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Staisch, L., Kelsey, H., Sherrod, B., Möller, A., Paces, J., Blakely, R., and Styron, R., 2017, Miocene–Pleistocene deformation of the Saddle Mountains: Implications for seismic hazard in central Washington, USA: GSA Bulletin, <https://doi.org/10.1130/B31783.1>.

DATA REPOSITORY

Figure DR1. Borehole stratigraphy near the Saddle Mountains anticline, based on original and published interpretations (Wilson et al., 2008; Czajkowski et al., 2012). Original data are downloadable online (www.dnr.wa.gov). The repeated section of CRBG in borehole BN 1-9 is estimated from cross section A-A' and matches with estimates from Reidel et al. (1989a).

Figure DR2. U-Pb ages from 0-250 Ma for the tephra collected from the Ringold Formation near the Saddle Mountains anticline. Samples 15SM002, -007, -006 and 16SM001 show nearly unimodal peaks. This indicates that the zircons are predominantly from the airfall tuff and the youngest age peaks are thus robust measurements of the depositional age. Sample 15SM003 has some more detrital zircon contamination, and the youngest age peak should be regarded as a maximum age of deposition.

Figure DR3. Detrital U-Pb zircon age spectra for the Ringold strata (15SM013, 15SM004) and for the Snake River Plain samples that compare well. Comparison is based in K-S test and Kuiper test p-values and coefficients of overlap, similarity, and cross correlation (Table A9).

Figure DR4. Map of the Saddle Mountains fault and anticline with paleomagnetic data from Reidel et. al. (1984) and Van Alstine and Gillett (1981). Paleomagnetic sample locations are estimated from township and range locations reported in Reidel et al. (1984). Paleomagnetic data are from the Pomona Member of the Saddle Mountains Basalt (12.0 - 10.9 Ma). Cross section transects A-A' and B-B' are shown for reference. Similar quantities of rotation since 12 Ma are measured near both cross section transects. Greater quantities of rotation to the east occur along the Smyrna Bench and Saddle Gap segments of the Saddle Mountains fault.

