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Table DR1: Biostratigraphic source data used to compile Figure 2.

Table DR2: U-Pb geochronologic analyses of zircons from the Railroad Canyon Section by LA-ICP-MS.

Table DR3: U-Pb geochronologic analysis data for zircons from the Railroad Canyon Section by CA-TIMS.

BIOSTRATIGRAPHIC SOURCE DATA

Table DR1 contains the references and details for the biostratigraphic data plotted in Figure 2 and discussed throughout the text.

RESULTS FROM ZIRCON LA-ICP-MS AND CA-TIMS DATING

Isotopic results from zircon U-Pb analysis using the LA-ICP-MS (Table DR2) and CA-TIMS (Table DR3) methods as applied to four ash horizons preserved in the Railroad Canyon (RCS1 at 31.2 m in WH4; RCS2 at 68.5 m in WH4; RCS3 at 75 m in WH4; RCS4 at 339.9 m in HDS2).

TABLE DR1. BIOSTRATIGRAPHIC SOURCE DATA USED TO COMPILE FIGURE 2

Taxa	RCS Sites taxa reported from†	Taxon first appearance‡	Taxon last appearance‡	Suggested revision to taxonomic range	New suggested placement for first appearance
<i>Aepyamelus</i>	Snowfence, Deadman Pass 1 or 2, Tunnel Draw	Hemingfordian 2	Late Hemphillian	FAD is older in RCS	Ar4-He1
<i>Alphagaulus vetus</i>	Snowfence, Turtle Blowout A or B, Turtle 2 Roadcut, Rodent Bluff (Mollie Gulch), Cotton Lane, Big Camel	Hemingfordian 2§	Barstovian 2§	FAD is older in RCS	Ar4
<i>Archaeohippus cf. A. penultimus</i>	Tunnel Draw	Arikareean 3 or 4	Barstovian 2	no change	
<i>Archaeohippus ultimus</i>	Snowfence, Archaeohippus Locality, Turtle 2 Blowout A or B	Arikareean 3 or 4	Barstovian 2	no change	
<i>Bouromeryx</i>	Turtle 4, Archaeohippus Locality, Turtle 2 Blowout A or B	Hemingfordian 2	Barstovian 2	FAD <i>may be</i> older based on RCS	
<i>Brachycrus laticeps</i>	Tunnel Draw	Hemingfordian 2	Barstovian 1	FAD is older in RCS	Ar4-He1
<i>Cupidinimus</i>	East RR cut, Turtle 1, (South Portal)	Hemingfordian 1	Late Hemphillia#	FAD is older in RCS	Ar4
" <i>Cynorca</i> "	Snowfence	Arikareean 2	Barstovian 1	no change	
<i>Harrymys irvini</i>	Above West RR cut	Hemingfordian 2§	Barstovian 2§	FAD is older in RCS	Ar4
<i>Hypohippus cf. H. osborni</i>	Tunnel Draw	Hemingfordian 1	Barstovian 2§	FAD <i>may be</i> older based on RCS	
<i>Hypolagus</i>	Snowfence, Tunnel Draw, Turtle 2 Blowout A or B, Turtle 2 Roadcut	Hemingfordian 2	Late Hemphillia#	FAD is older in RCS	Ar4-He1
<i>Merychippus cf. M. insignis</i>	Tunnel Draw	Hemingfordian 1	Clarendonian 2	FAD <i>may be</i> older based on RCS	
<i>Merychius elegans</i>	East RR cut	Hemingfordian 1	Barstovian 1	FAD is older in RCS	Ar4
<i>Merycodus</i>	Tunnel Draw	Hemingfordian 2	Late Hemphillia#	FAD is older in RCS	Ar4-He1
<i>Mesogaulus</i>	Turtle 2 Blowout A or B, Turtle 2 Roadcut	Hemingfordian 1	Barstovian 2§	FAD is older in RCS	Ar4
<i>Oreolagus</i>	Snowfence, West RR Cut, East RR Cut, Turtle 1 and 4	Hemingfordian 1	Barstovian 2	FAD is older in RCS	Ar4
<i>Paracosoryx wilsoni</i>	Turtle 1	Arikareean 4	Barstovian 2§	no change	
<i>Paramiolabis</i>	Tunnel Draw	Hemingfordian 2	Barstovian 1	FAD is older in RCS	Ar4-He1
<i>Plesiosminthus</i>	Turtle 1, Turtle 2 Blowout A or B, Turtle 2 Roadcut	Arikareean 1	Barstovian 2§	no change	
<i>Pliocyon</i>	Snowfence	Hemingfordian 2	Barstovian 1	FAD is older in RCS	Ar4
<i>Rakomeryx</i>	Tunnel Draw	Hemingfordian 2	Barstovian 1	FAD is older in RCS	Ar4-He1
<i>Ticholeptus zygomaticus</i>	Tunnel Draw	Hemingfordian 1	Barstovian 2	FAD <i>may be</i> older based on RCS	
<i>Tylocephalonyx cf. T. skinneri</i>	Above West RR cut	Hemingfordian 2	Barstovian 2§	FAD is older in RCS	Ar4

