Swanson-Hysell, N.L., et al., 2020, Rapid emplacement of massive Duluth Complex intrusions within the North American Midcontinent Rift: Geology, v. 49, https://doi.org/10.1130/G47873.1

Data repository materials for "Rapid emplacement of massive Duluth Complex intrusions within the Midcontinent Rift"

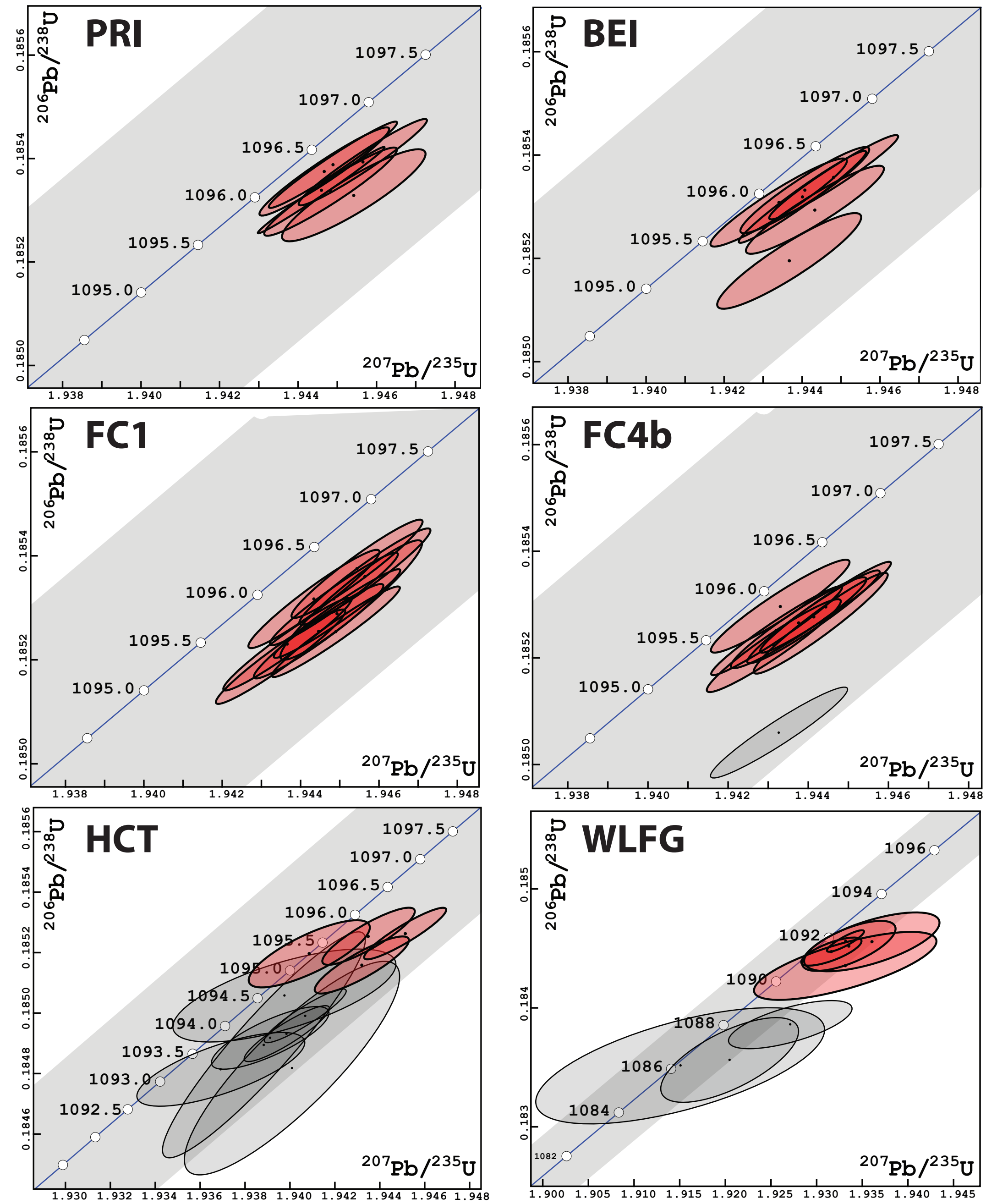

Figure DR1. U-Pb concordia plots for the new zircon dates. The grey region illustrates uncertainty on concordia due to decay constant uncertainties. Ellipses represent 2σ analytical uncertainty on individual zircon dates. Red ellipses are analyses included in the ^{206}Pb/^{238}U weighted mean dates while the grey ellipses are those that were excluded. The scale is the same for PRI, BEI, FC1 and FC4b and zoomed out for HCT and WLFG due to data that we interpret to have unmitigated Pb loss. Zircon dates for WLFG without chemical abrasion or with short abrasion duration included in Table DR1 are not shown.