TABLE DR1. RESULTS FOR ZIRCON STANDARDS USED DURING U-PB AGE ANALYSIS

TABLE DR2. U-PB ZIRCON AGE RESULTS FOR SAMPLE 15SM002, WITH BOLD DATA USED FOR CONCORDIA AGE

TABLE DR3. U-PB ZIRCON AGE RESULTS FOR SAMPLE 15SM003, WITH BOLD DATA USED FOR CONCORDIA AGE

TABLE DR4. U-PB ZIRCON AGE RESULTS FOR SAMPLE 15SM006, WITH BOLD DATA USED FOR CONCORDIA AGE

TABLE DR5. U-PB ZIRCON AGE RESULTS FOR SAMPLE 15SM007, WITH BOLD DATA USED FOR CONCORDIA AGE

TABLE DR6. U-PB ZIRCON AGE RESULTS FOR SAMPLE 16SM001, WITH BOLD DATA USED FOR CONCORDIA AGE

TABLE DR7. U-PB ZIRCON AGE RESULTS FOR SAMPLE 15SM004, WITH BOLD DATA USED FOR CONCORDIA AGE

TABLE DR8. U-PB ZIRCON AGE RESULTS FOR SAMPLE 15SM013

TABLE DR9. SAMPLE COMPARISON

TABLE DR10. RESULTS OF U-TH DATING OF PETROCALCIC HORIZONS

TABLE DR11. RESULTS FOR STANDARDS USED DURING U-SERIES AGE ANALYSIS

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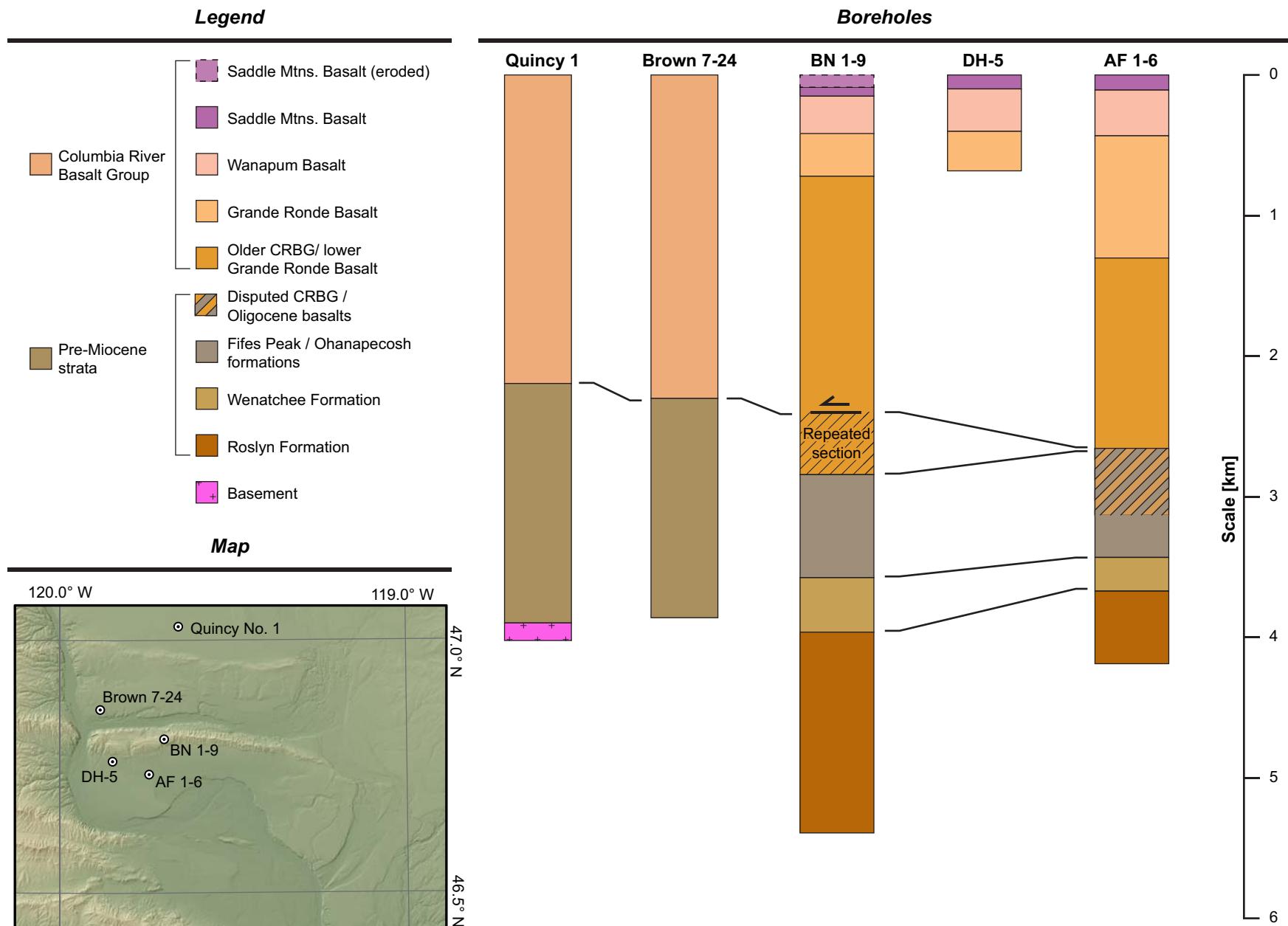