† – Data from Table 2 of Barnosky et al. (2007)

§ – First appearance data from Tedford et al. (2004), unless otherwise noted

– Appearance data from Carrasco et al. (2005)

Table DR2. U-Pb GEOCHRONOLOGIC ANALYSES OF ZIRCONS FROM THE RAILROAD CANYON SECTION BY LA-ICP-MS

Analysis	U (ppm) U/Th		Isotope ratios †								Apparent dates (Ma)							
			§	#	††	#	††	#	††	§§	§§	§§	§§	§§	§§			
			²⁰⁶ Pb ²⁰⁴ Pb	²⁰⁶ Pb* ²⁰⁷ Pb*	± (%)	²⁰⁷ Pb* ²³⁵ U	± (%)	²⁰⁶ Pb* ²³⁸ U	± (%)	error corr.	²⁰⁶ Pb* ²³⁸ U*	±1s (Ma)	²⁰⁷ Pb* ²³⁵ U	±1s (Ma)	²⁰⁶ Pb* ²⁰⁷ Pb*	±1s (Ma)	Best date (Ma)	± (Ma)
RCS1_01	34	1.6	353	21.810	14.4	0.0223	14.6	0.0035	2.3	0.16	22.7	0.5	22.4	3.2	-10.2	348.9	22.7	0.5
RCS1_06	57	1.1	3179	10.741	6.9	0.0456	7.2	0.0036	1.9	0.26	22.9	0.4	45.3	3.2	1489.9	130.9	22.9	0.4
RCS1_07	69	1.2	1096	17.674	8.7	0.0275	9.0	0.0035	2.1	0.23	22.7	0.5	27.5	2.4	475.3	193.7	22.7	0.5
RCS1_08	56	1.2	807	19.798	10.8	0.0245	11.0	0.0035	2.2	0.20	22.7	0.5	24.6	2.7	218.5	250.9	22.7	0.5
RCS1_10	59	1.2	1242	19.074	10.3	0.0250	10.5	0.0035	2.0	0.19	22.3	0.5	25.1	2.6	304.2	235.9	22.3	0.5
RCS1_11	184	1.1	3451	19.031	6.4	0.0265	6.6	0.0037	1.8	0.28	23.6	0.4	26.6	1.7	309.3	145.1	23.6	0.4
RCS1_12	57	1.3	852	17.376	9.8	0.0290	10.0	0.0037	2.1	0.21	23.5	0.5	29.1	2.9	512.6	215.1	23.5	0.5
RCS1_13	41	1.7	790	19.303	14.4	0.0251	14.6	0.0035	2.4	0.16	22.6	0.5	25.2	3.6	276.9	331.8	22.6	0.5
RCS1_14	39	1.5	320	21.905	11.6	0.0214	11.8	0.0034	2.4	0.20	21.9	0.5	21.5	2.5	-20.7	280.6	21.9	0.5
RCS1_16	151	1.8	1703	21.402	5.7	0.0236	6.0	0.0037	1.7	0.28	23.6	0.4	23.7	1.4	35.1	137.5	23.6	0.4
RCS1_17	97	1.0	3700	18.390	5.6	0.0265	5.9	0.0035	1.9	0.32	22.7	0.4	26.5	1.5	386.7	125.6	22.7	0.4
RCS1_18	67	1.2	711	19.645	11.3	0.0245	11.5	0.0035	2.1	0.18	22.5	0.5	24.6	2.8	236.4	262.4	22.5	0.5
RCS1_19	43	1.6	951	18.556	12.9	0.0270	13.1	0.0036	2.4	0.18	23.4	0.5	27.1	3.5	366.5	291.1	23.4	0.5
RCS1_20	48	1.2	2807	16.331	10.3	0.0310	10.5	0.0037	2.0	0.19	23.6	0.5	31.0	3.2	647.4	221.7	23.6	0.5
RCS1_21	52	1.3	525	21.197	10.3	0.0222	10.5	0.0034	2.2	0.21	22.0	0.5	22.3	2.3	58.1	246.2	22.0	0.5
RCS1_22	45	0.9	660	17.942	10.3	0.0270	10.5	0.0035	2.0	0.19	22.6	0.5	27.0	2.8	441.8	229.2	22.6	0.5
RCS1_23	53	1.5	645	20.528	11.9	0.0236	12.1	0.0035	2.0	0.16	22.6	0.4	23.7	2.8	134.0	280.4	22.6	0.4
RCS1_24	61	1.9	1310	15.957	8.7	0.0327	8.9	0.0038	1.9	0.22	24.3	0.5	32.6	2.9	697.0	184.8	24.3	0.5
