

Table A1 Zircon U–Pb analytical data.

sample name grain No.	Th U	Isotopic ratios						Age (Ma)				Remarks
		$\frac{^{207}\text{Pb}}{^{206}\text{Pb}}$	Error 2 $\sigma$	$\frac{^{206}\text{Pb}}{^{238}\text{U}}$	Error 2 $\sigma$	$\frac{^{207}\text{Pb}}{^{235}\text{U}}$	Error 2 $\sigma$	$\frac{^{206}\text{Pb}}{^{238}\text{U}}$	Error 2 $\sigma$	$\frac{^{207}\text{Pb}}{^{235}\text{U}}$	Error 2 $\sigma$	
<b>150516-5 from the Katsurabuchi Formation</b>												
No.1	0.55	0.0490 ± 0.0046	0.01782 ± 0.000554	0.1204 ± 0.0117	113.85	3.57	115.41 ± 11.84	Detrital				
No.2	0.29	0.0458 ± 0.0082	0.01093 ± 0.000488	0.0690 ± 0.0126	70.08	3.14	67.80 ± 12.76	Detrital				
No.3	0.58	0.0468 ± 0.0085	0.00503 ± 0.000229	0.0325 ± 0.0059	32.37	1.47	32.46 ± 5.98	Detrital				
No.4	0.53	0.0368 ± 0.0178	0.00375 ± 0.000358	0.0190 ± 0.0092	24.14	2.30	19.15 ± 9.30					
No.5	0.68	0.0425 ± 0.0111	0.00354 ± 0.000205	0.0207 ± 0.0054	22.76	1.32	20.84 ± 5.43					
No.6	0.72	0.0634 ± 0.0249	0.00310 ± 0.000308	0.0271 ± 0.0105	19.94	1.98	27.13 ± 10.62					
No.7	0.91	0.0452 ± 0.0173	0.00324 ± 0.000271	0.0202 ± 0.0077	20.86	1.75	20.30 ± 7.75					
No.8	0.31	0.0443 ± 0.0071	0.00416 ± 0.000170	0.0254 ± 0.0040	26.75	1.09	25.46 ± 4.10	Detrital				
No.9	0.56	0.0496 ± 0.0128	0.00350 ± 0.000214	0.0239 ± 0.0061	22.52	1.38	24.02 ± 6.19					
No.10	0.67	0.0467 ± 0.0145	0.00299 ± 0.000210	0.0193 ± 0.0059	19.23	1.35	19.37 ± 5.99					
No.11	0.81	0.0455 ± 0.0139	0.00337 ± 0.000231	0.0212 ± 0.0064	21.71	1.49	21.29 ± 6.49					
No.12	0.88	0.0432 ± 0.0079	0.00357 ± 0.000158	0.0213 ± 0.0038	22.96	1.02	21.36 ± 3.89	Excluded from mean				
No.13	0.64	0.0521 ± 0.0129	0.00375 ± 0.000226	0.0270 ± 0.0066	24.13	1.46	27.02 ± 6.72	Excluded from mean				
No.14	0.99	0.0491 ± 0.0091	0.00347 ± 0.000161	0.0235 ± 0.0043	22.32	1.04	23.58 ± 4.35					
No.15	0.94	0.0482 ± 0.0100	0.00350 ± 0.000178	0.0233 ± 0.0048	22.55	1.15	23.39 ± 4.86					
No.16	0.76	0.0484 ± 0.0204	0.00306 ± 0.000288	0.0204 ± 0.0085	19.72	1.86	20.55 ± 8.64					
No.17	0.72	0.0698 ± 0.0270	0.00320 ± 0.000327	0.0308 ± 0.0118	20.60	2.11	30.80 ± 11.94					
No.18	0.68	0.0425 ± 0.0106	0.00354 ± 0.000197	0.0207 ± 0.0051	22.77	1.27	20.85 ± 5.20					
No.19	0.82	0.0544 ± 0.0214	0.00310 ± 0.000287	0.0232 ± 0.0091	19.93	1.85	23.31 ± 9.15					
No.20	0.67	0.0343 ± 0.0098	0.00359 ± 0.000206	0.0170 ± 0.0048	23.09	1.32	17.11 ± 4.88					
No.21	0.68	0.0487 ± 0.0105	0.00337 ± 0.000175	0.0226 ± 0.0049	21.71	1.13	22.73 ± 4.92					
