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FIRST LU-HF, $\Delta 18O$ AND TRACE ELEMENTS IN ZIRCON SIGNATURES FROM THE STATHERIAN ESPINHAÇO ANOROGENIC PROVINCE (EASTERN BRAZIL): GEOTECTONIC IMPLICATIONS

Joana Reis Magalhães, Antonio Pedrosa-Soares, Ivo Dussin, Othmar Müntener, Marco Aurélio P. Pinheiro, Luiz Carlos da Silva, Luiz Guilherme Knauer, Anne-Sophie Bouvier, Lukas Baumgartner

REE zircon data for the ortho-amphibolite of the Alto Rio Guanhães region. Sample J02

Spot number	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
D_I_6.1	0.058	4.855	0.442	6.766	8.512	0.733	36.35	10.797	124.002	40.385	173.544	34.291	297.613	56.171
D_I_7.1	0.057	4.728	0.43	6.201	8.198	0.77	35.536	10.048	119.275	39.783	171.389	33.156	280.075	54.983
D_I_10.1	0.07	4.845	0.627	8.406	10.57	0.914	43.782	12.176	140.367	46.105	197.245	37.713	317.744	61.796
D_II_16.1	0.112	5.379	0.651	9.298	11.182	0.969	47.066	13.346	153.246	49.764	214.927	40.361	344.684	66.186
D_II_21.1	0.005	16.675	0.087	1.791	4.129	0.175	22.92	7.678	99.831	37.126	169.823	35.147	302.311	56.841
D_II_23.1	3.454	11.251	1.283	6.752	3.042	0.399	11.804	3.672	46.45	16.495	74.48	15.167	137.254	27.836
D_III_36.1	0.035	10.287	0.149	2.519	4.653	0.243	21.704	7.254	91.466	32.6	147.279	31.316	262.591	49.927
D_III_43.1	0.074	3.339	0.101	1.481	2.226	0.223	11.276	3.597	45.55	15.815	72.452	15.227	136.162	27.773
D_III_44.1	0.019	4.357	0.142	2.882	4.065	0.412	19.987	6.242	78.647	26.081	113.914	23.385	204.88	38.596
D_IV_48.1	0.006	7.804	0.04	0.79	1.613	0.117	10.497	3.75	48.447	18.195	86.343	18.254	163.547	31.129

REE zircon data for the meta-rhyolite of the Alto Rio Guanhães region. Sample J03

Spot number	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
D_I_4.1	0.013	7.418	0.077	1.448	2.834	0.287	17.101	5.017	63.626	22.047	100.696	20.188	175.232	34.248
D_I_11.1	0.949	19.375	0.563	7.7	13.126	0.456	60.322	17.827	214.738	71.98	302.91	57.74	479.403	88.403
D_I_13.1	3.573	24.959	1.336	7.741	5.128	0.452	18.228	5.857	74.395	27.344	122.509	25.762	223.482	43.255
D_II_18.1	0.017	9.508	0.114	1.877	3.626	0.231	18.385	5.941	73.951	26.143	115.517	23.15	202.217	37.568
D_II_19.1	0.092	20.363	0.487	8.448	13.594	0.593	60.017	19.568	216.466	76.465	337.068	62.349	526.318	95.775
D_II_20.2	0.032	13.925	0.45	8.099	12.742	0.589	56.218	16.508	191.102	64.774	272.03	52.086	430.36	78.48
D_III_32.1	0.542	10.559	0.308	2.055	2.876	0.273	13.955	4.402	59.817	20.375	87.426	19.028	177.724	28.443
D_III_31.1	0.012	10.682	0.073	1.122	2.837	0.197	16.274	5.571	71.768	24.925	105.681	22.487	197.521	35.616
D_III_35.1	0.011	7.946	0.245	3.68	6.197	0.466	38.009	10.441	125.203	41.508	179.802	35.751	350.381	64.647
D_IV_41.1	0.02	3.231	0.233	3.841	6.484	1.267	23.712	7.384	95.92	28.831	107.113	22.227	233.787	38.8
D_IV_48.1	0.159	10.102	0.26	3.133	6.281	0.562	23.452	9.605	129.93	32.763	144.607	31.932	273.493	34.101
D_V_51.1	0.024	7.065	0.3	4.848	9.503	1.109	41.268	11.577	143.257	47.481	189.285	35.709	340.071	59.686