RCS1_25	41	1.7	4390	12.072	13.7	0.0396	13.9	0.0035	2.4	0.17	22.3	0.5	39.4	5.4	1265.4	268.2	22.3	0.5
RCS1_26	42	1.6	403	17.890	9.8	0.0252	10.1	0.0033	2.3	0.23	21.1	0.5	25.3	2.5	448.3	218.6	21.1	0.5
RCS1_28	36	1.0	401	22.471	15.8	0.0209	16.0	0.0034	2.8	0.17	21.9	0.6	21.0	3.3	-82.8	388.6	21.9	0.6
RCS1_29	44	1.7	661	19.991	25.8	0.0242	25.9	0.0035	2.1	0.08	22.5	0.5	24.2	6.2	196.1	609.5	22.5	0.5
RCS1_30	67	1.2	784	19.449	11.3	0.0250	11.5	0.0035	2.1	0.19	22.7	0.5	25.1	2.8	259.5	259.7	22.7	0.5
RCS1_31	48	1.4	670	15.785	14.4	0.0288	14.7	0.0033	2.7	0.19	21.3	0.6	28.9	4.2	720.0	307.1	21.3	0.6
RCS2_01	187	2.6	4675	20.508	12.2	0.0754	12.4	0.0112	2.0	0.16	71.9	1.4	73.8	8.8	136.3	288.4	71.9	1.4
RCS2_02	529	1.7	9687	21.366	5.2	0.0748	5.5	0.0116	1.7	0.30	74.3	1.2	73.3	3.9	39.2	125.2	74.3	1.2
RCS2_03	659	1.2	3371	26.113	15.2	0.0174	15.5	0.0033	2.9	0.19	21.2	0.6	17.5	2.7	-464.7	403.9	21.2	0.6
RCS2_04	1323	2.2	45836	20.832	1.7	0.0811	2.6	0.0123	2.0	0.77	78.5	1.6	79.2	2.0	99.4	39.7	78.5	1.6
RCS2_06	352	1.9	4358	19.879	5.3	0.0852	5.8	0.0123	2.3	0.40	78.7	1.8	83.0	4.6	209.0	123.5	78.7	1.8
RCS2_08	194	1.7	1859	18.841	36.2	0.0263	37.2	0.0036	8.6	0.23	23.1	2.0	26.3	9.7	332.0	846.1	23.1	2.0
RCS2_10	297	2.4	11835	21.505	9.1	0.0747	9.3	0.0117	1.7	0.18	74.7	1.3	73.1	6.6	23.6	219.6	74.7	1.3
RCS2_11	289	1.7	8424	23.408	10.0	0.0649	10.1	0.0110	1.5	0.15	70.6	1.1	63.9	6.3	-183.9	249.9	70.6	1.1
RCS2_12	319	1.9	11334	22.393	9.1	0.0703	9.2	0.0114	1.2	0.14	73.2	0.9	69.0	6.1	-74.3	222.5	73.2	0.9
RCS2_14	140	2.3	18176	11.626	3.2	0.3857	5.5	0.0325	4.4	0.81	206.3	9.0	331.2	15.4	1338.5	61.8	206.3	9.0
RCS2_15	211	1.1	8192	25.075	15.8	0.0631	16.1	0.0115	3.0	0.18	73.5	2.2	62.1	9.7	-358.7	411.0	73.5	2.2
RCS2_16	325	2.2	8331	23.002	6.1	0.0683	6.3	0.0114	1.4	0.23	73.0	1.1	67.1	4.1	-140.4	152.0	73.0	1.1
RCS2_17	928	3.1	15584	21.557	2.5	0.0724	2.7	0.0113	1.1	0.42	72.6	0.8	71.0	1.9	17.9	60.0	72.6	0.8
RCS2_18	123	0.9	4721	26.069	22.3	0.0642	24.8	0.0121	10.8	0.44	77.7	8.4	63.1	15.2	-460.3	594.3	77.7	8.4
RCS2_20	148	1.4	8942	22.811	14.7	0.0735	15.1	0.0122	3.4	0.23	78.0	2.6	72.1	10.5	-119.8	846.5	78.0	2.6
RCS2_21	242	0.9	8772	21.632	14.0	0.0725	14.3	0.0114	2.7	0.19	72.9	2.0	71.0	9.8	9.5	338.1	72.9	2.0
RCS2_22	157	1.9	7260	22.500	11.4	0.0695	12.1	0.0113	3.9	0.32	72.7	2.8	68.2	8.0	-86.0	280.6	72.7	2.8
RCS2_23	274	0.7	3583	18.702	12.1	0.0833	12.3	0.0113	2.1	0.17	72.5	1.5	81.3	9.6	348.8	274.9	72.5	1.5
