.52	0.62	3.59	3.74	6.73	7.40	5.17	1.68	1.24	1.53
Lu	##	0.516	0.932	0.793	0.676	0.276	0.112	0.088	0.100	0.590	0.605	1.087	1.176	0.819	0.262	0.198	0.237
Hf	##	1.714	2.756	3.250	2.506	0.498	0.105	0.166	0.165	1.872	1.994	2.318	1.997	1.504	0.261	0.246	0.374
Ta	##	0.228	0.403	0.454	0.407	0.047	0.009	0.007	0.018	0.223	0.255	0.303	0.255	0.292	0.028	0.023	0.048
Pb	##	8.10	14.58	15.08	11.89	2.91	0.74	0.58	1.31	17.78	16.12	33.34	13.65	19.34	2.55	6.06	8.51
Th	##	2.259	3.108	6.250	2.910	0.347	0.052	0.066	0.118	2.754	2.715	3.283	2.860	3.746	0.271	0.210	0.273
U	##	9.651	1.508	2.125	1.232	1.986	0.541	0.272	0.232	7.074	9.668	1.330	0.956	0.996	0.260	0.104	0.267

Samples taken from same interval as shipboard carbon/carbonate measurements (Mayer et al., 1992); na: no analysis; mcd: meters composite depth; mbsf: meters below seafloor; LOI: weight loss on ignition to 950°C; H2O-: weight loss to 105°C; all concentrations reported relative to dry (105°C) weight

Table DR2: Chemical analyses, locations and ages of Miocene volcanics from Nicaragua

Sample	CHD 2	CHD 3	TAM 2	LEO 18	LEO 25A	LEO 25B	TAM 1	LEO 8	LEO 9	TOR 1	LAR 1L	LAR 1M	LAR 2	ZAR 12	ZAR 1	ZAR 2	ZAR 3	ZAR 5	ZAR 7	ZAR 6	ZAR 8	ZAR 9	ZAR 11	CD 1	CD 2	CDC 2	CDC 3	LM 3B	LM 3A	LM 2A	LM 2B	LM 1	SJ 2	SJ 3	EC 136	LL 3	LL 4	EC 177	EC 179	LL 1	LL 6	LL 5	LL 2	SLU 2	SL 1	SL 2	SE 1	SE 2
Split	Ny	Ny		Ny	Ny	Ny		Ny	Ny																	Ny	Ny					Ny			Ny			Ny									
UTM E			538.9	506.7	537.8	537.8	538.9	538.6	539.4	530.4	544.9	544.9	544.7	557.5	561.1	561.1	562.2	570.3	577.1	574	578	582.5	582.3	594.5	595.8	602.8	602.9	599.2	599.2	600.5	600.5	602.5	610.4	610.4	616.9	622.1	622.4	622.2	622.2	618.4	641.5	647.5	620.5	649	644.4	647.7	666.5	672.3
UTM N			1341	1372.9	1342.6	1342.6	1341	1341.1	1340.5	1404	1405.1	1405.1	1405.7	1402.4	1400	1400.1	1400.1	1406.6	1410.7	1406.9	1410.6	1409.5	1408.1	1400.8	1401.6	1394.6	1394.6	1388.4	1388.4	1388.62	1388.62	1377.8	1361.9	1361.9	1365.6	1368	1369.3	1373.1	1373.2	1365.7	1367.7	1341.6	1366	1388.5	1368.7	1361.9	1341.6	1341.3
Age (Ma)			16.28									7.96			7.7						16.72 *																			8.87		11.23	10.16		15.95 *		17.58	
err			0.26									0.1			0.11						0.25																			0.21		0.24	0.26		0.46		0.26	