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Lu-Hf isotopic data for the ortho-amphibolite of the Alto Rio Guanhões region. Sample J02

Spot number	U/Pb Age (Ma)	Sample (Present day ratios)				Sample Initial Ratios		TDM (Ga)
		$^{176}\text{Hf}/^{177}\text{Hf}$	$\pm 2\text{SE}$	$^{176}\text{Lu}/^{177}\text{Hf}$	$\pm 2\text{SE}$	$^{176}\text{Hf}/^{177}\text{Hf}$ (t)	$\epsilon\text{Hf}(t)$	
10.1	1718	0.281494	0.000057	0.001123	0.000010	0.281457	-8.25	2.44
13.1	1728	0.281485	0.000116	0.000981	0.000066	0.281453	-8.19	2.44
15.1	1723	0.281484	0.000089	0.000888	0.000063	0.281455	-8.23	2.44
16.1	1717	0.281554	0.000150	0.000909	0.000009	0.281524	-5.90	2.35
18.1	1723	0.281559	0.000169	0.001304	0.000056	0.281516	-6.04	2.36
25.1	1732	0.281524	0.000565	0.001007	0.000053	0.281491	-6.73	2.39
40.1	1726	0.281596	0.000316	0.000777	0.000011	0.281571	-4.05	2.28
42.1	1725	0.281500	0.000295	0.001071	0.000149	0.281465	-7.80	2.43
43.1	1718	0.281510	0.000165	0.001129	0.000073	0.281473	-7.69	2.42
48.1	1725	0.281484	0.000215	0.000767	0.000070	0.281459	-8.03	2.43
V 4.1	1725	0.281522	0.000131	0.001236	0.000053	0.281482	-7.23	2.41

Lu-Hf isotopic data for the meta-rhyolite of the Alto Rio Guanhões region. Sample J03

Spot number	U/Pb Age (Ma)	Sample (Present day ratios)				Sample Initial Ratios		TDM (Ga)
		$^{176}\text{Hf}/^{177}\text{Hf}$	$\pm 2\text{SE}$	$^{176}\text{Lu}/^{177}\text{Hf}$	$\pm 2\text{SE}$	$^{176}\text{Hf}/^{177}\text{Hf}$ (t)	$\epsilon\text{Hf}(t)$	
15.1	1754	0.281222	0.000074	0.000535	0.000007	0.281204	-16.42	2.77
18.1	1749	0.281235	0.000061	0.000929	0.000025	0.281204	-16.52	2.78
19.1	1744	0.281210	0.000072	0.000804	0.000023	0.281184	-17.37	2.80
21.1	1751	0.281242	0.000047	0.000699	0.000050	0.281218	-15.98	2.75
27.1	1748	0.281197	0.000055	0.000501	0.000005	0.281180	-17.41	2.80
38.1	1736	0.281204	0.000091	0.000635	0.000030	0.281183	-17.58	2.80
34.1	1744	0.281211	0.000082	0.000496	0.000007	0.281195	-16.97	2.78
41.1	1751	0.281263	0.000109	0.001236	0.000058	0.281222	-15.84	2.76
48.1	1749	0.281277	0.000102	0.000696	0.000020	0.281254	-14.77	2.70
V 5.1	1752	0.281270	0.000208	0.001287	0.000039	0.281227	-15.66	2.76
V 6.1	1753	0.281354	0.000077	0.001019	0.000024	0.281320	-12.32	2.62
V 7.1	1735	0.281324	0.000068	0.000757	0.000035	0.281299	-13.47	2.64
V 11.1	1739	0.281279	0.000076	0.000474	0.000006	0.281263	-14.66	2.69
V 13.1	1745	0.281349	0.000088	0.000947	0.000021	0.281318	-12.59	2.62
V 14.1	1760	0.281258	0.000119	0.000918	0.000034	0.281227	-15.45	2.74