No.22	0.84	0.2033 ± 0.0349	0.00433 ± 0.000314	0.1215 ± 0.0208	27.87	2.03	116.43 ± 20.94	Discordant				
No.23	0.66	0.0503 ± 0.0133	0.00344 ± 0.000215	0.0239 ± 0.0063	22.14	1.39	23.94 ± 6.36					
No.24	1.02	0.0594 ± 0.0157	0.00342 ± 0.000229	0.0280 ± 0.0074	22.03	1.47	28.07 ± 7.44					
No.25	0.88	0.0529 ± 0.0101	0.00346 ± 0.000168	0.0253 ± 0.0048	22.28	1.08	25.32 ± 4.86					
No.26	0.68	0.0451 ± 0.0153	0.00345 ± 0.000257	0.0215 ± 0.0072	22.20	1.66	21.56 ± 7.32					
No.27	0.67	0.0444 ± 0.0108	0.00331 ± 0.000183	0.0202 ± 0.0049	21.28	1.18	20.34 ± 4.95					
No.28	0.71	0.0768 ± 0.0337	0.00331 ± 0.000398	0.0351 ± 0.0152	21.33	2.57	35.02 ± 15.36					
No.29	0.66	0.0531 ± 0.0164	0.00336 ± 0.000247	0.0246 ± 0.0076	21.60	1.59	24.67 ± 7.65					
No.30	0.83	0.0455 ± 0.0087	0.00362 ± 0.000167	0.0227 ± 0.0043	23.28	1.08	22.78 ± 4.40	Excluded from mean				
			<i>Weighted mean of the youngest group (n = 22)</i>		21.80	0.30	22.40 ± 1.33					
<b>170607-4 from the Hachiwari Formation</b>												
No.1	0.52	0.0439 ± 0.0033	0.002516 ± 0.000045	0.0152 ± 0.0011	16.20	0.29	15.36 ± 1.15					
No.2	0.62	0.0518 ± 0.0042	0.002563 ± 0.000053	0.0183 ± 0.0015	16.50	0.34	18.42 ± 1.50	Discordant				
No.3	0.41	0.0485 ± 0.0028	0.002477 ± 0.000036	0.0166 ± 0.0010	15.95	0.24	16.69 ± 0.96					
No.4	0.47	0.0442 ± 0.0036	0.002485 ± 0.000047	0.0152 ± 0.0012	16.00	0.30	15.28 ± 1.23					
No.5	0.45	0.0530 ± 0.0044	0.002485 ± 0.000052	0.0182 ± 0.0015	16.00	0.34	18.28 ± 1.51	Discordant				
No.6								No data				
No.7	0.49	0.0430 ± 0.0031	0.002594 ± 0.000044	0.0154 ± 0.0011	16.70	0.28	15.49 ± 1.12	Excluded from mean				
No.8	0.97	0.0481 ± 0.0020	0.002601 ± 0.000029	0.0173 ± 0.0007	16.74	0.19	17.37 ± 0.72	Excluded from mean				
No.9	0.57	0.0488 ± 0.0025	0.002595 ± 0.000035	0.0175 ± 0.0009	16.71	0.23	17.58 ± 0.92	Excluded from mean				
No.10	0.42	0.0486 ± 0.0030	0.002624 ± 0.000041	0.0176 ± 0.0011	16.89	0.26	17.69 ± 1.09	Excluded from mean				
No.11								No data				
No.12	0.58	0.0530 ± 0.0027	0.002451 ± 0.000034	0.0179 ± 0.0009	15.78	0.22	18.03 ± 0.94	Discordant				
No.13	0.50	0.0506 ± 0.0044	0.002480 ± 0.000060	0.0173 ± 0.0015	15.96	0.39	17.41 ± 1.48					
No.14	1.10	0.0474 ± 0.0021	0.002635 ± 0.000043	0.0172 ± 0.0007	16.96	0.28	17.33 ± 0.76	Excluded from mean				
No.15	0.61	0.0438 ± 0.0036	0.002560 ± 0.000057	0.0155 ± 0.0013	16.48	0.37	15.57 ± 1.27	Excluded from mean				
No.16	0.48	0.0439 ± 0.0030	0.002478 ± 0.000049	0.0150 ± 0.0010	15.95	0.32	15.14 ± 1.01					