RCS2_24	334	0.8	11945	21.572	6.2	0.0746	6.3	0.0117	1.3	0.20	74.8	0.9	73.0	4.4	16.2	148.0	74.8	0.9
RCS2_25	372	1.5	16864	21.633	8.1	0.0732	8.3	0.0115	1.9	0.22	73.6	1.4	71.8	5.8	9.4	195.2	73.6	1.4
RCS2_26	255	1.8	4960	22.280	10.1	0.0723	10.3	0.0117	2.0	0.19	74.9	1.5	70.9	7.1	-62.0	247.9	74.9	1.5
RCS2_27	367	2.1	15695	21.188	8.5	0.0749	8.6	0.0115	1.0	0.12	73.8	0.8	73.3	6.1	59.2	204.0	73.8	0.8
RCS2_28	336	1.6	1646	21.022	14.4	0.0740	15.3	0.0113	5.3	0.34	72.3	3.8	72.5	10.7	77.9	343.5	72.3	3.8
RCS2_29	268	3.2	6007	20.551	7.9	0.0772	8.3	0.0115	2.6	0.31	73.8	1.9	75.5	6.0	131.5	185.8	73.8	1.9
RCS2_30	755	2.4	18035	21.234	3.7	0.0769	4.1	0.0118	1.6	0.39	75.9	1.2	75.2	2.9	54.0	89.3	75.9	1.2
RCS3_01	185	1.3	1483	22.203	5.2	0.0206	5.5	0.0033	2.0	0.36	21.4	0.4	20.7	1.1	-53.5	125.6	21.4	0.4
RCS3_02	171	2.2	5024	19.004	5.2	0.0241	5.6	0.0033	2.0	0.36	21.4	0.4	24.1	1.3	312.4	118.0	21.4	0.4
RCS3_03	147	1.4	1538	19.739	5.9	0.0224	6.3	0.0032	2.2	0.35	20.7	0.5	22.5	1.4	225.5	135.8	20.7	0.5
RCS3_04	213	1.2	2897	18.600	4.8	0.0241	5.1	0.0033	2.0	0.38	20.9	0.4	24.2	1.2	361.2	107.2	20.9	0.4
RCS3_05	180	1.1	6421	18.459	5.1	0.0242	6.4	0.0032	3.9	0.61	20.9	0.8	24.3	1.5	378.3	114.2	20.9	0.8
RCS3_06	337	1.2	3363	21.093	3.4	0.0211	4.3	0.0032	2.6	0.61	20.8	0.5	21.2	0.9	69.9	80.4	20.8	0.5
RCS3_07	243	1.6	7875	20.732	1.6	0.0753	2.3	0.0113	1.7	0.73	72.6	1.2	73.7	1.7	110.8	37.6	72.6	1.2
RCS3_08	141	2.0	2872	20.515	7.1	0.0223	7.4	0.0033	2.1	0.29	21.3	0.5	22.4	1.6	135.6	166.9	21.3	0.5
RCS3_09	202	1.3	5051	18.664	3.5	0.0245	4.0	0.0033	1.9	0.48	21.4	0.4	24.6	1.0	353.4	79.8	21.4	0.4
RCS3_10	305	1.0	14697	19.536	3.6	0.0228	4.0	0.0032	1.7	0.43	20.8	0.4	22.9	0.9	249.3	82.2	20.8	0.4
RCS3_11	255	1.3	2230	20.269	3.5	0.0221	3.9	0.0033	1.8	0.47	20.9	0.4	22.2	0.9	163.8	81.3	20.9	0.4
RCS3_12	199	2.4	2178	20.611	4.6	0.0219	5.0	0.0033	1.9	0.39	21.1	0.4	22.0	1.1	124.5	108.3	21.1	0.4
RCS3_13	176	1.7	10031	18.796	5.1	0.0244	5.5	0.0033	1.9	0.35	21.4	0.4	24.5	1.3	337.4	115.8	21.4	0.4
RCS3_14	169	1.8	2161	20.914	5.6	0.0230	5.9	0.0035	1.8	0.31	22.5	0.4	23.1	1.3	90.1	132.9	22.5	0.4
RCS3_16	193	1.5	16376	20.600	1.6	0.1274	2.4	0.0190	1.8	0.74	121.6	2.1	121.7	2.7	125.9	38.2	121.6	2.1
RCS3_17	258	1.9	1365	22.160	3.5	0.0202	4.0	0.0033	1.9	0.47	20.9	0.4	20.3	0.8	-48.8	86.3	20.9	0.4
RCS3_18	323	1.8	1681	21.679	4.7	0.0206	5.1	0.0032	2.0	0.39	20.8	0.4	20.7	1.0	4.3	112.6	20.8	0.4
RCS3_19	217	1.3	3783	20.891	5.3	0.0216	5.5	0.0033	1.8									