CA-TIMS U-Pb Geochronology Methods

U-Pb dates were obtained by the chemical abrasion isotope dilution thermal ionization mass spectrometry (CA-TIMS) method from analyses composed of single zircon grains in the Boise State Isotope Geology Laboratory (Table DR1). Chemical abrasion was modified after Mattinson (2005). Zircon was separated from rocks using standard techniques, and placed in a muffle furnace at 900°C for 60 hours in quartz beakers. Following this thermal annealing, the zircon was chemically abraded. For this step, zircon was put into 3 ml Teflon PFA beakers and loaded into 300 μl Teflon PFA microcapsules. Fifteen microcapsules were placed in a large-capacity Parr vessel and the zircon partially dissolved in 120 μl of 29 M HF for 12 hours at 180°C with the exception of some WLFG zircon that either did not undergo this chemical abrasion step, for which a temperature of 160°C was used, or for which there was a shorter duration. The zircon data for which these method variants were applied are noted in Table DR1. Zircon was returned to 3 ml Teflon PFA beakers, HF was removed, and zircon was immersed in 3.5 M HNO_3, ultrasonically cleaned for an hour, and fluxed on a hotplate at 80°C for an hour. The HNO_3 was removed and zircon was rinsed twice in ultrapure H_2O before being reloaded into the 300 μl Teflon PFA microcapsules (rinsed and fluxed in 6 M HCl during sonication and washing of the zircon) and spiked with the EARTHTIME mixed ^{233}U-^{235}U-^{205}Pb tracer solution (ET535). Zircon was dissolved in Parr vessels in 120 μl of 29 M HF with a trace of 3.5 M HNO_3 at 220°C for 48 hours, dried to fluorides, and re-dissolved in 6 M HCl at 180°C overnight. U and Pb were separated from the zircon matrix using an HCl-based anion-exchange chromatographic procedure (Krogh, 1973), eluted together and dried with 2 μl of 0.05 N H_3PO_4.

Pb and U were loaded on a single outgassed Re filament in 5 μl of a silica-gel/phosphoric acid mixture (Gerstenberger and Haase, 1997), and U and Pb isotopic measurements made on a GV Isoprobe-T multicollector thermal ionization mass spectrometer equipped with an ion-counting Daly detector. Pb isotopes were measured by one of two routines depending upon beam intensities: a) by peak-jumping all isotopes on the Daly detector for 160 cycles, with a mass bias correction of 0.18 $\pm$ 0.03%/a.m.u. (1σ); or b) by a two-sequence dynamic routine, with high mass Faraday cups at unit Pb spacing, alternating mass 204 and 205 onto the axial Daly detector, with the Faraday-Daly gain calibrated for each cycle with mass 205, and a mass-bias correction of 0.10 $\pm$ 0.03%/a.m.u. (1σ) for Faraday cup signals. Transitory isobaric interferences due to high-molecular weight organics, particularly on ^{204}Pb and ^{207}Pb, disappeared within approximately 30 cycles, while ionization efficiency averaged 10^4 cps/pg of each Pb isotope. Linearity (to $\geq$1.4 x 10^6 cps) and the associated deadtime correction of the Daly detector were determined by analysis of NBS982. Uranium was analyzed as UO_2^+ ions in static Faraday mode on 10^{11} ohm resistors for 300 cycles, and corrected for isobaric interference of ^{233}U^{18}O^{16}O on ^{235}U^{16}O^{16}O with an ^{18}O/^{16}O of 0.00206. Ionization efficiency averaged 20 mV/ng of each U isotope. U mass fractionation was corrected using the ^{233}U/^{235}U ratio of the ET535 tracer.

CA-TIMS U-Pb dates and uncertainties were calculated using the algorithms of Schmitz and Schoene (2007), ET535 tracer solution (Condon et al., 2015) with calibration of ^{235}U/^{205}Pb = 100.233, ^{233}U/^{235}U = 0.99506, and ^{205}Pb/^{204}Pb = 11268, and U decay constants recommended by Jaffey et al. (1971), including ^{238U}/^{235}U of 137.88. ^{206}Pb/^{238}U ratios and dates were corrected for initial ^{230}Th disequilibrium using as a Th/U [magma] value of 3. All common Pb in analyses was attributed to laboratory blank and subtracted based on the measured laboratory Pb isotopic composition and associated uncertainty. U blanks are estimated at 0.013 pg.