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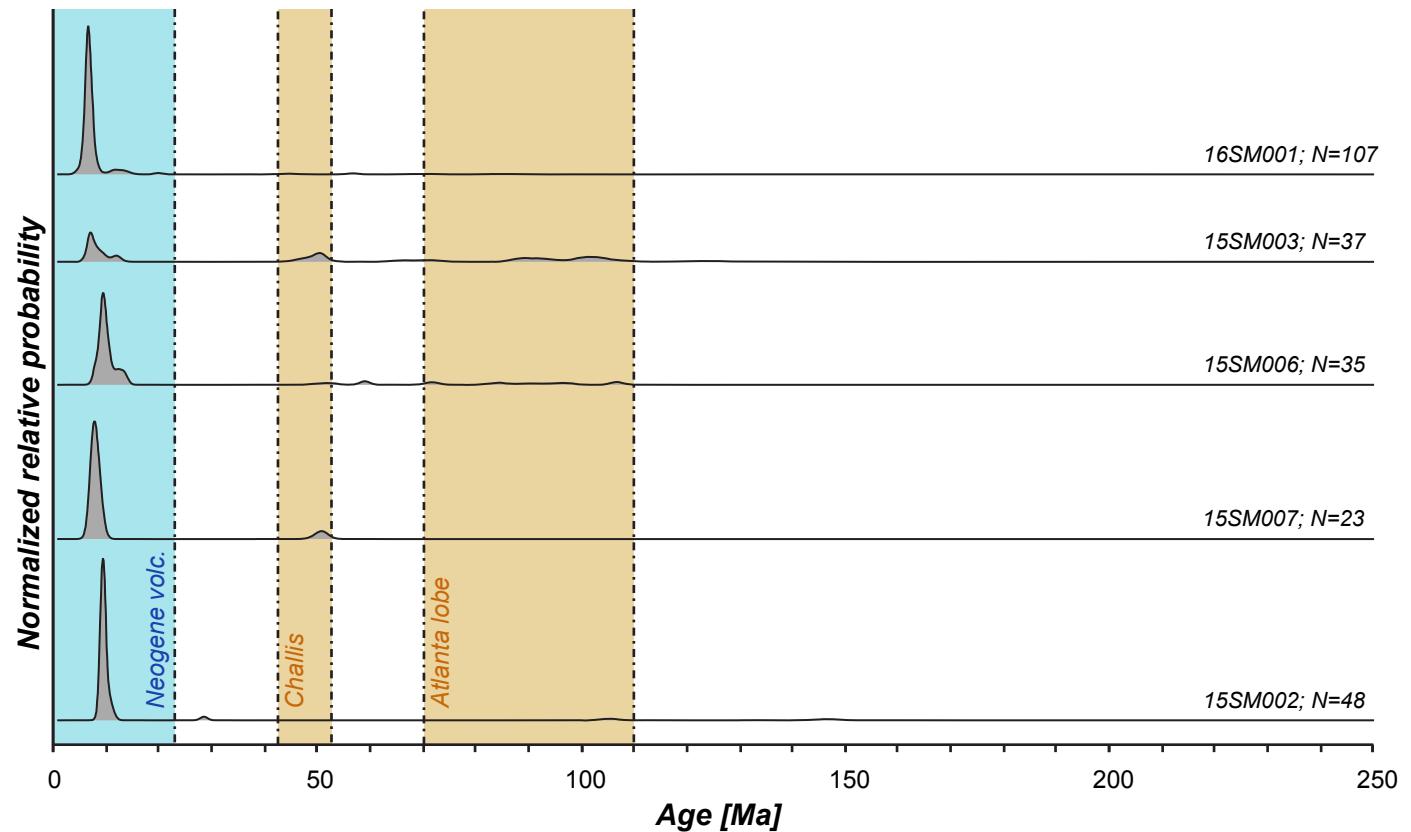