RCS3_25	394	1.0	6008	20.089	2.6	0.0224	3.3	0.0033	1.9	0.59	21.1	0.4	22.5	0.7	184.6	61.3	21.1	0.4
RCS3_26	233	2.0	1973	18.346	5.3	0.0242	5.6	0.0032	1.8	0.31	20.8	0.4	24.3	1.3	392.1	119.3	20.8	0.4
RCS3_27	119	2.3	1251	18.393	6.8	0.0245	7.1	0.0033	2.1	0.29	21.1	0.4	24.6	1.7	386.4	153.2	21.1	0.4
RCS3_28	205	1.7	2871	20.023	4.0	0.0233	4.3	0.0034	1.7	0.40	21.8	0.4	23.4	1.0	192.4	92.6	21.8	0.4
RCS3_29	215	1.3	3316	20.468	3.9	0.0223	4.3	0.0033	1.9	0.43	21.3	0.4	22.4	0.9	140.9	90.6	21.3	0.4
RCS3_30	165	1.3	2906	19.381	5.4	0.0242	5.7	0.0034	1.9	0.33	21.9	0.4	24.3	1.4	267.5	123.4	21.9	0.4
RCS4_01	43	1.8	865	13.494	13.4	0.0255	13.6	0.0025	2.3	0.17	16.1	0.4	25.5	3.4	1044.3	271.1	16.1	0.4
RCS4_02	318	1.2	2047	20.967	4.3	0.0162	4.6	0.0025	1.7	0.36	15.8	0.3	16.3	0.7	84.1	101.4	15.8	0.3
RCS4_03	602	0.6	5981	18.745	5.5	0.0199	6.1	0.0027	2.5	0.42	17.4	0.4	20.0	1.2	343.6	124.8	17.4	0.4
RCS4_04	45	1.6	330	20.395	16.4	0.0166	16.6	0.0025	2.3	0.14	15.8	0.4	16.7	2.7	149.4	387.7	15.8	0.4
RCS4_06	68	2.2	2080	14.880	12.3	0.0225	12.5	0.0024	2.2	0.18	15.6	0.3	22.6	2.8	844.1	255.8	15.6	0.3
RCS4_08	66	2.1	750	18.033	13.2	0.0193	13.4	0.0025	2.2	0.16	16.2	0.4	19.4	2.6	430.5	295.7	16.2	0.4
RCS4_10	615	1.3	4511	19.937	2.5	0.0172	3.0	0.0025	1.6	0.55	16.0	0.3	17.3	0.5	202.3	58.0	16.0	0.3
RCS4_11	169	1.7	2519	19.021	6.0	0.0218	6.9	0.0030	3.4	0.50	19.3	0.7	21.9	1.5	310.5	136.6	19.3	0.7
RCS4_12	145	1.1	2068	15.654	12.6	0.0212	12.9	0.0024	3.1	0.24	15.5	0.5	21.3	2.7	737.7	266.6	15.5	0.5