Table DR1. Zircon chemical abrasion IDTIMS U-Pb isotopic data

	Compositional Parameters						Radiogenic Isotope Ratios								Isotopic Ages					
Sample (a)	$\frac{Th}{U}$ (b)	$^{206}Pb^*$ x10^{-13} mol (c)	mol % $^{206}Pb^*$ (c)	$\frac{Pb^*}{Pb_c}$ (c)	Pb_c (pg) (c)	$\frac{^{206}Pb}{^{204}Pb}$ (d)	$\frac{^{208}Pb}{^{206}Pb}$ (e)	$\frac{^{207}Pb}{^{206}Pb}$ (e)	% err (f)	$\frac{^{207}Pb}{^{235}U}$ (e)	% err (f)	$\frac{^{206}Pb}{^{238}U}$ (e)	% err (f)	corr. coef.	$\frac{^{207}Pb}{^{206}Pb}$ (g)	± (f)	$\frac{^{207}Pb}{^{235}U}$ (g)	± (f)	$\frac{^{206}Pb}{^{238}U}$ (g)	± (f)
PRI *Partridge River intrusion* (Duluth Complex layered series)																				
z2	0.665	20.7388	0.9995	599	0.91	34763	0.201	0.0761152	0.042	1.94565	0.084	0.185393	0.045	0.967	**1098.10**	**0.84**	1096.95	0.56	**1096.37**	**0.45**
z5	0.795	15.3708	0.9993	470	0.89	26480	0.241	0.0760872	0.042	1.94489	0.084	0.185388	0.045	0.974	**1097.37**	**0.84**	1096.68	0.56	**1096.34**	**0.45**
z1	0.714	21.4970	0.9992	415	1.38	23809	0.216	0.0760841	0.043	1.94467	0.085	0.185375	0.046	0.959	**1097.29**	**0.87**	1096.61	0.57	**1096.27**	**0.46**
z6	0.624	12.4836	0.9992	392	0.83	22979	0.189	0.0760958	0.039	1.94459	0.083	0.185339	0.045	0.991	**1097.59**	**0.78**	1096.58	0.56	**1096.08**	**0.46**
z4	0.610	11.0228	0.9988	272	1.05	15998	0.185	0.0761063	0.045	1.94483	0.087	0.185336	0.046	0.952	**1097.87**	**0.91**	1096.66	0.59	**1096.06**	**0.47**
z3	0.669	4.5808	0.9983	192	0.63	11152	0.203	0.0761323	0.055	1.94542	0.094	0.185329	0.048	0.898	**1098.55**	**1.11**	1096.87	0.63	**1096.02**	**0.48**
weighted mean 206Pb/238U age = 1096.19 ± 0.19 (0.36) [1.15] Ma (2s); MSWD = 0.45 (n=6)																				
weighted mean 207Pb/206Pb age = 1097.71 ± 0.36 [5.1] Ma (2s); MSWD = 1.00 (n=6)																				
FC-4b *Forest Center anorthosite* (Duluth Complex anorthositic series)																				
z10	0.732	8.7414	0.9986	233	1.01	13304	0.222	0.0760627	0.047	1.94330	0.089	0.185297	0.047	0.946	**1096.72**	**0.94**	1096.14	0.60	**1095.85**	**0.47**
z2	0.686	30.2158	0.9996	721	1.11	41626	0.208	0.0761076	0.041	1.94443	0.084	0.185295	0.046	0.968	**1097.90**	**0.82**	1096.53	0.56	**1095.84**	**0.47**
z4	0.705	20.9839	0.9995	610	0.92	35079	0.214	0.0761032	0.042	1.94413	0.085	0.185277	0.047	0.963	**1097.79**	**0.83**	1096.42	0.57	**1095.74**	**0.48**
z11	0.716	11.7511	0.9989	288	1.09	16503	0.217	0.0760929	0.045	1.94376	0.087	0.185266	0.046	0.954	**1097.51**	**0.90**	1096.30	0.58	**1095.68**	**0.47**
z3	0.637	48.5088	0.9998	1280	0.99	74775	0.193	0.0761148	0.040	1.94431	0.086	0.185265	0.051	0.957	**1098.09**	**0.81**	1096.48	0.58	**1095.68**	**0.51**
z1	0.630	18.1802	0.9994	548	0.87	32063	0.191	0.0760777	0.042	1.94321	0.084	0.185251	0.045	0.969	**1097.12**	**0.84**	1096.11	0.56	**1095.60**	**0.46**
z6	0.659	12.0405	0.9992	397	0.80	23077	0.199	0.0760863	0.044	1.94314	0.086	0.185223	0.047	0.955	**1097.34**	**0.87**	1096.08	0.58	**1095.45**	**0.48**
z5	0.467	9.6852	0.9988	256	0.95	15587	0.141	0.0761585	0.046	1.94327	0.088	0.185060	0.046	0.952	1099.24	0.92	1096.13	0.59	1094.56	0.47
weighted mean 206Pb/238U age = 1095.69 ± 0.18 (0.35) [1.14] Ma (2s); MSWD = 0.34 (n=7)																				
weighted mean 207Pb/206Pb age = 1097.51 ± 0.32 [5.1] Ma (2s); MSWD = 1.20 (n=7)																				
FC-1 *Forest Center anorthosite* (Duluth Complex anorthositic series)																				