Age gr.	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I	II	II	II	II	II	II	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II	II	II	II
Region	Tam	Tam	Tam	Tam	Tam	Tam	Tam	Tam	Tam	Tam	Lar	Lar	Lar	Zar	Zar	Zar	Zar	Zar	Zar	Zar	Zar	Zar	Zar	CD-LM	CD-LM	CD-LM	CD-LM	CD-LM	CD-LM	CD-LM	CD-LM	CD-LM	CD-LM	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SJ-LL	SL	SL	SL	SL	SL
Dist. (km)	591	596	648	648	691	691	693	693	693	647	657	657	657	669	673	673	673	675	678	678	680	683	683	697	697	708	708	709	709	711	711	718	735	735	737	740	740	740	740	740	754	777	740	748	755	763	792	794
DCP-ES:																																																
SiO2	53.19	54.74	54.51	50.58	58.62	58.57	50.91	54.55	51.80	52.96	67.08	67.72	57.21	68.94	57.95	51.83	60.60	50.85	51.80	65.71	60.86	65.51	66.21	52.44	51.46	53.30	51.97	53.92	51.64	50.00	50.06	52.10	51.84	63.18	56.70	59.79	49.59	50.73	53.17	48.85	51.55	52.20	49.74	55.75	54.45	67.00	52.38	50.25
TiO2	1.11	1.18	1.50	1.38	1.15	1.26	1.30	1.50	1.06	1.71	0.58	0.55	0.75	0.81	0.90	0.95	1.11	0.85	1.10	0.85	0.85	0.82	0.85	0.87	1.13	0.81	0.81	1.44	1.05	1.08	0.84	0.99	0.92	0.62	0.92	0.73	1.03	1.02	1.00	0.74	1.02	0.82	0.87	0.89	1.02	0.56	0.82	0.97
Al2O3	16.32	16.41	15.54	16.43	14.52	14.75	17.28	15.11	18.70	17.29	16.59	16.59	18.23	15.09	19.13	20.20	15.96	18.72	19.10	15.86	17.97	16.15	15.62	19.98	18.86	16.56	20.34	17.29	17.92	19.70	23.32	17.73	17.83	17.84	18.17	17.51	18.41	17.82	16.68	15.77	19.27	17.84	16.86	18.73	18.16	16.08	19.76	18.25
FeO	10.32	10.29	11.83	12.14	10.41	9.90	11.55	11.98	10.40	9.05	4.05	3.89	7.30	4.24	6.85	9.21	7.60	9.58	8.38	4.60	5.56	4.73	4.73	9.06	10.45	9.08	8.22	11.29	9.33	10.87	7.73	9.42	8.84	5.07	8.00	6.88	11.00	10.04	9.51	9.54	9.12	8.75	9.29	7.75	9.42	3.84	8.20	9.59
MnO	0.18	0.19	0.21	0.20	0.23	0.25	0.21	0.24	0.20	0.13	0.09	0.06	0.15	0.05	0.17	0.17	0.15	0.19	0.19	0.10	0.12	0.11	0.10	0.18	0.30	0.17	0.16	0.19	0.17	0.18	0.14	0.19	0.23	0.15	0.17	0.14	0.20	0.20	0.17	0.18	0.21	0.17	0.17	0.18	0.19	0.11	0.15	0.18
MgO	5.53	4.51	4.12	5.73	3.16	3.32	5.52	4.24	4.17	4.92	1.31	0.63	3.96	0.48	2.27	3.24	2.60	5.73	2.63	1.27	1.95	1.45	1.35	3.25	3.97	6.87	4.79	3.31	5.95	3.84	2.72	6.38	6.18	1.42	2.53	3.16	5.73	5.54	5.70	10.25	3.71	5.74	8.82	3.58	4.08	1.43	4.32	5.99
