

GSA Data Repository Item 2020124

Shellnutt, J.G., et al., 2020, Magmatic duration of the Emeishan large igneous province: Insight from northern Vietnam: *Geology*, v. 48, <https://doi.org/10.1130/G47076.1>

METHODS

Zircon crystals were separated using magnetic and heavy liquid mineral-separation techniques. Several clear, euhedral zircons for each sample were isolated, and pre-treated according to the chemical-abrasion method of Mattinson (2005). Selected zircons were cleaned with concentrated distilled HNO₃ and HCl, and were sufficiently small that chemical-separation methods were not employed. For ID-TIMS analysis, the samples were spiked with an in-house ²⁰⁵Pb-²³⁵U tracer solution.

Dissolution and equilibration of spiked single crystals was by vapour transfer of HF, using Teflon microcapsules in a Parr pressure vessel placed in a 220°C oven for six days. The resulting residue was re-dissolved in HCl and H₃PO₄ and placed on an outgassed, zone-refined rhenium single filament with 5 µL of silicic acid gel. U–Pb isotope analyses were carried out at the John de Laeter Centre for Isotope Research at Curtin University using a Thermo Triton mass spectrometer, in peak-jumping mode using a secondary electron multiplier. Uranium was measured as an oxide (UO₂). Fractionation and deadtime were monitored using SRM981 and SRM982. Mass fractionation was 0.03 ± 0.06 ‰/amu. Data were reduced and plotted using the software packages Tripoli (from CIRDLES.org) and Isoplot 4.15 (Ludwig, 2011). All uncertainties are reported at 2σ, and do not include tracer-calibration uncertainties. Decay constants are from Jaffey et al. (1971)

and the weights of the zircon crystals were calculated from measurements of photomicrographs and estimates of the third dimension.