RCS4_14	50	1.4	469	15.956	13.9	0.0214	14.1	0.0025	2.7	0.19	16.0	0.4	21.5	3.0	697.1	297.0	16.0	0.4
RCS4_15	464	1.0	4960	16.975	5.7	0.0231	6.3	0.0028	2.7	0.43	18.3	0.5	23.2	1.4	563.8	123.5	18.3	0.5
RCS4_16	90	1.8	443	23.076	13.2	0.0144	13.3	0.0024	1.9	0.14	15.5	0.3	14.5	1.9	-148.3	328.6	15.5	0.3
RCS4_17	257	1.0	2806	19.249	4.4	0.0182	4.8	0.0025	1.8	0.37	16.3	0.3	18.3	0.9	283.3	101.5	16.3	0.3
RCS4_18	63	1.3	597	17.423	13.1	0.0192	13.3	0.0024	2.4	0.18	15.7	0.4	19.3	2.5	506.8	289.1	15.7	0.4
RCS4_20	172	1.3	3369	19.118	3.8	0.0314	4.4	0.0044	2.2	0.51	28.0	0.6	31.4	1.4	298.8	86.3	28.0	0.6
RCS4_21	43	1.9	362	12.613	12.4	0.0272	12.7	0.0025	2.5	0.20	16.0	0.4	27.2	3.4	1179.2	246.3	16.0	0.4
RCS4_22	38	1.4	295	21.121	21.6	0.0160	21.8	0.0024	2.8	0.13	15.8	0.4	16.1	3.5	66.7	519.1	15.8	0.4
RCS4_23	799	0.9	3401	21.438	2.1	0.0160	2.7	0.0025	1.7	0.62	16.0	0.3	16.1	0.4	31.2	51.4	16.0	0.3
RCS4_24	320	1.5	4411	20.027	4.4	0.0164	4.7	0.0024	1.8	0.39	15.4	0.3	16.5	0.8	191.9	101.5	15.4	0.3
RCS4_25	58	1.2	703	16.656	14.6	0.0206	14.8	0.0025	2.2	0.15	16.1	0.4	20.8	3.0	604.9	317.4	16.1	0.4
RCS4_26	91	2.2	513	14.386	9.6	0.0228	9.8	0.0024	2.2	0.23	15.3	0.3	22.9	2.2	913.9	197.7	15.3	0.3
RCS4_27	103	2.3	1937	16.496	6.9	0.0204	7.3	0.0024	2.3	0.31	15.7	0.4	20.5	1.5	625.8	148.8	15.7	0.4
RCS4_28	198	1.5	1233	20.928	5.7	0.0158	6.0	0.0024	1.9	0.31	15.5	0.3	15.9	0.9	88.6	135.2	15.5	0.3
RCS4_29	87	1.2	984	17.129	12.1	0.0192	12.3	0.0024	2.5	0.20	15.4	0.4	19.3	2.4	544.0	264.4	15.4	0.4
RCS4_30	44	1.6	333	19.227	17.2	0.0167	17.4	0.0023	2.7	0.16	15.0	0.4	16.9	2.9	285.9	394.6	15.0	0.4