CaO	9.75	8.72	8.47	10.28	7.45	7.89	10.12	8.23	10.22	9.09	4.07	3.76	8.11	2.82	6.97	10.74	6.92	10.79	12.67	3.99	6.00	4.12	3.85	10.78	9.71	9.68	10.35	7.87	9.88	10.40	11.92	9.26	10.33	4.93	8.28	6.91	10.37	10.84	9.50	12.05	11.24	10.52	10.72	8.30	8.46	4.00	10.59	11.61
Na2O	2.80	3.00	2.90	2.66	3.29	3.29	2.46	3.17	2.78	3.32	4.18	4.58	2.96	4.66	4.39	2.90	2.76	2.63	3.01	3.77	4.16	4.03	3.93	2.73	3.14	2.87	2.88	3.51	3.01	3.00	2.69	2.92	2.81	4.31	3.65	3.02	2.72	2.72	2.97	1.93	2.78	2.58	2.52	3.72	3.20	3.82	2.86	2.47
K2O	0.60	0.73	0.65	0.50	0.96	0.55	0.47	0.66	0.53	1.10	1.88	2.04	1.18	2.66	1.02	0.56	1.98	0.54	0.78	3.55	2.17	2.77	3.03	0.58	0.71	0.49	0.40	0.80	0.74	0.69	0.42	0.68	0.72	2.24	1.25	1.67	0.75	0.77	0.84	0.52	0.86	1.18	0.72	0.72	0.83	2.98	0.71	0.49
P2O5	0.19	0.23	0.26	0.08	0.22	0.22	0.20	0.33	0.13	0.43	0.17	0.16	0.15	0.24	0.34	0.21	0.31	0.12	0.35	0.29	0.37	0.30	0.32	0.13	0.27	0.17	0.10	0.37	0.30	0.24	0.16	0.33	0.29	0.25	0.33	0.18	0.19	0.32	0.47	0.17	0.25	0.19	0.28	0.39	0.20	0.20	0.20	0.19
LOI	0.59	0.86	0.11	1.41	0.45	1.00	1.49	0.75	0.49	0.99	1.38	1.19	1.97	1.30	1.45	1.37	2.42	1.44	7.03	2.14	1.28	2.06	3.47	1.15	1.02	0.54	0.52	2.39	0.72	0.92	0.73	0.48	0.89	1.13	0.65	1.79	1.15	0.93	0.85	1.70	1.06	0.29	1.48	1.43	1.16	5.02	1.16	2.99
ICP-MS:																																																
Li	9.32	10.02	13.97	8.03	23.59	7.02	8.32	12.09	5.83		4.54			15.07	6.75				21.81	27.07		27.75	24.66	6.43										9.88	6.26	5.32				5.04				4.35	4.16	6.85	5.33
Be	0.53	0.64	0.80	0.65	0.74	0.81	0.67	0.80	0.51		1.19			1.42	1.06				0.76	1.47		1.42	1.49	0.65										1.30	0.79	0.83				0.52				1.14	0.72	1.26	0.66
Sc	39.82	36.67	42.46	42.04	38.93	39.95	40.89	43.24	36.19	20.35	14.70	14.24	28.85	18.36	23.43	30.22	27.98	34.30	24.42	15.45	19.21	15.16	16.05	33.46	31.40	31.84	26.46	33.23	28.73	30.55	23.20	32.16	33.60	12.55	27.81	23.71	35.17	34.86	31.61	39.93	33.15	36.56	31.94	20.41	35.66	11.07	30.62	35.36
V	365.37	380.23	355.81	406.52	276.35	287.00	398.29	356.23	357.79	249.44	96.32	76.88	227.30	40.67	130.92	174.54	193.31	301.04	211.65	72.79	108.35	85.11	69.41	304.86	294.78	232.31	227.10	270.75	221.89	335.49	232.37	237.16	255.63	122.06	227.27	192.52	357.45	296.29	236.10	268.74	294.97	267.00	241.54	178.18	302.96	74.79	252.63	288.41