SUPPLEMENTARY FIGURES

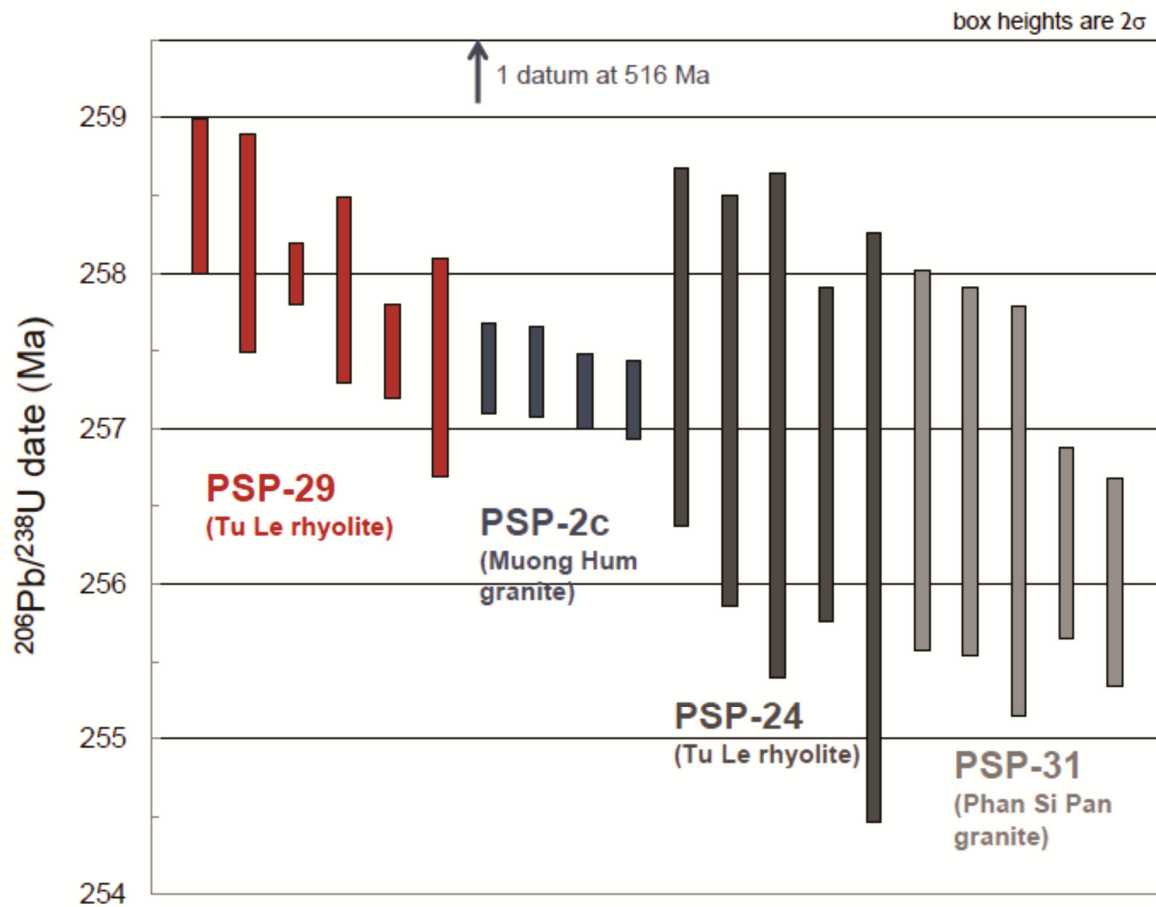


Figure DR1. Ranked age plot for single zircon U/Pb analyses for PSP-29 (Tu Le rhyolite), PSP-2c (Muong Hum granite), PSP-24 (Tu Le rhyolite), and PSP-31 (Phan Si Pan granite). There is one inherited zircon (515.6 ± 0.5 Ma) in sample PSP-2c.

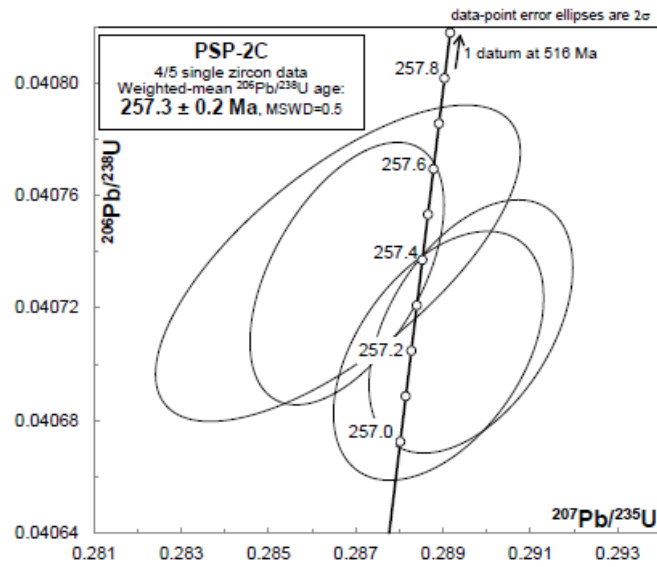


Figure DR2. Concordia plot of zircon ages from sample PSP-2c (Muong Hum granite).

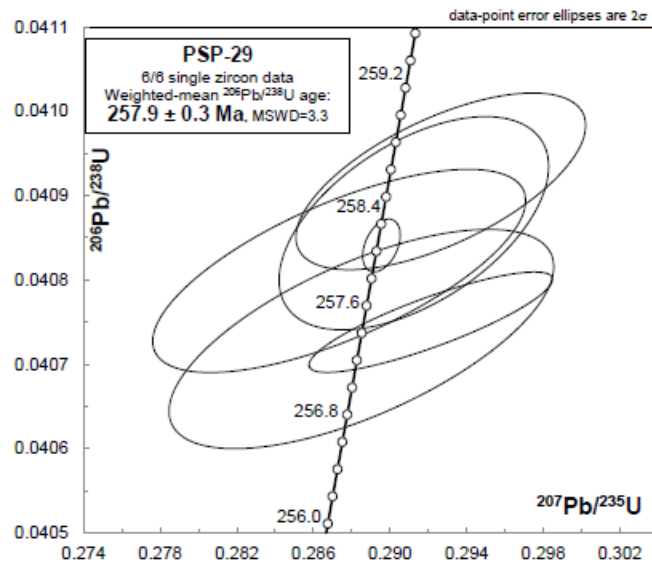


Figure DR3. Concordia plot of zircon ages from sample PSP-29 (Tu Le rhyolite).