z21	0.347	89.3479	0.9999	4055	0.54	254586	0.105	0.0761142	0.040	1.94544	0.086	0.185375	0.051	0.958	**1098.08**	**0.80**	1096.87	0.58	**1096.27**	**0.51**
z23	1.362	38.6752	0.9998	1969	0.60	97907	0.412	0.0761283	0.040	1.94564	0.086	0.185360	0.050	0.959	**1098.45**	**0.81**	1096.95	0.57	**1096.19**	**0.51**
z22	0.614	135.1333	1.0000	8332	0.42	489236	0.186	0.0760948	0.040	1.94434	0.086	0.185317	0.051	0.958	**1097.56**	**0.80**	1096.50	0.57	**1095.96**	**0.51**
z26	1.443	63.5688	0.9999	4620	0.43	225979	0.437	0.0761149	0.040	1.94485	0.084	0.185317	0.048	0.965	**1098.09**	**0.80**	1096.67	0.56	**1095.96**	**0.48**
z20	1.508	98.5654	0.9999	4740	0.66	228892	0.457	0.0761327	0.040	1.94529	0.093	0.185315	0.062	0.944	**1098.56**	**0.80**	1096.82	0.62	**1095.95**	**0.63**
z25	0.684	41.1099	0.9998	2139	0.51	123514	0.207	0.0761295	0.040	1.94493	0.083	0.185289	0.046	0.970	**1098.48**	**0.80**	1096.70	0.56	**1095.81**	**0.47**
z19	0.715	125.9011	0.9999	5523	0.61	316609	0.217	0.0761253	0.040	1.94446	0.085	0.185255	0.049	0.961	**1098.37**	**0.80**	1096.54	0.57	**1095.62**	**0.50**
z27	0.547	56.2585	0.9998	1614	0.89	96360	0.166	0.0761425	0.040	1.94490	0.084	0.185254	0.047	0.968	**1098.82**	**0.81**	1096.69	0.56	**1095.62**	**0.47**
z18	1.414	46.2410	0.9998	1865	0.77	91792	0.428	0.0761037	0.040	1.94366	0.084	0.185230	0.048	0.965	**1097.80**	**0.81**	1096.26	0.57	**1095.49**	**0.48**
z24	1.439	92.3175	0.9999	6768	0.43	331313	0.436	0.0761075	0.040	1.94349	0.085	0.185206	0.049	0.962	**1097.90**	**0.80**	1096.20	0.57	**1095.35**	**0.50**
weighted mean 206Pb/238U age = 1095.81 ± 0.16 (0.34) [1.14] Ma (2s); MSWD = 1.44 (n=10)																				
weighted mean 207Pb/206Pb age = 1098.21 ± 0.25 [5.0] Ma (2s); MSWD = 0.94 (n=10)																				
BEI *Bald Eagle intrusion* (Duluth Complex layered series)																				
z4	0.681	16.1663	0.9991	341.8	1.25	19772	0.206	0.0760969	0.044	1.94481	0.085	0.185357	0.044	0.966	**1097.62**	**0.87**	1096.66	0.57	**1096.17**	**0.45**
z6a	0.649	30.1146	0.9997	914	0.86	53261	0.197	0.0760783	0.045	1.94407	0.085	0.185332	0.045	0.942	**1097.13**	**0.91**	1096.40	0.57	**1096.04**	**0.46**
z6b	0.841	24.9060	0.9996	803	0.85	44740	0.255	0.0760813	0.039	1.94401	0.084	0.185319	0.048	0.974	**1097.21**	**0.79**	1096.38	0.56	**1095.97**	**0.48**
z5	0.652	4.7525	0.9983	186	0.67	10867	0.197	0.0760617	0.050	1.94340	0.090	0.185308	0.046	0.942	**1096.70**	**0.99**	1096.17	0.61	**1095.91**	**0.46**
z3	0.576	6.7271	0.9982	178	0.97	10592	0.174	0.0761041	0.052	1.94433	0.091	0.185294	0.046	0.928	**1097.81**	**1.04**	1096.49	0.61	**1095.83**	**0.46**
z1	0.523	5.9782	0.9981	159	0.96	9575	0.158	0.0761187	0.054	1.94367	0.095	0.185195	0.050	0.912	**1098.19**	**1.07**	1096.26	0.64	**1095.29**	**0.50**
weighted mean 206Pb/238U age = 1095.89 ± 0.19 (0.36) [1.15] Ma (2s); MSWD = 1.59 (n=6)																				
weighted mean 207Pb/206Pb age = 1097.40 ± 0.38 [5.1] Ma (2s); MSWD = 1.14 (n=6)																				
HCT *Houghtaling Creek troctolite* (Beaver Bay Complex)																				
z7	0.765	11.6934	0.9978	149	2.12	8437	0.232	0.0761478	0.055	1.94513	0.094	0.185263	0.046	0.920	**1098.96**	**1.10**	1096.77	0.63	**1095.66**	**0.47**
z6	0.666	4.7620	0.9968	101	1.24	5877	0.202	0.0760881	0.067	1.94350	0.106	0.185254	0.051	0.870	**1097.39**	**1.34**	1096.21	0.71	**1095.61**	**0.52**
z1	0.396	3.7022	0.9945	54	1.68	3382	0.120	0.0760085	0.099	1.94086	0.139	0.185196	0.060	0.784	1095.29	1.98	1095.30	0.93	**1095.30**	**0.60**