Cr	53.99	10.81	2.26	69.33	1.10	0.63	69.00	2.70	20.34	78.71	1.76		9.80	0.93	1.50	33.72	8.23	35.48	26.66	1.37	0.62	1.55	0.84	28.14	10.24	310.65	63.33	2.88	173.39	7.40	4.20	180.65	301.53	2.23	2.08	15.90	15.53	162.72	169.56	391.30	16.76	110.81	315.80	2.22	13.93	4.63	45.43	50.81
Co	34.22	31.60	34.24	38.53	25.52	26.45	37.84	32.88	31.00	30.50	7.83	6.40	23.75	3.79	13.50	24.22	15.16	35.16	23.03	7.16	11.55	7.69	6.91	31.25	35.34	36.72	32.23	23.23	34.14	31.48	21.69	36.73	37.48	12.85	20.39	20.01	36.21	43.33	30.56	44.46	27.12	34.18	39.77	21.18	28.54	7.24	27.32	33.15
Ni	21.71	13.02	8.39	30.85	2.34	2.04	30.60	7.29	12.93	36.35	2.96	0.55	25.30	0.47	2.97	14.16	13.45	28.30	16.15	2.25	15.33	2.48	1.88	14.81	13.53	98.20	53.09	9.30	80.92	27.70	10.09	73.97	74.41	4.43	3.00	10.69	26.37	76.38	73.56	109.62	26.69	40.96	95.54	3.91	10.48	3.35	36.35	26.86
Cu	231.56	344.49	266.34	353.37	178.83	174.10	294.18	269.79	202.42	149.89	30.96	31.66	118.13	10.75	14.62	144.00	69.75	152.67	65.36	25.65	36.28	19.53	18.99	156.55	156.69	102.50	100.91	189.66	101.70	175.30	102.06	110.31	109.13	45.86	129.83	88.13	219.94	151.43	116.04	120.73	201.60	134.91	135.01	59.44	95.76	27.05	66.53	130.75
Zn	96.55	101.94	124.18	110.80	119.78	124.51	110.66	122.80	96.34	127.04	65.65	55.66	76.32	90.50	85.56	72.34	107.55	80.40	79.27	69.13	63.42	71.67	71.33	78.60	92.32	79.21	65.46	118.26	86.83	78.00	61.30	98.09	82.22	67.11	84.83	75.08	91.52	79.83	82.12	71.63	88.67	87.22	80.99	84.25	92.78	59.82	80.41	76.93
Rb	10.31	11.72	6.07	8.33	7.26	4.95	6.75	4.06	5.10	6.29	48.63	43.14	20.05	57.18	16.66	11.66	41.81	7.37	16.46	90.08	49.13	64.97	71.53	13.39	13.71	6.47	4.54	16.53	9.96	11.76	7.92	8.55	8.41	48.64	20.86	39.80	21.64	10.88	9.77	9.36	16.04	26.73	12.04	23.88	48.95	62.06	11.28	3.85
Sr	370.03	377.09	312.32	332.04	323.62	369.35	332.95	305.62	355.93	1233.85	331.83	314.53	383.80	297.48	580.55	502.43	372.06	390.27	655.74	310.76	383.24	343.76	254.47	482.79	482.80	444.31	525.03	456.76	435.14	631.08	553.01	445.21	505.33	486.11	522.38	417.97	570.86	540.44	506.51	453.71	456.00	409.86	513.79	693.45	413.97	333.85	524.52	442.26
Y	23.75	27.72	39.55	30.94	34.15	37.38	29.50	39.72	21.96	13.18	40.10	41.29	22.91	63.77	30.52	23.41	34.38	15.15	24.40	41.72	31.93	46.47	41.10	21.06	55.29	25.85	21.42	35.96	22.55	22.31	16.49	24.78	24.84	26.47	25.13	24.74	18.50	18.75	24.03	14.34	24.10	20.42	17.95	27.01	25.61	23.30	19.57	16.19