No.17	0.57	0.0589 ± 0.0026	0.002941 ± 0.000050	0.0239 ± 0.0010	18.93	0.32	23.97 ± 1.03	Discordant				
No.18	0.57	0.0449 ± 0.0036	0.002562 ± 0.000056	0.0159 ± 0.0012	16.50	0.36	15.97 ± 1.25	Excluded from mean				
No.19	0.58	0.0486 ± 0.0027	0.002512 ± 0.000045	0.0168 ± 0.0009	16.18	0.29	16.97 ± 0.90					
No.20								No data				
No.21	0.49	0.0453 ± 0.0026	0.002567 ± 0.000047	0.0160 ± 0.0009	16.53	0.30	16.17 ± 0.90	Excluded from mean				
No.22								No data				
No.23								No data				
No.24	0.61	0.0472 ± 0.0046	0.002504 ± 0.000065	0.0163 ± 0.0016	16.12	0.42	16.41 ± 1.59					
No.25								No data				
No.26								No data				
No.27								No data				
No.28	0.65	0.0994 ± 0.0043	0.002786 ± 0.000052	0.0382 ± 0.0015	17.94	0.33	38.07 ± 1.56	Discordant				
No.29								No data				
No.30								No data				
No.31	0.71	0.0573 ± 0.0054	0.002467 ± 0.000066	0.0195 ± 0.0018	15.89	0.43	19.61 ± 1.81	Discordant				
No.32	0.77	0.0497 ± 0.0029	0.002505 ± 0.000047	0.0172 ± 0.0010	16.13	0.30	17.30 ± 0.98					
No.33	1.08	0.0458 ± 0.0057	0.002511 ± 0.000077	0.0158 ± 0.0019	16.17	0.50	15.97 ± 1.95					
No.34	0.61	0.0518 ± 0.0024	0.002543 ± 0.000043	0.0182 ± 0.0008	16.37	0.28	18.28 ± 0.82	Discordant				
No.35	0.30	0.0475 ± 0.0040	0.002423 ± 0.000056	0.0159 ± 0.0013	15.60	0.36	16.00 ± 1.33					
No.36	0.60	0.0496 ± 0.0022	0.002576 ± 0.000042	0.0176 ± 0.0007	16.58	0.27	17.74 ± 0.75	Discordant				
			<i>Weighted mean of the youngest group (n = 10)</i>		16.03	0.10	16.31 ± 0.37					

Table A1 Zircon U–Pb analytical data (continued).

sample name grain No.	Th U	Isotopic ratios						Age (Ma)				Remarks
		$\frac{^{207}\text{Pb}}{^{206}\text{Pb}}$	Error 2 $\sigma$	$\frac{^{206}\text{Pb}}{^{238}\text{U}}$	Error 2 $\sigma$	$\frac{^{207}\text{Pb}}{^{235}\text{U}}$	Error 2 $\sigma$	$\frac{^{206}\text{Pb}}{^{238}\text{U}}$	Error 2 $\sigma$	$\frac{^{207}\text{Pb}}{^{235}\text{U}}$	Error 2 $\sigma$	
<b>150516-2 from the Yamaya Formation</b>												
No.1	0.59	0.0455 ± 0.0129		0.00125 ± 0.000085		0.0079 ± 0.0022		8.07	0.55	7.94 ± 2.21		
No.2	0.40	0.0291 ± 0.0138		0.00128 ± 0.000112		0.0051 ± 0.0024		8.25	0.72	5.20 ± 2.44		
No.3	0.50	0.0430 ± 0.0094		0.00121 ± 0.000067		0.0072 ± 0.0015		7.78	0.43	7.24 ± 1.56		
No.4	0.40	0.0424 ± 0.0088		0.00116 ± 0.000062		0.0068 ± 0.0014		7.50	0.40	6.89 ± 1.40		
No.5	0.45	0.0501 ± 0.0091		0.00129 ± 0.000067		0.0089 ± 0.0016		8.33	0.43	9.04 ± 1.60		
No.6	0.42	0.0514 ± 0.0111		0.00125 ± 0.000073		0.0089 ± 0.0019		8.07	0.47	8.98 ± 1.90		