z10	0.719	3.5063	0.9965	94	1.00	5380	0.218	0.0761151	0.069	1.94320	0.108	0.185159	0.051	0.865	**1098.10**	**1.39**	1096.10	0.73	**1095.10**	**0.51**
z4	1.566	1.3175	0.9876	31	1.36	1502	0.474	0.0760216	0.210	1.93975	0.256	0.185058	0.083	0.671	1095.64	4.19	1094.91	1.71	1094.55	0.83
z9	1.053	4.8694	0.9980	173	0.81	9209	0.319	0.0760857	0.054	1.94068	0.094	0.184991	0.048	0.920	**1097.33**	**1.07**	1095.23	0.63	1094.18	0.48
z12	1.398	4.7973	0.9977	167	0.89	8245	0.424	0.0760778	0.057	1.93986	0.098	0.184932	0.050	0.902	**1097.12**	**1.14**	1094.95	0.66	1093.86	0.50
z11	0.687	2.1862	0.9947	61	0.95	3536	0.208	0.0760543	0.096	1.93912	0.135	0.184918	0.056	0.792	**1096.50**	**1.93**	1094.69	0.90	1093.79	0.57
z14	0.404	1.0610	0.9951	61	0.43	3817	0.122	0.0760529	0.086	1.93884	0.233	0.184895	0.202	0.932	**1096.46**	**1.71**	1094.60	1.56	1093.66	2.04
z8	2.079	1.5846	0.9926	57	0.97	2508	0.630	0.0761335	0.128	1.94009	0.247	0.184818	0.191	0.858	**1098.58**	**2.57**	1095.03	1.65	1093.24	1.92
z5	1.078	2.7707	0.9909	39	2.08	2053	0.327	0.0760109	0.152	1.93692	0.193	0.184814	0.066	0.724	1095.36	3.03	1093.94	1.29	1093.22	0.67
weighted mean 206Pb/238U age = 1095.44 ± 0.26 (0.40) [1.16] Ma (2s); MSWD = 1.13 (n=4)																				
weighted mean 207Pb/206Pb age = 1097.63 ± 0.48 [5.1] Ma (2s); MSWD = 1.62 (n=8)																				
WLFG *Wilson Lake ferrogabbro* (Beaver Bay Complex)																				
z2	1.225	3.6441	0.9967	111	0.98	5701	0.371	0.0759668	0.066	1.93316	0.105	0.184562	0.049	0.880	**1094.20**	**1.32**	1092.63	0.70	**1091.85**	**0.49**
z9	1.236	1.2015	0.9806	18	1.96	958	0.375	0.0760828	0.312	1.93604	0.383	0.184555	0.134	0.651	**1097.25**	**6.25**	1093.63	2.56	**1091.81**	**1.35**
z16	1.209	0.7717	0.9872	28	0.82	1452	0.366	0.0759981	0.205	1.93352	0.265	0.184521	0.114	0.685	**1095.02**	**4.10**	1092.76	1.77	**1091.62**	**1.15**
z26*	1.115	1.3194	0.9923	45	0.85	2401	0.338	0.0759428	0.131	1.93161	0.171	0.184473	0.064	0.743	**1093.56**	**2.62**	1092.10	1.15	**1091.36**	**0.65**
z19	2.350	0.3987	0.9715	15	0.96	652	0.712	0.0760519	0.419	1.93313	0.517	0.184353	0.155	0.724	**1096.44**	**8.38**	1092.62	3.46	**1090.71**	**1.55**
z27*	2.410	0.7114	0.9816	24	1.10	1010	0.730	0.0760187	0.290	1.92711	0.351	0.183859	0.110	0.666	**1095.56**	**5.80**	1090.54	2.35	1088.02	1.10
z21^	0.864	0.7751	0.9872	26	0.82	1456	0.262	0.0761744	0.207	1.92984	0.268	0.183743	0.116	0.681	1099.66	4.14	1091.48	1.79	1087.39	1.16
z28*	1.613	0.4676	0.9820	21	0.71	1031	0.489	0.0758794	0.298	1.92047	0.393	0.183562	0.194	0.676	1091.89	5.98	1088.23	2.62	1086.40	1.94
z18	1.210	0.2411	0.9586	8	0.86	450	0.367	0.0756855	0.693	1.91505	0.826	0.183513	0.266	0.620	1086.76	13.89	1086.35	5.51	1086.14	2.66
z22†	2.049	8.4437	0.9964	118	2.51	5108	0.621	0.0760155	0.066	1.91398	0.105	0.182614	0.050	0.867	1095.48	1.33	1085.97	0.70	1081.24	0.50
z25†	2.317	7.1459	0.9920	54	4.83	2211	0.702	0.0758945	0.079	1.90443	0.119	0.181993	0.056	0.830	1092.29	1.57	1082.64	0.79	1077.85	0.55
z24†	2.234	5.9767	0.9911	48	4.51	1984	0.677	0.0759124	0.086	1.89255	0.127	0.180815	0.058	0.816	1092.76	1.72	1078.48	0.84	1071.42	0.57
z23†	2.428	18.5179	0.9956	100	6.93	3953	0.737	0.0759089	0.053	1.88488	0.097	0.180090	0.052	0.914	1092.67	1.07	1075.78	0.64	1067.47	0.51
weighted mean 206Pb/238U age = 1091.63 ± 0.35 (0.46) [1.18] Ma (2s); MSWD = 0.74 (n=5)																				
weighted mean 207Pb/206Pb age = 1094.3 ± 1.1 [5.2] Ma (2s); MSWD = 0.36 (n=6)																				