Zr	65.06	85.69	99.84	81.85	91.14	93.86	77.25	102.60	53.01	56.50	168.88	165.90	76.70	234.19	90.73	58.93	140.48	48.38	104.84	246.42	165.25	238.87	249.56	53.78	71.14	46.05	43.56	99.01	91.24	53.11	38.65	89.24	65.84	161.71	87.10	112.72	41.67	50.10	78.28	38.49	73.29	76.85	56.95	120.00	92.31	168.70	57.41	49.99
Nb	0.97	1.77	1.64	1.62	1.46	1.50	1.50	1.62	0.91	3.18	3.26	3.35	1.49	4.39	2.21	1.45	3.25	0.93	2.51	5.48	4.18	5.27	5.57	1.20	2.74	1.60	1.53	3.81	4.28	2.03	1.45	3.72	2.44	3.14	2.00	2.32	0.99	1.77	3.14	1.24	3.07	2.85	2.46	3.38	2.25	3.89	1.63	1.63
Cs	0.37	0.20	0.06	0.61	0.06	0.64	0.38	0.05	0.09	0.19	1.98	1.16	1.39	1.69	0.45	0.38	3.07	0.08	1.70	2.15	1.31	0.63	1.63	0.45	0.42	0.26	0.18	0.71	0.24	0.40	0.23	0.22	0.18	0.76	0.52	1.64	0.19	0.31	0.15	0.06	0.60	0.78	0.26	1.54	0.82	0.49	0.07	0.49
Ba	477.63	515.40	387.12	297.03	433.43	478.35	285.04	421.80	272.92	661.20	1196.43	1293.25	619.32	1606.50	723.67	485.50	1020.42	266.47	470.91	1039.23	645.71	939.50	1066.93	579.77	1990.53	669.98	484.45	763.04	690.30	579.28	501.01	601.41	795.60	1447.14	877.84	997.51	267.38	706.92	546.36	249.19	595.19	717.22	414.94	488.05	383.58	1324.39	343.92	237.17
Ga	17.03	17.53	17.13	17.94	17.19	17.68	17.16	17.68	18.61		9.95			11.30	17.07				17.53	9.38		11.14	10.41	16.58										9.13	21.18	12.82				12.89				19.38	17.44	9.26	17.17
La	3.59	4.92	6.51	4.81	6.15	6.55	4.56	6.34	3.79	11.32	14.15	19.47	4.92	17.74	9.88	7.11	10.85	3.53	8.74	16.96	13.19	17.06	17.26	8.06	15.06	6.09	4.56	11.82	9.25	7.18	5.07	9.91	9.28	15.25	7.44	8.81	5.80	6.59	9.16	5.19	7.21	7.97	7.67	12.26	7.42	14.01	6.30	5.78
Ce	9.55	12.91	17.07	13.09	15.56	16.40	12.36	17.20	9.45	25.22	28.82	35.63	12.32	39.21	22.46	14.95	25.96	8.96	20.91	39.29	31.19	39.15	39.99	16.47	29.37	13.06	10.37	22.26	20.36	15.82	9.81	20.97	20.61	31.49	17.42	19.76	14.11	14.34	19.88	12.28	17.06	17.60	18.15	27.48	17.51	28.94	14.59	13.70
Pr	1.73	2.26	2.98	2.33	2.69	2.83	2.19	3.02	1.66	4.32	4.64	6.90	2.03	7.24	3.80	2.72	4.23	1.49	3.21	5.82	4.70	5.89	5.94	2.78	4.83	2.15	1.77	4.29	3.11	2.68	1.75	3.25	3.29	4.69	2.82	3.07	2.41	2.32	3.21	2.00	2.75	2.77	2.87	4.21	2.79	4.03	2.32	2.19