† – Isotope ratios normalized with respect to the Sri Lanka (SL2) reference zircon of Gehrels et al. (2008) using a standard-bracketing approach. See details in text.

§ – Corrected for ^{204}Hg interference on ^{204}Pb using the natural ratio $^{202}\text{Hg}/^{204}\text{Hg} = 4.34$. Masses ^{202}Hg and $^{204}(\text{Hg}+\text{Pb})$ were continuously measured by multi-collection using discrete-dynode secondary electron multipliers

– Radiogenic ratios corrected for common-Pb contributions, estimated from the measured $^{206}\text{Pb}/^{204}\text{Pb}$ and using the model of Stacey and Kramers (1975).

†† – Total measurement uncertainties including internal analytical uncertainty, normalization uncertainty, reference material age uncertainty and common-Pb correction uncertainty (see Ibanez-Mejia et al., 2014 for details). Uncertainties of 1.0% and 0.3% were assigned to the common $^{206}\text{Pb}/^{204}\text{Pb}$ and $^{207}\text{Pb}/^{204}\text{Pb}$ ratios of the Stacey and Kramers model, respectively.

§§ – Isotopic dates calculated using the decay constants (^{238}U)= 1.55125E-10 and (^{235}U)= 9.8485E-10 (Jaffey et al., 1971)

TABLE DR3. U-PB GEOCHRONOLOGIC ANALYSES FOR SINGLE ZIRCONS FROM THE RAILROAD CANYON SECTION BY CA-TIMS

Fraction	Composition			Isotopic Ratios								Dates (Ma)					
	Pb _# (pg) ^(†)	Pb*/ Pb _# ^(§)	Th/ U ^(#)	²⁰⁶ Pb/ ²⁰⁴ Pb ^(††)	²⁰⁸ Pb/ ²⁰⁶ Pb ^(§§)	²⁰⁶ Pb/ ²³⁸ U ^(§§, ##)	±2σ (%)	²⁰⁷ Pb/ ²³⁵ U ^(§§)	±2σ (%)	²⁰⁷ Pb/ ²⁰⁶ Pb ^(§§, ##)	±2σ (%)	²⁰⁶ Pb/ ²³⁸ U ^(##, †††)	±2σ (abs)	²⁰⁷ Pb/ ²³⁵ U ^(†††)	±2σ (abs)	²⁰⁶ Pb/ ²⁰⁷ Pb ^(##, †††)	±2σ (abs)
RCS3																	
z19	0.35	12	0.67	696	0.215	0.003297	0.16	0.02140	1.9	0.047094	1.8	21.221	0.034	21.50	0.40	53	44
z03	0.22	6	0.65	356	0.208	0.003292	0.30	0.02114	4.2	0.046584	4.1	21.189	0.064	21.24	0.88	27	98
z09	0.33	4	0.65	262	0.209	0.003298	0.40	0.0217	5.3	0.047849	5.1	21.224	0.085	21.8	1.1	91	122
z08	0.53	3	0.66	193	0.213	0.003306	0.57	0.0217	7.3	0.047695	7.1	21.28	0.12	21.8	1.6	83	169
z12	0.75	2	0.52	146	0.169	0.003283	0.75	0.0219	9.7	0.048487	9.4	21.13	0.16	22.0	2.1	122	222
z05	1.25	2	0.65	127	0.209	0.003299	0.90	0.0216	12	0.047425	12	21.23	0.19	21.7	2.5	70	275
z04	1.67	2	0.88	116	0.283	0.003312	0.97	0.0229	12	0.050100	12	21.32	0.21	23.0	2.7	199	275

† – Total mass of common Pb. MIT lab blank: ²⁰⁶Pb/²⁰⁴Pb= 17.911 ± 2.08% ; ²⁰⁷Pb/²⁰⁴Pb= 15.205 ± 1.72% ; ²⁰⁸Pb/²⁰⁴Pb= 36.842 ± 1.97% (1 sigma uncertainties)

§ – Ratio of radiogenic Pb (including ²⁰⁸Pb) to common Pb.

– Th contents calculated from radiogenic ²⁰⁸Pb and the ²⁰⁷Pb/²⁰⁶Pb date of the sample and assuming concordance between U-Th and Pb systems.

†† – Measured ratio corrected for fractionation and spike contribution only.

§§ – Measured ratios corrected for fractionation and tracer and blank.

– Corrected for initial Th/U disequilibrium using radiogenic ²⁰⁸Pb and Th/U[magma] = 2.8.

††† – Isotopic dates calculated using the decay constants λ(²³⁸U) = 1.55125E-10 and λ(²³⁵U) = 9.8485E-10 (Jaffey et al. 1971).