No.7	0.38	0.0625 ± 0.0147		0.00121 ± 0.000080		0.0105 ± 0.0024		7.82	0.52	10.57 ± 2.43		
No.8	0.38	0.0499 ± 0.0101		0.00114 ± 0.000063		0.0078 ± 0.0015		7.32	0.40	7.90 ± 1.56		
No.9	0.45	0.0480 ± 0.0123		0.00133 ± 0.000086		0.0088 ± 0.0022		8.59	0.55	8.92 ± 2.24		
No.10	0.44	0.0360 ± 0.0095		0.00118 ± 0.000070		0.0058 ± 0.0015		7.58	0.45	5.91 ± 1.54		
No.11	0.46	0.0386 ± 0.0086		0.00121 ± 0.000066		0.0064 ± 0.0014		7.79	0.43	6.52 ± 1.43		
No.12	0.40	0.0451 ± 0.0094		0.00125 ± 0.000069		0.0078 ± 0.0016		8.06	0.44	7.87 ± 1.61		
No.13	0.47	0.0409 ± 0.0168		0.00123 ± 0.000109		0.0069 ± 0.0028		7.94	0.70	7.03 ± 2.84		
No.14	0.61	0.0393 ± 0.0088		0.00127 ± 0.000070		0.0069 ± 0.0015		8.18	0.45	6.96 ± 1.52		
No.15	0.35	0.0435 ± 0.0230		0.00114 ± 0.000129		0.0068 ± 0.0035		7.32	0.83	6.90 ± 3.58		
No.16	0.54	0.0711 ± 0.0286		0.00119 ± 0.000128		0.0117 ± 0.0046		7.68	0.83	11.81 ± 4.61		
No.17	0.45	0.0573 ± 0.0213		0.00130 ± 0.000118		0.0103 ± 0.0037		8.37	0.76	10.38 ± 3.77		
No.18	0.47	0.0534 ± 0.0098		0.00129 ± 0.000063		0.0095 ± 0.0017		8.31	0.41	9.61 ± 1.69		
No.19	0.46	0.0538 ± 0.0096		0.00126 ± 0.000060		0.0094 ± 0.0016		8.14	0.39	9.47 ± 1.61		
No.20	0.37	0.0420 ± 0.0119		0.00129 ± 0.000081		0.0075 ± 0.0021		8.31	0.52	7.57 ± 2.09		
No.21	0.45	0.0449 ± 0.0085		0.00126 ± 0.000060		0.0078 ± 0.0014		8.14	0.39	7.91 ± 1.44		
No.22	0.48	0.0418 ± 0.0097		0.00123 ± 0.000066		0.0071 ± 0.0016		7.90	0.42	7.15 ± 1.61		
No.23	0.44	0.0441 ± 0.0110		0.00119 ± 0.000069		0.0072 ± 0.0018		7.68	0.44	7.33 ± 1.78		
No.24	0.40	0.0491 ± 0.0090		0.00122 ± 0.000058		0.0083 ± 0.0014		7.89	0.37	8.39 ± 1.47		
No.25	0.44	0.0466 ± 0.0173		0.00122 ± 0.000101		0.0078 ± 0.0028		7.83	0.65	7.90 ± 2.87		
No.26	0.44	0.0392 ± 0.0090		0.00120 ± 0.000063		0.0065 ± 0.0014		7.73	0.40	6.56 ± 1.47		
No.27	0.40	0.0450 ± 0.0097		0.00124 ± 0.000064		0.0077 ± 0.0016		7.98	0.41	7.77 ± 1.62		
No.28	0.52	0.0339 ± 0.0121		0.00121 ± 0.000085		0.0057 ± 0.0020		7.81	0.55	5.74 ± 2.01		
No.29	0.42	0.0341 ± 0.0169		0.00119 ± 0.000112		0.0056 ± 0.0027		7.65	0.72	5.65 ± 2.76		
No.30	0.52	0.0539 ± 0.0203		0.00130 ± 0.000117		0.0097 ± 0.0035		8.38	0.75	9.78 ± 3.60		
						<i>Weighted mean (n = 30)</i>		7.94	0.09	7.69 ± 0.34		
<b>150515-4 from the Yamaya Formation</b>												
No.1	0.57	0.0680 ± 0.0278		0.00131 ± 0.000137		0.0123 ± 0.0048		8.42	0.89	12.39 ± 4.86		
No.2	0.58	0.0152 ± 0.0267		0.00139 ± 0.000306		0.0029 ± 0.0051		8.92	1.98	2.95 ± 5.13		
No.3	0.79	0.0433 ± 0.0286		0.00119 ± 0.000167		0.0071 ± 0.0046		7.70	1.07	7.23 ± 4.67		