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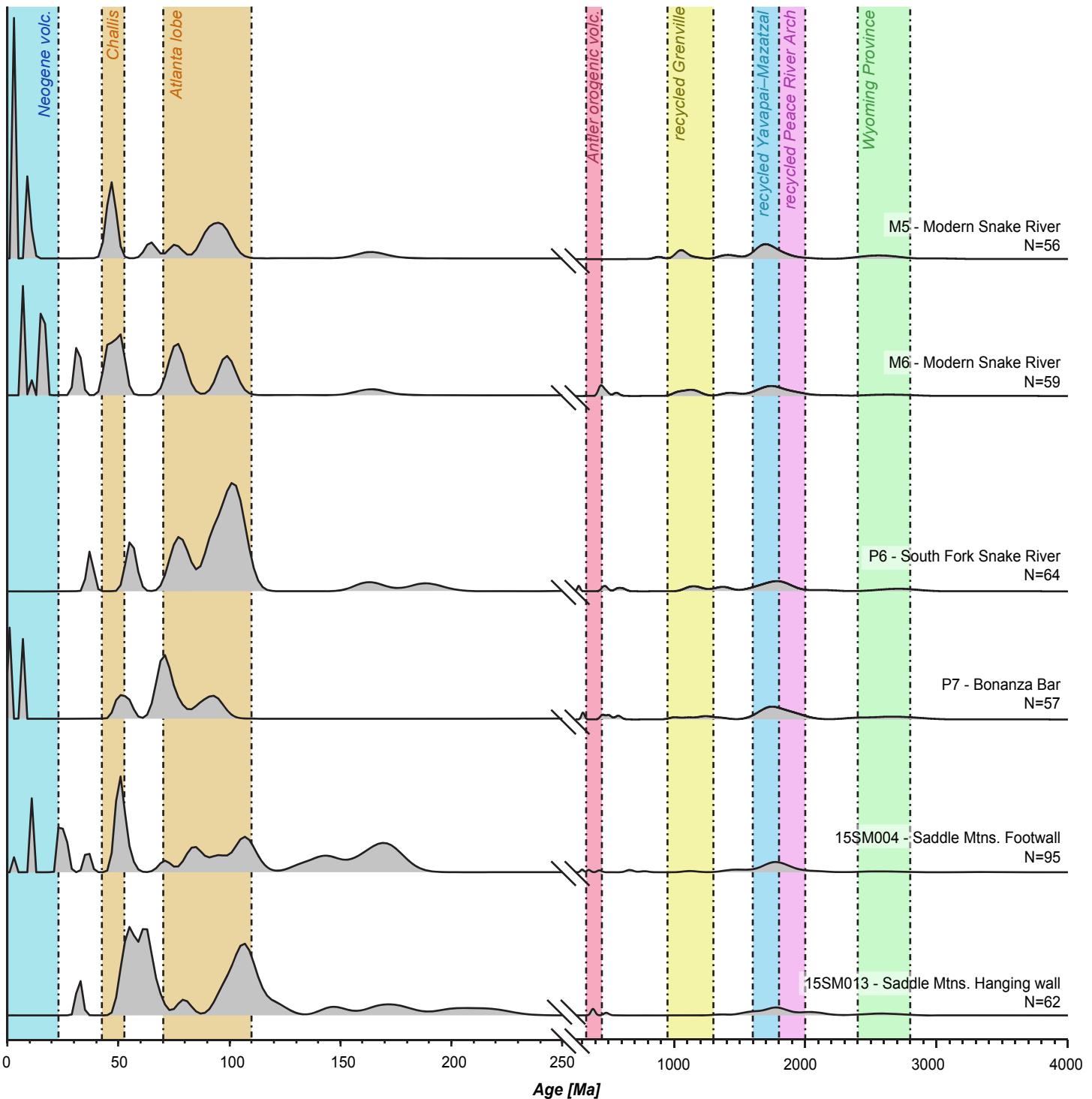


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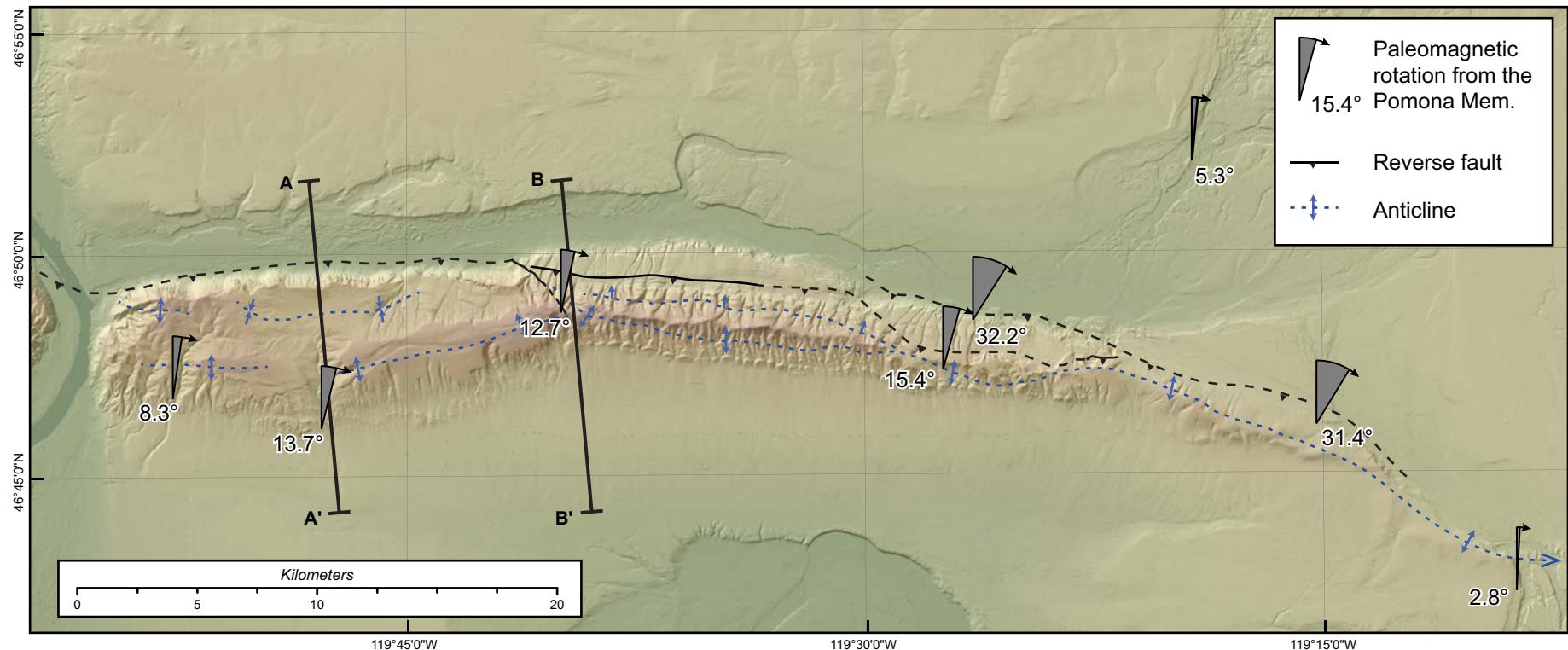