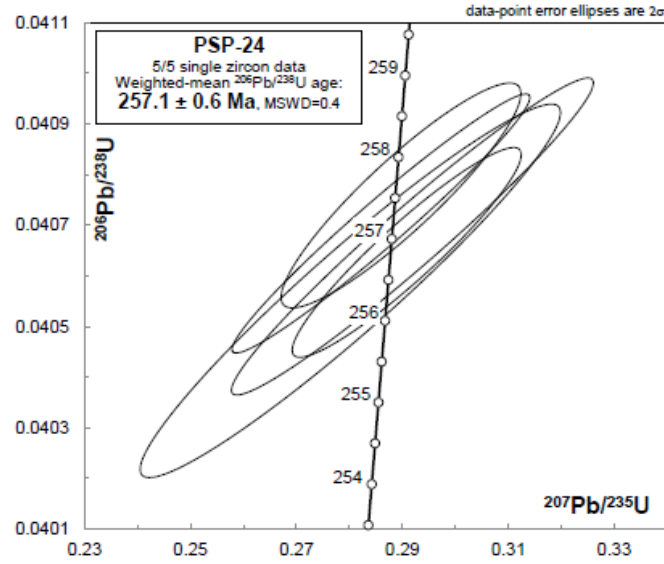


Figure DR4. Concordia plot of zircon ages from sample PSP-24 (Tu Le rhyolite).

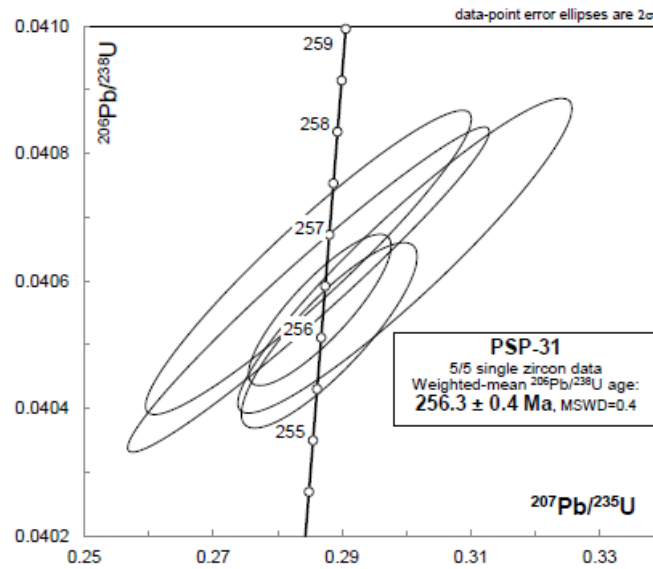


Figure DR5. Concordia plot of zircon ages from sample PSP-31 (Phan Si Pan granite).

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TABLE DR1. RESULTS OF ZIRCON CA-ID TIMS DATING OF ROCKS FROM THE TU LE-PHAN SI PAN REGION, NORTHERN VIETNAM.