(a) z1, z2 etc. are labels for single zircon fragments annealed and chemically abraded in a single 180°C step for 12 hours modified from Mattinson (2005), with the exception of WLFG analyses marked as * (160°C for 12 hours), ^ (180°C for 6 hours), and † (no chemical abrasion). Bold indicates analyses used in weighted mean calculations.

(b) Model Th/U ratio iteratively calculated from the radiogenic 208Pb/206Pb ratio and 206Pb/238U age.

(c) Pb* and Pbc represent radiogenic and common Pb, respectively; mol % $^{206}Pb^*$ with respect to radiogenic, blank and initial common Pb.

(d) Measured ratio corrected for spike and fractionation only. Fractionation estimated at 0.18 (Daly) or 0.10 (Faraday) ± 0.02 %/a.m.u. based on analysis of NBS-981 & 982.

(e) Corrected for fractionation, spike, and common Pb; all common Pb was assumed to be procedural blank: 206Pb/204Pb = 18.60 ± 0.72%; 207Pb/204Pb = 15.69 ± 0.62%; 208Pb/204Pb = 38.51 ± 0.74% (all uncertainties 1-sigma). Isotope dilution measurements made with the ET535 spike (Condon et al., 2015).

(f) Errors are 2-sigma, propagated using the algorithms of Schmitz and Schoene (2007). Uncertainties for single grain dates, that are propagated into the weighted means, are based upon nonsystematic analytical errors, including counting statistics, instrumental fractionation, tracer subtraction, and blank subtraction. The first weighted mean daten uncertainty is based on propagation of this analytical uncertainty. The second uncertainty (in parentheses) is the combined analytical and tracer uncertainty. The third uncertainty [in brackets] is the combined analytical, tracer and 238U decay constant uncertainty.

(g) Calculations are based on the decay constants of Jaffey et al. (1971) and natural 238U/233U ratio of 137.88 (Steiger and Jäger, 1977). All ratios and ages corrected for initial 230Th/238U disequilibrium with Th/U [magma] = 3.