TABLE DR1. RESULTS FOR ZIRCON STANDARDS USED DURING U-Pb

Date of run	GJ1 reference		Plešovice reference					Concordia Age (Ma)
	N	2 σ U-Pb age uncertainty	Concordia Age (Ma)	2 σ	N	MSWD	Difference from standard	
05/18/15	26	0.8% - 1.2%	344.1	1.1	12	1.0	2.0%	
08/03/15	42	0.8% - 1.3%	331.9	1.4	20	1.2	1.6%	
11/12/15	36	0.8% - 1.4%				N.A.*		28.53
08/22/16	55	1.3% - 1.8%	342.0	1.1	20	1.0	1.4%	28.70
08/23/16	53	1.4% - 2.2%	342.9	1.4	18	1.2	1.7%	28.37
01/05/17	44	1.2% - 1.4%	334.1	0.9	23	0.6	0.9%	27.74

* N.A.: Not analyzed

B AGE ANALYSIS

Fish Canyon reference

2σ (Ma)	N	MSWD	Difference from standard
		N.A.*	
		N.A.*	
0.17	17	1.0	0.2%
0.32	20	1.0	0.8%
0.20	18	1.0	0.4%
0.21	16	1.0	2.7%

34	18.1	8/3/2015	0.0959 ± 0.0015	3.5920 ± 0.0810	0.26860 ± 0.00540	0.749	1545 ± 18	1533 ± 27	1549 ± 27	-0.8	0.7	257.0 ± 8.4	66.5 ± 3.0
43	18.7	8/3/2015	0.1030 ± 0.0018	4.0380 ± 0.0940	0.28690 ± 0.00650	0.720	1639 ± 19	1624 ± 32	1681 ± 32	-0.9	0.8	177.0 ± 12.0	37.5 ± 1.4
2	16.1	8/3/2015	0.1050 ± 0.0016	4.4300 ± 0.1100	0.30410 ± 0.00710	0.800	1715 ± 20	1710 ± 35	1710 ± 28	-0.3	0.3	530.0 ± 69.0	214.0 ± 51.0
31	15.2	8/3/2015	0.1160 ± 0.0025	5.3400 ± 0.1300	0.33610 ± 0.00890	0.669	1875 ± 21	1866 ± 43	1893 ± 37	-0.5	0.4	384.0 ± 12.0	116.5 ± 6.4
20	12.6	8/3/2015	0.1289 ± 0.0022	6.4100 ± 0.1100	0.35630 ± 0.00720	0.623	2033 ± 15	1964 ± 34	2083 ± 30	-3.5	4.6	310.0 ± 27.0	156.5 ± 7.5
44	9.3	8/3/2015	0.1740 ± 0.0032	11.4000 ± 0.2900	0.47380 ± 0.00930	0.718	2558 ± 23	2499 ± 41	2599 ± 30	-2.4	2.6	323.0 ± 10.0	169.0 ± 18.0
*48	18.9	8/3/2015	0.0740 ± 0.0130	0.0104 ± 0.0016	0.00111 ± 0.00007	0.249	10.5 ± 1.7	7.16 ± 0.47	790 ± 320	-46.6	2.0	261.0 ± 12.0	58.1 ± 2.1
*‡37	21.5	8/3/2015	0.1020 ± 0.0240	0.0136 ± 0.0030	0.00118 ± 0.00011	0.390	13.6 ± 3.1	7.59 ± 0.71	830 ± 430	-79.2	1.9	141.0 ± 11.0	24.1 ± 2.1
*‡4	16.2	8/3/2015	0.0870 ± 0.0230	0.0137 ± 0.0033	0.00119 ± 0.00011	0.390	13.7 ± 3.3	7.69 ± 0.71	950 ± 500	-78.2	1.8	153.0 ± 6.1	34.0 ± 1.0
*16	13.7	8/3/2015	0.0750 ± 0.0120	0.0120 ± 0.0020	0.00122 ± 0.00008	0.098	12.1 ± 2.0	7.84 ± 0.52	820 ± 340	-54.3	2.1	293.9 ± 9.1	126.4 ± 6.0