No.4	0.49	0.0301 ± 0.0243		0.00123 ± 0.000177		0.0051 ± 0.0041		7.92	1.14	5.17 ± 4.10		
No.5	0.58	0.0873 ± 0.0402		0.00124 ± 0.000162		0.0150 ± 0.0066		8.00	1.04	15.08 ± 6.67		
No.6	0.52	0.0432 ± 0.0295		0.00122 ± 0.000176		0.0073 ± 0.0049		7.88	1.13	7.38 ± 4.92		
No.7	0.57	0.0175 ± 0.0219		0.00107 ± 0.000183		0.0026 ± 0.0032		6.88	1.18	2.62 ± 3.24		
No.8	0.59	0.0626 ± 0.0655		0.00127 ± 0.000327		0.0110 ± 0.0112		8.17	2.10	11.06 ± 11.30		
No.9	0.70	0.0724 ± 0.0356		0.00126 ± 0.000163		0.0126 ± 0.0059		8.12	1.05	12.71 ± 6.02		
No.10	0.31	0.0559 ± 0.0367		0.00118 ± 0.000182		0.0091 ± 0.0058		7.62	1.18	9.23 ± 5.89		
No.11	0.72	0.0293 ± 0.0231		0.00127 ± 0.000178		0.0051 ± 0.0040		8.20	1.14	5.21 ± 4.05		
No.12	0.50	0.0323 ± 0.0207		0.00121 ± 0.000145		0.0054 ± 0.0034		7.77	0.93	5.46 ± 3.42		
No.13											In bad condition	
No.14	0.58	0.0378 ± 0.0173		0.00127 ± 0.000120		0.0066 ± 0.0029		8.20	0.77	6.72 ± 2.98		
No.15	0.60	0.0505 ± 0.0277		0.00134 ± 0.000167		0.0093 ± 0.0050		8.62	1.07	9.42 ± 5.04		
No.16	0.58	0.0681 ± 0.0306		0.00124 ± 0.000143		0.0116 ± 0.0050		7.96	0.92	11.73 ± 5.08		
No.17	0.68	0.0470 ± 0.0224		0.00115 ± 0.000122		0.0074 ± 0.0034		7.40	0.78	7.53 ± 3.48		
No.18	0.50	0.0389 ± 0.0257		0.00138 ± 0.000184		0.0074 ± 0.0048		8.90	1.19	7.50 ± 4.85		
No.19	0.62	0.0537 ± 0.0290		0.00125 ± 0.000157		0.0093 ± 0.0049		8.05	1.01	9.37 ± 4.91		
No.20	0.63	0.1679 ± 0.1296		0.00103 ± 0.000301		0.0240 ± 0.0173		6.66	1.94	24.04 ± 17.46		
No.21	0.46	0.0802 ± 0.0470		0.00108 ± 0.000173		0.0119 ± 0.0068		6.94	1.11	12.04 ± 6.85		
No.22	0.58	0.0560 ± 0.0288		0.00122 ± 0.000148		0.0095 ± 0.0048		7.89	0.95	9.56 ± 4.82		
No.23	0.54	0.1120 ± 0.1055		0.00135 ± 0.000405		0.0209 ± 0.0189		8.70	2.61	20.97 ± 19.04		
No.24	0.59	0.1245 ± 0.1082		0.00112 ± 0.000325		0.0193 ± 0.0160		7.23	2.09	19.39 ± 16.13		
No.25	0.78	0.0243 ± 0.0246		0.00125 ± 0.000200		0.0042 ± 0.0042		8.04	1.29	4.23 ± 4.25		
No.26	0.62	0.0466 ± 0.0236		0.00120 ± 0.000131		0.0077 ± 0.0038		7.70	0.85	7.78 ± 3.87		
No.27	0.47	0.0554 ± 0.0356		0.00133 ± 0.000198		0.0101 ± 0.0064		8.54	1.28	10.24 ± 6.45		
No.28	0.58	0.0607 ± 0.0695		0.00124 ± 0.000344		0.0104 ± 0.0117		8.02	2.22	10.52 ± 11.78		
No.29	0.49	0.0774 ± 0.0430		0.00117 ± 0.000175		0.0125 ± 0.0067		7.54	1.13	12.61 ± 6.82		
No.30	0.65	0.1166 ± 0.0747		0.00143 ± 0.000295		0.0230 ± 0.0142		9.22	1.90	23.11 ± 14.30		
						<i>Weighted mean (n = 29)</i>		7.93	0.21	7.63 ± 0.93		