Table DR2. $^{207}Pb/^{206}Pb$ dates for the Midcontinent Rift intrusion dates discussed in the paper using both the Steiger and Jäger (1977) and Hiess et al. (2012) $^{238}U/^{235}U$ ratios

Sample	$^{207}Pb/^{206}Pb$ date (Ma) $^{238}U/^{235}U$ = 137.818 Hiess et al. (2012)	$^{207}Pb/^{206}Pb$ date (Ma) $^{238}U/^{235}U$ = 137.88 Steiger and Jäger (1977)	Uncertainty (2σ) X	Z	MSWD	n/N
PRI *Partridge River intrusion*	1096.83	1097.73	0.36	5.1	1.00	6/6
BEI *Bald Eagle intrusion*	1096.50	1097.40	0.38	5.1	1.14	6/6
AS3 *Duluth anorthosite*	1097.69	1098.59	0.33	5.1	0.37	8/8
FC1 *Forest Center anorthosite*	1097.31	1098.21	0.25	5.1	0.94	10/10
FC4b *Forest Center anorthosite*	1096.63	1097.53	0.32	5.1	1.20	7/8
HCT *Houghtaling Creek troctolite*	1096.73	1097.63	0.48	5.1	1.62	8/11
WLFG *Wilson Lake ferrogabbro*	1093.42	1094.32	1.09	5.2	0.36	6/13
BBC-SBA1 *Silver Bay aplite*	1093.10	1094.00	0.51	5.1	0.84	6/6

Notes: X–internal (analytical) uncertainty in the absence of external or systematic uncertainties; Z–uncertainty including X, as well as decay constant uncertainty (Jaffey et al., 1971)). This Z uncertainty needs to be utilized when comparing to dates developed using other decay systems (e.g., $^{40}Ar/^{39}Ar$, ^{187}Re-^{187}Os); MSWD–mean square of weighted deviates; n–number of individual zircon dates included in the calculated sample mean date; N–number of individual zircons analyzed for the sample. All dates are from this study with the exceptions of AS3 which was published in Schoene et al. (2006) and BBC-SBA1 which was published in Fairchild et al. (2017). Most $^{207}Pb/^{206}Pb$ dates in the literature for the Midcontinent Rift use the $^{238}U/^{235}U$ = 137.88 of Steiger and Jäger (1977).