*17	17.4	8/3/2015	0.0880 ± 0.0240	0.0139 ± 0.0037	0.00126 ± 0.00010	0.032	13.9 ± 3.7	8.12 ± 0.63	650 ± 510	-71.2	1.6	139.1 ± 5.7	34.1 ± 1.0
*‡1	16.0	8/3/2015	0.1400 ± 0.0480	0.0177 ± 0.0051	0.00131 ± 0.00014	0.390	18.4 ± 5.2	8.46 ± 0.91	730 ± 690	-117.5	1.9	96.3 ± 5.6	23.6 ± 1.7
*‡53	22.6	8/3/2015	0.1160 ± 0.0320	0.0278 ± 0.0066	0.00222 ± 0.00020	0.390	29.0 ± 6.7	14.30 ± 1.30	1020 ± 510	-102.8	2.2	55.8 ± 3.4	19.9 ± 0.9
*13	14.8	8/3/2015	0.6730 ± 0.0850	0.2270 ± 0.0230	0.00272 ± 0.00033	0.549	208.0 ± 19.0	17.50 ± 2.10	4580 ± 230	-1088.6	10.0	70.6 ± 6.7	29.9 ± 4.3
*‡29	19.4	8/3/2015	0.0639 ± 0.0058	0.0629 ± 0.0051	0.00729 ± 0.00025	0.390	61.7 ± 4.9	46.80 ± 1.60	650 ± 170	-31.8	3.0	150.8 ± 7.6	108.5 ± 4.8
†9	7.1	8/3/2015	0.0462 ± 0.0020	0.0586 ± 0.0024	0.00915 ± 0.00035	0.268	57.8 ± 2.3	58.70 ± 2.20	25 ± 87	1.5	-0.4	1590.0 ± 100.0	386.0 ± 16.0
*†14	4.7	8/3/2015	0.0710 ± 0.0100	0.0960 ± 0.0130	0.00987 ± 0.00069	0.078	93.0 ± 12.0	63.30 ± 4.40	930 ± 270	-46.9	2.5	1480.0 ± 190.0	4.9 ± 0.5
*47	17.3	8/3/2015	0.0603 ± 0.0050	0.0987 ± 0.0081	0.01211 ± 0.00043	0.185	95.1 ± 7.5	77.60 ± 2.70	520 ± 160	-22.6	2.3	119.7 ± 9.1	38.5 ± 2.6
*27	19.9	8/3/2015	0.0942 ± 0.0096	0.1610 ± 0.0160	0.01248 ± 0.00071	0.200	152.0 ± 14.0	79.90 ± 4.50	1370 ± 220	-90.2	5.2	47.1 ± 4.4	10.3 ± 1.2
†49	5.1	8/3/2015	0.0478 ± 0.0016	0.1156 ± 0.0043	0.01760 ± 0.00046	0.562	111.1 ± 3.9	112.50 ± 2.90	111 ± 77	1.2	-0.4	1860.0 ± 98.0	117.1 ± 9.5
†45	6.6	8/3/2015	0.0516 ± 0.0032	0.1860 ± 0.0140	0.02640 ± 0.00130	0.578	173.0 ± 12.0	167.90 ± 8.40	280 ± 130	-3.0	0.4	287.0 ± 20.0	0.5 ± 0.1
*15	13.3	8/3/2015	0.1083 ± 0.0026	1.7630 ± 0.0700	0.11600 ± 0.00400	0.796	1027 ± 26	707 ± 23	1769 ± 42	-45.3	12.3	256.0 ± 24.0	11.5 ± 0.6
†28	7.2	8/3/2015	0.0897 ± 0.0021	3.0670 ± 0.0780	0.24660 ± 0.00600	0.631	1423 ± 20	1420 ± 31	1424 ± 47	-0.2	0.2	248.0 ± 17.0	50.3 ± 3.6
†50	5.0	8/3/2015	0.0981 ± 0.0025	3.4500 ± 0.1000	0.25760 ± 0.00550	0.658	1515 ± 23	1477 ± 28	1596 ± 50	-2.6	1.7	208.0 ± 9.1	149.2 ± 4.5