Fraction	wt. (μg)	U (ppm)	Pb _c (pg)	mol% Pb*	Th U	²⁰⁶ Pb ²⁰⁴ Pb	²⁰⁷ Pb ²⁰⁶ Pb	± (%)	²⁰⁷ Pb ²³⁵ U	± (%)	²⁰⁶ Pb ²³⁸ U	± (%)	ρ	²⁰⁶ Pb/ ²³⁸ U Age (Ma)	± (Ma)	²⁰⁷ Pb/ ²⁰⁶ Pb Age (Ma)	± (Ma)
PSP-2c: 1 zircon per fraction (22° 21' 37.5" N, 103° 46' 40.8" E)																	
1	0.2	102	0.2	97	0.55	194	0.05159	0.71	0.2896	0.76	0.040713	0.09	.51	257.25	0.24	267	16.4
2	0.4	197	0.4	91	0.64	474	0.05107	1.12	0.2868	1.20	0.040732	0.11	.71	257.37	0.29	244	25.9
3	0.3	262	0.4	90	0.64	477	0.05102	1.12	0.2866	1.19	0.040736	0.11	.70	257.39	0.29	242	25.7
4	0.1	210	0.3	92	0.68	171	0.05148	0.84	0.2889	0.90	0.040703	0.10	.58	257.19	0.25	262	19.4
5	0.2	65	0.3	91	0.76	222	0.05741	0.57	0.6591	0.61	0.083270	0.10	.48	515.61	0.50	507	12.5
PSP-29: 1 zircon per fraction (21° 52' 28.8" N, 103° 53' 45.6" E)																	
1	0.2	47	0.6	41	0.52	54	0.05137	2.68	0.2885	2.85	0.04073	0.26	.66	257.4	0.7	257.3	61.6
2	0.4	173	2.6	55	0.87	84	0.05199	1.68	0.2921	1.78	0.04075	0.12	.85	257.5	0.3	284.9	38.4
3	0.3	36	0.5	53	1.02	66	0.05106	2.61	0.2873	2.77	0.04081	0.24	.69	257.9	0.6	243.6	60.1
4	0.4	235	0.4	91	1.00	468	0.05142	0.26	0.2896	0.28	0.04084	0.06	.40	258.0	0.2	259.7	5.9
5	0.2	42	0.3	52	0.64	66	0.05168	1.85	0.2912	1.97	0.04087	0.25	.53	258.2	0.7	271.4	42.5
6	0.2	57	0.4	55	0.84	73	0.05187	1.99	0.2927	2.11	0.04092	0.21	.63	258.5	0.5	279.7	45.5
PSP-24: 1 zircon per fraction (22° 2' 24.2" N, 103° 57' 9.2" E)																	
1	0.2	132	0.2	87	0.43	91	0.05204	8.96	0.2919	9.57	0.040678	0.63	.97	257.03	1.62	287	204.8
2	0.2	122	0.2	77	0.41	57	0.05008	10.9	0.2802	11.58	0.040570	0.74	.96	256.37	1.90	199	252.5
3	0.2	142	0.3	84	0.49	80	0.05155	5.98	0.2898	6.39	0.040759	0.45	.91	257.53	1.15	266	137.3
4	0.3	146	0.2	98	0.74	166	0.05189	5.69	0.2908	6.08	0.040646	0.42	.93	256.84	1.07	281	130.2
5	0.3	124	0.2	87	0.58	84	0.05095	7.54	0.2860	8.04	0.040703	0.51	.97	257.19	1.32	239	173.9
PSP-31: 1 zircon per fraction (22° 18' 12.2" N, 103° 46' 31.1" E)																	
1	0.2	189	0.4	93	0.65	114	0.05349	6.60	0.2997	7.07	0.040640	0.47	.98	256.80	1.22	350	149.3
2	0.2	180	0.2	99	0.74	212	0.05155	3.62	0.2880	3.87	0.040515	0.26	.94	256.02	0.67	266	83.1
3	0.4	178	0.3	98	0.48	282	0.05124	2.95	0.2865	3.15	0.040555	0.24	.84	256.27	0.61	252	68.0
4	0.3	155	0.3	93	0.40	144	0.05031	6.88	0.2819	7.33	0.040629	0.46	.98	256.73	1.18	209	159.4
5	0.2	136	0.2	87	0.58	84	0.05089	7.55	0.2851	8.04	0.040587	0.51	.97	256.47	1.32	236	174.2

U-Pb isotopic data for zircons from samples from Vietnamese granites.

Sample weights are calculated from crystal dimensions and are associated with as much as 50% uncertainty (estimated)

Pb_c = Total common Pb including analytical blank (0.8 ± 0.3 pg per analysis). Blank composition is: $^{206}\text{Pb}/^{204}\text{Pb} = 18.55 \pm 0.63$, $^{207}\text{Pb}/^{204}\text{Pb} = 15.50 \pm 0.55$, $^{208}\text{Pb}/^{204}\text{Pb} = 38.07 \pm 1.56$ (all 2σ), and a $^{206}\text{Pb}/^{204}\text{Pb} - ^{207}\text{Pb}/^{204}\text{Pb}$ correlation of 0.9.

Th/U calculated from radiogenic $^{208}\text{Pb}/^{206}\text{Pb}$ and age.

Measured isotopic ratios corrected for tracer contribution and mass fractionation (0.04 ± 0.09 ‰/amu).

ρ = error correlation coefficient of radiogenic $^{207}\text{Pb}/^{235}\text{U}$ vs. $^{206}\text{Pb}/^{238}\text{U}$.

All uncertainties given at 2σ