Nd	8.90	11.41	14.98	11.98	13.55	14.17	11.22	15.34	8.29	20.03	20.56	29.69	9.76	33.33	17.85	12.99	19.77	7.38	14.76	25.20	20.94	25.66	25.68	12.49	22.92	10.40	8.71	20.59	14.16	12.87	8.37	14.60	15.46	19.65	13.25	13.81	11.62	10.58	14.46	9.32	13.05	12.60	13.34	18.58	12.98	16.35	10.88	10.37
Sm	2.76	3.42	4.66	3.72	4.03	4.25	3.57	4.68	2.51	4.37	5.19	7.10	2.85	8.54	4.69	3.51	5.21	2.19	3.79	6.25	5.18	6.47	6.33	3.33	6.10	2.88	2.49	5.55	3.59	3.38	2.30	3.61	3.98	4.52	3.60	3.52	3.10	2.79	3.64	2.44	3.56	3.27	3.33	4.55	3.54	3.71	2.88	2.79
Eu	0.99	1.16	1.55	1.28	1.38	1.44	1.20	1.55	0.94	1.59	1.40	1.77	0.94	2.13	1.65	1.28	1.51	0.84	1.22	1.55	1.46	1.67	1.58	1.06	2.15	1.14	0.98	1.80	1.29	1.21	0.96	1.20	1.44	1.39	1.23	1.08	1.13	1.07	1.30	0.88	1.19	1.11	1.16	1.45	1.13	1.11	1.04	1.03
Gd	3.54	4.27	5.86	4.76	5.09	5.41	4.50	5.91	3.22	3.74	6.02	7.25	3.39	9.69	5.25	4.13	5.85	2.65	4.24	6.62	5.49	7.16	6.70	3.76	7.76	3.75	3.21	6.46	4.00	3.80	2.77	4.06	4.54	4.53	4.10	3.93	3.37	3.23	4.14	2.75	4.16	3.66	3.57	4.74	4.05	3.78	3.22	3.15
Tb	0.67	0.80	1.09	0.88	0.96	1.01	0.83	1.10	0.60	0.56	1.07	1.28	0.64	1.73	0.91	0.72	1.06	0.48	0.73	1.17	0.98	1.23	1.19	0.67	1.36	0.67	0.58	1.13	0.71	0.67	0.49	0.70	0.78	0.77	0.74	0.71	0.59	0.56	0.73	0.48	0.76	0.66	0.61	0.81	0.73	0.65	0.57	0.56
Dy	3.91	4.63	6.41	5.19	5.65	5.98	4.90	6.48	3.55	2.66	6.07	7.07	3.71	10.04	5.10	4.10	5.82	2.78	4.06	6.59	5.33	6.94	6.64	3.75	7.82	3.93	3.31	6.29	3.99	3.69	2.79	4.01	4.36	4.23	4.18	3.99	3.27	3.20	4.12	2.62	4.19	3.60	3.24	4.49	4.22	3.66	3.20	3.13
Ho	0.84	0.99	1.40	1.12	1.22	1.31	1.05	1.40	0.78	0.46	1.30	1.44	0.81	2.15	1.06	0.88	1.24	0.60	0.84	1.39	1.11	1.46	1.39	0.79	1.73	0.86	0.72	1.32	0.83	0.78	0.60	0.83	0.92	0.87	0.87	0.84	0.68	0.67	0.85	0.53	0.89	0.75	0.66	0.92	0.90	0.77	0.68	0.65
Er	2.40	2.83	3.94	3.18	3.48	3.72	3.00	3.97	2.23	1.19	3.76	4.11	2.28	6.22	2.96	2.46	3.47	1.65	2.32	3.93	3.10	4.05	3.90	2.16	4.91	2.44	2.03	3.68	2.32	2.17	1.70	2.36	2.56	2.49	2.47	2.40	1.88	1.86	2.43	1.45	2.49	2.10	1.80	2.57	2.54	2.24	1.90	1.82
Yb	2.34	2.77	3.79	3.06	3.41	3.62	2.90	3.83	2.18	0.95	3.91	4.05	2.32	6.20	2.84	2.36	3.40	1.60	2.16	3.88	3.02	3.81	3.86	2.09	4.46	2.33	1.87	3.46	2.19	2.02	1.60	2.25	2.45	2.54	2.45	2.42	1.79	1.77	2.36	1.36	2.45	2.05	1.72	2.57	2.50	2.41	1.84	1.75