Table DR3. Site level paleomagnetic data

site	site lat	site lon	n	dec_{is}	inc_{is}	dec_{tc}	inc_{tc}	k	α_{95}	VGP lat	VGP lon
FC1 (AF)	47.7826	-91.3265	9	301.6	40.5	297.1	52.4	32	9.3	41.3	185.0
FC1 (thermal)	47.7826	-91.3265	9	289.7	34.4	284.1	45.1	64	6.5	28.6	187.8
FC4 (AF)	47.7625	-91.3827	7	296.0	26.8	292.6	38.3	59	7.9	30.8	177.4
HCT1 (AF)	47.6008	-91.1495	7	287.2	35.6	281.0	46.0	54	8.3	26.9	190.8
HCT1 (thermal)	47.6008	-91.1495	6	285.7	45.3	276.3	55.3	144	5.6	29.5	201.0
1 (Beck layered)	46.68	-92.24	4	279.5	47.5	287.7	64.4	51	9.8	42.0	205.2
3 (Beck layered)	46.68	-92.24	4	292.0	26.5	298.0	41.9	17	17.2	36.3	175.6
4 (Beck layered)	46.68	-92.24	3	279.5	36.0	284.5	53.0	20	18.0	33.0	193.5
5 (Beck layered)	46.68	-92.24	3	279.5	55.0	291.8	71.7	14	22.0	48.4	217.4
6 (Beck layered)	46.68	-92.24	1	280.5	32.0	285.0	48.9			31.1	189.7
7 (Beck layered)	46.68	-92.24	5	278.0	33.0	282.0	50.1	85	6.8	29.7	192.7
8 (Beck layered)	46.68	-92.24	7	290.5	43.0	301.6	58.3	345	2.8	47.5	189.4
9 (Beck layered)	46.68	-92.23	3	281.5	42.0	288.7	58.7	35	13.6	39.2	197.0
10 (Beck layered)	46.70	-92.23	3	297.5	30.5	305.6	44.9	15	21.2	43.0	172.0
11 (Beck layered)	46.70	-92.22	1	284.0	30.5	289.2	47.0			32.9	185.6
12 (Beck layered)	46.72	-92.21	5	284.5	36.0	291.1	52.4	43	9.6	37.1	188.9
13 (Beck layered)	46.69	-92.24	6	281.5	28.0	285.6	44.8	437	2.7	29.3	186.4
14 (Beck layered)	46.72	-92.20	7	287.0	35.0	294.1	51.1	334	2.9	38.4	185.8
15 (Beck layered)	46.73	-92.21	2	290.0	31.5	296.9	47.2			38.2	180.4
17 (Beck layered)	46.74	-92.19	3	279.5	37.0	284.7	54.0	80	9.1	33.8	194.3
19 (Beck layered)	46.75	-92.19	4	288.0	35.0	295.3	50.9	51	9.8	39.2	184.8
20 (Beck layered)	46.77	-92.15	3	282.0	33.0	287.1	49.7	444	3.8	33.0	189.1
25 (Beck layered)	46.78	-92.12	1	273.5	18.5	274.9	36.0			17.7	188.5
27 (Beck layered)	46.77	-92.15	1	310.0	40.5	324.6	51.6			59.4	162.2
30 (Beck layered)	46.77	-92.14	1	284.0	36.5	290.6	53.0			37.1	189.8
32 (Beck layered)	46.77	-92.14	1	290.0	36.0	298.2	51.6			41.5	183.5
33 (Beck layered)	46.77	-92.15	2	288.0	32.0	294.5	48.0			37.0	182.7
35 (Beck layered)	46.79	-92.23	8	290.0	23.5	294.9	39.3	194	3.6	32.9	176.1
36 (Beck layered)	46.78	-92.21	2	276.0	27.0	278.6	44.3			24.3	190.6
37 (Beck layered)	46.79	-92.25	2	273.0	29.0	275.0	46.5			23.1	194.3
92 (Beck layered)	46.81	-92.10	3	290.0	41.5	300.2	57.0	16	20.1	45.9	188.3
93 (Beck layered)	46.83	-92.18	5	284.5	24.5	288.6	41.0	151	5.1	29.4	181.7
94 (Beck layered)	46.85	-92.04	4	291.0	36.5	299.6	51.9	107	6.8	42.7	182.9
97 (Beck layered)	46.78	-92.12	2	281.0	28.5	285.0	45.4			29.2	187.2
98 (Beck layered)	46.77	-92.13	6	288.5	34.0	295.7	49.9	115	5.3	38.8	183.6
99 (Beck layered)	46.77	-92.12	3	287.0	35.0	294.1	51.1	39	13.0	38.4	185.8
103 (Beck layered)	46.75	-92.18	2	276.0	29.0	278.8	46.3			25.5	191.8
215 (Beck layered)	48.08	-90.77	2	281.0	48.0	290.2	64.7			44.4	204.8
217 (Beck layered)	46.79	-92.20	5	287.0	41.0	296.0	57.0	53	8.6	43.0	190.8
218 (Beck layered)	46.79	-92.18	6	284.5	27.5	289.2	44.0	62	7.3	31.3	183.3
219 (Beck layered)	46.79	-92.17	5	284.5	33.5	290.5	49.9	10	19.7	35.3	187.1
220 (Beck layered)	46.80	-92.15	5	284.0	30.5	289.2	47.0	291	3.7	32.9	185.6
221 (Beck layered)	46.79	-92.14	5	290.5	27.5	296.4	43.2	1433	1.7	35.8	177.6
18 (Beck anorthosite)	46.75	-92.17	7	279.0	37.5	284.1	54.5	91	5.5	33.7	195.2
21 (Beck anorthosite)	46.77	-92.15	2	290.0	42.0	300.5	57.5			46.3	188.8
22 (Beck anorthosite)	46.78	-92.12	6	275.0	40.5	279.1	57.8	10	17.8	32.6	201.4
23 (Beck anorthosite)	46.78	-92.12	2	295.5	39.5	306.5	54.0			48.5	180.6
26 (Beck anorthosite)	46.77	-92.15	2	309.5	43.5	325.8	54.5			61.9	165.6
31 (Beck anorthosite)	46.77	-92.14	1	278.0	33.0	282.0	50.1			29.7	192.7
38 (Beck anorthosite)	46.83	-92.11	2	262.0	33.0	260.9	50.6			16.7	206.2
40 (Beck anorthosite)	46.83	-92.09	2	309.0	35.0	320.7	46.6			54.0	160.2
101 (Beck anorthosite)	46.76	-92.16	2	296.5	37.5	306.9	51.9			47.6	177.7
102 (Beck anorthosite)	46.75	-92.18	1	275.0	29.0	277.6	46.4			24.7	192.7
222 (Beck anorthosite)	46.76	-92.15	5	270.5	43.0	273.0	60.6	75	7.3	30.7	207.6

Notes: n–number of samples analyzed and included in the site mean; dec– mean declination for the site (is = insitu; tc = tilt-corrected); inc–mean inclination for the site; k–Fisher precision parameter; α_{95}–95% confidence limit in degrees; VGP lat–latitude of the virtual geomagnetic pole for the site; VGP lon–longitude of the virtual geomagnetic pole for the site. Sites in **bold** were included in the calculation of the mean pole (filtered for $\alpha_{95} < 15^{\circ}$ and so that only one site for FC1 and HCT). The resulting mean pole is: 188.7°E, 35.6°N, N=24, A_{95}=3.1, k=92.

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