† Short laser duration / high error: Duration of laser <8 seconds or uncertainty in 207Pb/235U age exceeds 5 Ma

‡ error correlation recalculated

* Discordant age: >5% discordant is either unreliable or is evaluated for discordia calculations. The cut-off used is an Uncertainty weighted age difference >1.2 for 206Pb/238U dates (dates younger than 1000Ma), or 207Pb/235U vs 206Pb/238U discordance >5% for 207Pb/206Pb dates (for dates older than 1000 Ma)

†24	21.7	11/12/2015	0.0730 ± 0.0330	0.0135 ± 0.0062	0.00185 ± 0.00018	0.038	14.0 ± 6.3	11.90 ± 1.10	-390 ± 770	15.0	0.3	69.3 ± 3.6	35.6 ± 1.9
†‡9	22.9	11/12/2015	0.0540 ± 0.0450	0.0153 ± 0.0096	0.00189 ± 0.00021	0.240	14.4 ± 9.6	12.20 ± 1.30	-1500 ± 1200	15.3	0.2	46.5 ± 4.8	13.1 ± 1.4
†78	14.4	11/12/2015	0.0600 ± 0.0520	0.0150 ± 0.0110	0.00191 ± 0.00022	0.063	14.0 ± 11.0	12.30 ± 1.40	-300 ± 1000	12.1	0.2	74.5 ± 7.4	18.2 ± 2.2
†‡83	19.2	11/12/2015	0.1290 ± 0.0610	0.0210 ± 0.0100	0.00192 ± 0.00021	0.240	22.0 ± 10.0	12.40 ± 1.30	530 ± 830	43.6	1.0	60.3 ± 1.8	16.4 ± 0.7
*5	21.6	11/12/2015	0.2620 ± 0.0420	0.0920 ± 0.0200	0.00239 ± 0.00018	0.834	83.0 ± 16.0	15.40 ± 1.10	2820 ± 310	81.4	4.2	129.6 ± 5.3	74.9 ± 3.8
†52	19.0	11/12/2015	0.0830 ± 0.0430	0.0248 ± 0.0098	0.00248 ± 0.00023	0.092	25.2 ± 9.9	16.00 ± 1.50	470 ± 740	36.5	0.9	55.8 ± 3.2	30.6 ± 1.6
‡*51	11.7	11/12/2015	0.0552 ± 0.0042	0.0608 ± 0.0050	0.00814 ± 0.00023	0.240	59.8 ± 4.8	52.20 ± 1.40	400 ± 160	12.7	1.6	333.0 ± 15.0	112.7 ± 4.0
*77	17.9	11/12/2015	0.0690 ± 0.0085	0.0780 ± 0.0096	0.00822 ± 0.00038	0.149	76.7 ± 9.2	52.80 ± 2.40	800 ± 240	31.2	2.6	146.0 ± 14.0	43.0 ± 3.2
†53	18.3	11/12/2015	0.0510 ± 0.0091	0.0640 ± 0.0100	0.00839 ± 0.00046	0.014	61.7 ± 9.8	53.90 ± 2.90	240 ± 310	12.6	0.8	65.4 ± 6.4	29.8 ± 2.5
†79	10.9	11/12/2015	0.0466 ± 0.0034	0.0748 ± 0.0054	0.01194 ± 0.00033	0.179	73.1 ± 5.1	76.50 ± 2.10	40 ± 140	-4.7	-0.7	319.0 ± 31.0	138.0 ± 13.0
*80	21.0	11/12/2015	0.1170 ± 0.0120	0.2460 ± 0.0290	0.01590 ± 0.00120	0.566	220.0 ± 24.0	101.70 ± 7.50	1840 ± 200	53.8	4.9	38.6 ± 3.6	6.2 ± 0.5
†57	16.4	11/12/2015	0.0483 ± 0.0047	0.1067 ± 0.0099	0.01685 ± 0.00052	0.122	102.3 ± 9.0	107.70 ± 3.30	90 ± 170	-5.3	-0.6	131.0 ± 12.0	4.9 ± 0.7
†62	17.1	11/12/2015	0.0487 ± 0.0034	0.1113 ± 0.0088	0.01693 ± 0.00069	0.472	106.7 ± 8.0	108.20 ± 4.40	120 ± 130	-1.4	-0.2	184.8 ± 9.3	55.1 ± 2.8
*87	19.6	11/12/2015	0.1078 ± 0.0016	3.5000 ± 0.2800	0.23400 ± 0.01700	0.980	1489 ± 70	1340 ± 90	1764 ± 28	10.0	2.1	215.0 ± 20.0	51.7 ± 2.4
†54	12.7	11/12/2015	0.0888 ± 0.0010	2.8530 ± 0.0560	0.23300 ± 0.00320	0.585	1369 ± 15	1350 ± 16	1397 ± 22	1.4	1.3	443.0 ± 14.0	3.3 ± 0.4
†85	19.2	11/12/2015	0.0873 ± 0.0009	2.9110 ± 0.0670	0.24240 ± 0.00440	0.941	1383 ± 18	1398 ± 23	1370 ± 20	-1.1	-0.8	592.0 ± 49.0	86.7 ± 4.5
†84	18.5	11/12/2015	0.1017 ± 0.0015	4.1350 ± 0.0890	0.29780 ± 0.00370	0.383	1660 ± 18	1680 ± 18	1651 ± 27	-1.2	-1.1	132.0 ± 17.0	81.0 ± 10.0
†89	9.2	11/12/2015	0.1037 ± 0.0013	4.3350 ± 0.0830	0.30510 ± 0.00370	0.521	1700 ± 16	1716 ± 18	1690 ± 24	-0.9	-1.0	668.0 ± 58.0	324.0 ± 25.0
†76	15.9	11/12/2015	0.1080 ± 0.0013	4.6410 ± 0.0920	0.30850 ± 0.00260	0.417	1756 ± 16	1735 ± 12	1768 ± 23	1.2	1.3	206.0 ± 14.0	69.7 ± 2.2
†63	12.0	11/12/2015	0.1062 ± 0.0015	4.6290 ± 0.1100	0.31420 ± 0.00540	0.734	1755 ± 20	1761 ± 27	1737 ± 25	-0.3	-0.3	278.0 ± 28.0	47.4 ± 4.6
†43	19.8	11/12/2015	0.1078 ± 0.0012	4.7200 ± 0.1400	0.31800 ± 0.00610	0.849	1772 ± 24	1779 ± 30	1762 ± 21	-0.4	-0.3	250.0 ± 39.0	28.3 ± 0.7
†75	9.9	11/12/2015	0.1614 ± 0.0020	10.5000 ± 0.2500	0.47120 ± 0.00800	0.814	2478 ± 22	2488 ± 35	2469 ± 21	-0.4	-0.5	353.0 ± 27.0	32.7 ± 1.7