Lu	0.37	0.44	0.61	0.48	0.54	0.58	0.46	0.61	0.34	0.15	0.65	0.65	0.37	0.98	0.45	0.37	0.54	0.25	0.34	0.62	0.47	0.61	0.62	0.33	0.73	0.37	0.30	0.54	0.34	0.32	0.25	0.36	0.39	0.42	0.38	0.39	0.28	0.28	0.38	0.21	0.39	0.32	0.27	0.40	0.39	0.39	0.29	0.27
Hf	1.92	2.49	2.86	2.39	2.65	2.73	2.20	2.93	1.53	1.77	4.15	4.33	2.27	6.44	2.43	1.72	4.10	1.44	2.77	6.21	4.48	6.01	6.24	1.52	2.03	1.31	1.23	2.75	2.36	1.63	1.18	2.24	1.78	3.91	2.34	3.03	1.32	1.30	1.95	1.12	2.14	2.17	1.56	2.88	2.52	4.03	1.58	1.48
Ta	0.07	0.12	0.11	0.11	0.11	0.11	0.10	0.11	0.06	0.20	0.23	0.22	0.10	0.30	0.14	0.10	0.20	0.07	0.18	0.38	0.28	0.36	0.38	0.08	0.18	0.11	0.10	0.24	0.26	0.12	0.10	0.22	0.15	0.21	0.13	0.17	0.06	0.12	0.18	0.08	0.19	0.18	0.14	0.22	0.16	0.29	0.11	0.11
Pb	2.90	3.28	3.44	3.29	3.66	4.05	2.78	3.72	2.27	3.72	6.70	5.66	3.57	8.68	2.30	2.40	6.42	2.24	4.51	9.15	6.72	8.22	10.40	2.75	3.12	2.17	1.86	4.20	3.16	2.72	1.94	3.62	2.95	5.64	3.17	5.22	1.97	2.15	2.84	1.65	3.40	3.16	2.79	4.24	3.03	8.12	2.02	2.05
Th	0.28	0.42	0.54	0.41	0.60	0.62	0.39	0.56	0.20	0.25	2.07	2.15	0.81	2.34	0.98	0.62	1.57	0.41	1.37	3.56	2.50	3.45	3.64	0.54	0.77	0.50	0.16	1.06	0.49	0.55	0.35	0.46	0.51	1.80	1.13	1.47	0.31	0.64	0.48	0.32	0.89	1.19	0.43	1.64	1.18	2.65	0.69	0.58
U	0.14	0.21	0.28	0.20	0.30	0.32	0.19	0.28	0.11	0.12	0.97	1.01	0.42	1.10	0.42	0.28	0.74	0.19	0.57	1.53	1.09	1.50	1.55	0.23	0.35	0.20	0.07	0.40	0.21	0.26	0.14	0.20	0.23	1.00	0.51	0.66	0.19	0.29	0.22	0.15	0.40	0.53	0.23	0.68	0.51	1.19	0.32	0.24
$^{87}Sr/^{86}Sr$												0.703785			0.703796																0.703641								0.703793					0.703604			

Oxides (wt%); Elements (ppm). Ny = Splits from Nystrom et al. (1988); Ar-Ar total fusion groundmass ages, Lehigh Univ. Age group I – 6-13 Ma, II – 16-24 Ma; (*) = step heating Ar-Ar ages. Regions: Tamarindo, Larreynaga, Zarzales, Ciudad Dairo-Laguna Mayna, San Jacinto- Las Lajas, San Lorenzo, San Esteban, Juigalpa, El Rama. Major elements by DCP-ES at Rutgers University; and ICP-ES at the University of Kansas for Ny splits. All Fe calculated as FeO, and major elements summed to 100%. Trace elements by ICP-MS at University of Kansas. ICP-MS precission is better than 3% based on replicate analyses of a basalt standard (MAR) over the course of this project. Analytical procedures followed those in Johnson and Plank (1999) and Balzer (1999).