SIMS $d^{18}\text{O}$ data for the analyzed zircon grains from the ortho-amphibolite sample (J02) and the meta-rhyolite (J03)

Spot number	$d^{18}\text{O}$ VSMOW	2SD
Ortho-amphibolite (J02)		
D_I_1.1	6.64	0.30
D_I_2.1	6.83	0.30
D_I_3.1	7.25	0.30
D_I_4.1	6.79	0.30
D_I_5.1	7.21	0.30
D_I_6.1	7.54	0.30
D_I_7.1	5.68	0.30
D_I_8.1	7.17	0.30
D_I_9.1	6.55	0.30
D_I_10.1	7.17	0.30
D_I_11.1	7.03	0.30
D_I_12.1	7.00	0.30
D_I_13.1	7.02	0.30
D_I_14.1	6.99	0.30
D_I_15.1	7.01	0.30
D_II_16.1	7.42	0.30
D_II_17.1	7.49	0.30
D_II_18.1	5.56	0.30
D_II_19.1	6.50	0.30
D_II_21.1	7.17	0.30
D_II_24.1	6.59	0.30
D_II_27.1	6.55	0.30
D_III_31.1	7.56	0.30
D_III_34.1	7.42	0.30
D_III_41.1	7.37	0.30
D_IV_43.1	7.87	0.30
D_IV_44.1	6.83	0.30
D_IV_46.1	7.64	0.30
D_IV_54.1	7.19	0.30
V_I_3.1	7.37	0.30
V_I_5.1	7.46	0.30

Spot number	$d^{18}\text{O}$ VSMO	2SD
Meta-rhyolite (J03)		
D_I_1.1	7.06	0.30
D_I_4.1	7.41	0.30
D_I_7.1	6.96	0.30
D_I_11.1	7.55	0.30
D_I_12.1	7.47	0.30
D_I_13.1	7.43	0.30
D_I_14.1	6.91	0.30
D_I_15.1	7.31	0.30
D_I_15.1	7.28	0.30
D_I_16.1	7.12	0.30
D_II_18.1	7.66	0.30
D_II_19.1	6.92	0.30
D_II_20.2	7.13	0.30
D_II_23.1	7.29	0.30
D_II_24.1	7.59	0.30
D_II_27.1	7.82	0.30
D_II_28.1	7.85	0.30
D_II_29.1	7.81	0.30
D_III_30.1	7.53	0.30
D_III_31.1	6.77	0.30
D_III_32.1	7.53	0.30
D_III_34.1	7.63	0.30
D_III_35.1	7.52	0.30
D_III_36.1	7.01	0.30
D_III_37.1	7.68	0.30
D_III_38.1	7.55	0.30
D_IV_41.1	7.46	0.30
D_IV_42.1	7.28	0.30
D_IV_43.1	7.63	0.30
D_IV_47.1	7.45	0.30
D_IV_48.1	7.74	0.30
D_V_49.1	7.21	0.30
D_V_50.1	7.43	0.30
D_V_51.1	7.17	0.30
D_V_53.1	7.14	0.30
D_VI_55.1	7.25	0.30
D_VI_56.1	7.79	0.30
D_VI_57.1	7.36	0.30
D_VI_58.1	7.30	0.30
D_VI_59.1	7.76	0.30
D_VI_60.1	7.53	0.30
V_I_2.1	7.98	0.30

Spot number	$d^{18}\text{O}$ VSMO	2SD
Meta-rhyolite (J03)		
V_I_4.1	7.76	0.30
V_I_7.1	7.89	0.30
V_I_8.1	7.91	0.30
V_II_10.1	7.70	0.30
V_II_12.1	7.68	0.30
V_II_13.1	7.60	0.30
V_II_14.1	7.65	0.30
V_II_15.1	7.71	0.30
V_II_16.1	7.67	0.30