† Short laser duration / high error: Duration of laser <8 seconds or uncertainty in 207Pb/235U age exceeds 5 Ma

‡ error correlation recalculated

* Discordant age: >5% discordant is either unreliable or is evaluated for discordia calculations. The cut-off used is an Uncertainty weighted age difference >1.2 for 206Pb/238U dates (dates younger than 1000Ma), or 207Pb/235U vs 206Pb/238U discordance >5% for 207Pb/206Pb dates (for dates older than 1000 Ma)

*16	14.0	1/5/2017	0.1281 ± 0.0024	6.0100 ± 0.1500	0.34280 ± 0.00780	0.802	1975 ± 22	1899 ± 38	2070 ± 33	-4.0	3.5	276.0 ± 13.0	103.4 ± 6.3
*47	17.9	1/5/2017	0.1631 ± 0.0038	8.2200 ± 0.2100	0.36150 ± 0.01000	0.616	2252 ± 23	1986 ± 49	2487 ± 39	-13.4	11.6	140.0 ± 11.0	55.1 ± 2.6
*52	17.9	1/5/2017	0.2669 ± 0.0052	22.2700 ± 0.5600	0.60400 ± 0.01300	0.775	3195 ± 24	3043 ± 54	3287 ± 31	-5.0	6.3	117.5 ± 2.1	48.1 ± 1.3

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