Table DR3. Bulk sediment calculations

	Hemi-1	Carb-1	Carb-2	Carb-3	Bulk-2.5	Bulk-12
Thick (m)					464	454
dens(g/cc)	1.37	1.72	1.92	1.54	1.64	1.69
SiO2	55.00	13.60	4.25	29.67	19.58	15.54
TiO2	0.592	0.030	0.021	0.344	0.135	0.101
Al2O3	12.36	0.880	0.160	7.19	2.92	2.21
Fe2O3	6.21	3.14	1.97	5.02	3.49	3.35
MnO	0.146	0.610	0.230	0.434	0.444	0.495
MgO	2.26	0.980	0.781	1.71	1.18	1.11
CaO	2.99	41.3	52.2	27.6	36.2	40.2
NaO	2.10	0.430	0.196	1.06	0.700	0.532
K2O	1.82	0.260	0.169	1.02	0.539	0.419
P2O5	0.126	0.153	0.130	0.157	0.143	0.150
LOI	16.4	38.6	40.0	25.9	34.7	35.9
H20-	61	44	31	52	46	44
CaCO3 %	0.0	73.8	90.9	45.9	63.2	70.6
Sc	14.8	3.67	2.20	9.98	5.49	4.86
V	117	74.5	48.7	118	77.4	79.5
Cr	35.1	11.5	17.5	29.0	17.2	16.7
Co	58.1	6.60	4.15	14.4	15.9	7.95
Ni	181	39.9	26.1	38.5	63.9	36.9
Cu	152	139	61.9	121	126	120
Zn	227	69.7	31.0	75.8	91.7	63.6
Rb	39.7	6.40	4.54	35.0	12.4	12.7
Sr	332	1290	1523	926	1155	1250
Y	27.7	27.1	12.8	25.8	24.3	24.0
Zr	138	19.4	3.52	62.9	38.8	26.5
Nb	3.92	0.878	0.249	4.432	1.329	1.586
Cs	2.25	0.257	0.155	2.811	0.616	0.834
Ba	3344	2785	1875	1988	2705	2422
La	20.7	14.2	7.4	16.7	14.0	13.5
Ce	28.3	5.13	1.43	19.89	8.79	7.86
Pr	4.80	2.60	1.40	3.65	2.77	2.61
Nd	18.3	10.1	5.2	14.0	10.7	10.1
Sm	4.12	2.48	1.08	3.11	2.50	2.35
Eu	1.07	0.492	0.250	0.705	0.553	0.495
Gd	4.38	2.63	1.29	3.11	2.69	2.48
Tb	0.700	0.480	0.240	0.548	0.473	0.449
Dy	4.49	3.16	1.61	3.42	3.10	2.92
Ho	1.00	0.670	0.365	0.739	0.670	0.627
Er	2.91	1.80	1.05	2.03	1.86	1.71
Yb	2.68	1.57	1.00	1.85	1.67	1.53
Lu	0.400	0.230	0.155	0.281	0.247	0.227
Hf	2.74	0.297	0.054	1.377	0.712	0.502
Ta	0.205	0.046	0.013	0.285	0.070	0.096
Pb	9.03	5.85	3.61	7.73	5.99	5.85
Th	2.94	0.381	0.088	2.893	0.809	0.911
U	5.47	0.159	0.169	0.766	1.174	0.303
87Sr/86Sr	0.70763	0.70866	0.70831	0.70840	0.70851	0.70824

Sedimentary column compositions calculated based on the section at Site 495, which consists of hydrothermal -oxide-carbonate (Carb-2), overlain by pelagic carbonate with opal (Carb-1), hemipelagic diatom ooze, and hemipelagic ooze with arc ash (Hemi-1). These same units are used to calculate the 2.5 Ma column (see below), but assuming 2.5 Ma (~27 m) more Carb-1 preceding the carbonate crash, and 2.5 Ma (~ 27 m) less of Hemi-1 immediately following the crash, based on accumulation rates in Aubouin et al. (1982). The top unit in the 12 Ma column (Carb-3) was assumed to be deposited prior to both the carbonate crash and the Costa Rica dome, but with Hemi-1 = average of top 5 samples (145 m) at Site 495 (Patino et al., 2000). Co calculated from Co/Fe, Zn from Zn/Cu, Ga from Ga/Al, Zr from Zr/Al, Hf from Hf/Zr, and Ta from Nb/Ta in 844 and 845 sediments (Table DR1).

Carb-1 = sample s24-7-19 in Patino et al. (2000), which has ~75% CaCO3, appropriate to the average for the unit. Other elements calculated as abo