SUPPLEMENTARY INFORMATION

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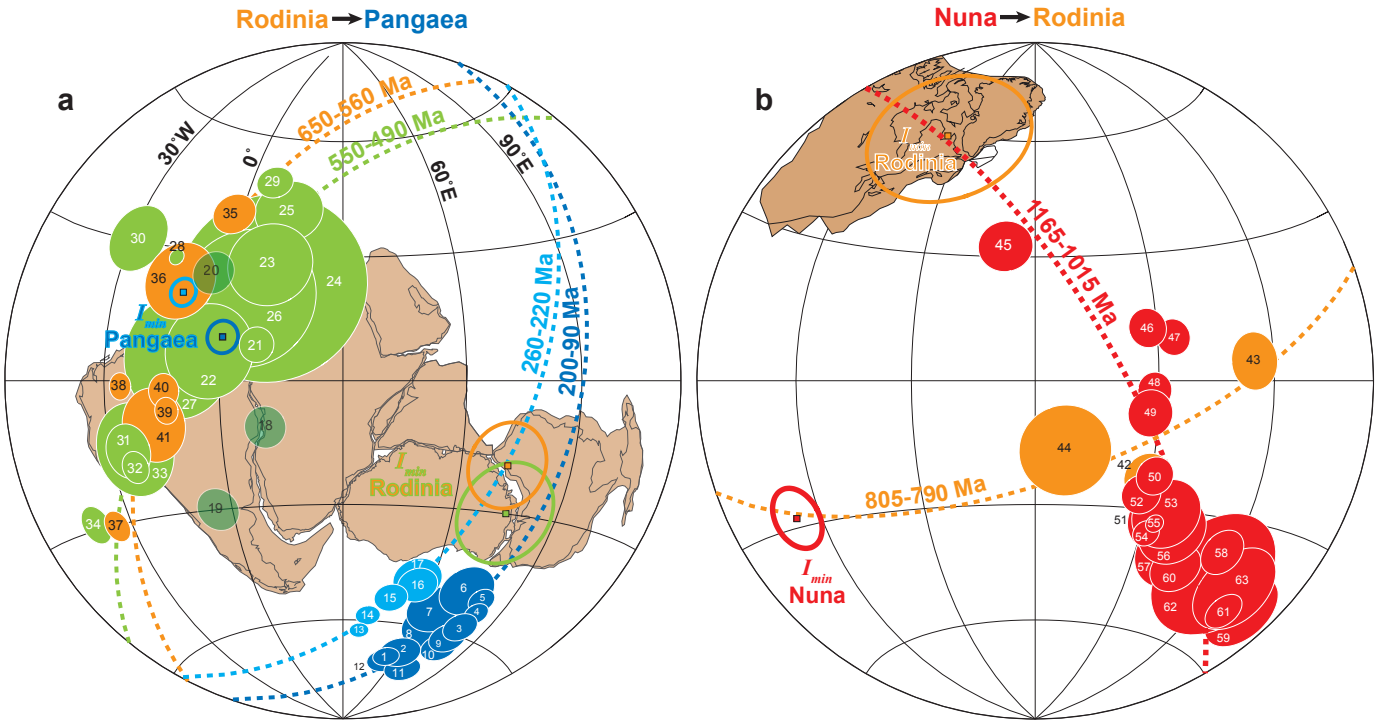

Figure S1 Supplemental version of Figure 2 with poles numbered to give a sense of age order. Pole numbers come from Table S1. TPW appears to occur in an oscillatory fashion for past ~1 billion years.

Table S1. Palaeomagnetic poles used in analysis in both local and rotated coordinates.

Paleomag. pole		#	Age (Ma)	Local Ref.frame	Local coordinates Lat (°N)	Long (°E)	A95 (°)	Rotated coordinates Lat (°N)	Long (°E)	Ref.
Pangaea breakup TPW								***rotated to S. Africa***		
mean		1	90	S. Africa	-69.5	054.7	2.6	-69.5	054.7	42
mean		2	100	S. Africa	-67.7	060.8	4.1	-67.7	060.8	42
mean		3	110	S. Africa	-57.9	079.2	3.6	-57.9	079.2	42
mean		4	120	S. Africa	-53.8	081.3	2.6	-53.8	081.3	42
mean		5	130	S. Africa	-50.6	080.0	2.9	-50.6	080.0	42
mean		6	140	S. Africa	-49.2	073.1	6.1	-49.2	073.1	42
mean		7	150	S. Africa	-55.2	065.0	5.9	-55.2	065.0	42
mean		8	160	S. Africa	-59.3	067.0	6.0	-59.3	067.0	42
mean		9	170	S. Africa	-61.2	077.6	3.8	-61.2	077.6	42
mean		10	180	S. Africa	-64.1	077.4	3.6	-64.1	077.4	42
mean		11	190	S. Africa	-71.8	068.8	3.5	-71.8	068.8	42
mean		12	200	S. Africa	-70.8	054.4	3.2	-70.8	054.4	42
										42
mean		13	220	S. Africa	-62.8	037.2	2.0	-62.8	037.2	42
mean		14	230	S. Africa	-58.6	040.0	2.6	-58.6	040.0	42
mean		15	240	S. Africa	-53.5	047.4	3.6	-53.5	047.4	42
mean		16	250	S. Africa	-49.6	055.4	4.4	-49.6	055.4	42
mean		17	260	S. Africa	-48.1	054.8	5.4	-48.1	054.8	42
post-Rodinia TPW								***rotated to S. Africa***		
Late Devonian	Late Dev	18	ca. 370	S. Africa	-11.0	011.0	N.A.	-11.0	011.0	43
Silurian-Devonian	Sil-Dev	19	ca. 410	S. Africa	-30.0	356.0	N.A.	-30.0	356.0	43
Late Ordovician	Late Ord	20	ca. 450	S. Africa	25.0	356.0	N.A.	25.0	356.0	43
Black Hill norite	BHn	21	ca. 490	Australia	-37.5	034.4	4.2	08.5	009.0	44
Carion granite	Car	22	509	Madagascar	-07.0	001.0	11.0	06.8	357.2	45
Hugh R / Jay Ck	HR/JC	23	510	Australia	-19.3	039.1	10.0	27.8	010.7	46
Sierra Animas 1	Sanim	24	510	S. America	06.0	338.0	22.9	22.5	011.4	47
Zanuck granite	Zanu	25	515	Antarctica	-07.1	038.8	7.7	41.2	013.8	48
Aroona Dam seds.	Aroo	26	515	Australia	-26.0	033.0	16.5	19.6	005.7	49
Virgation granites	Virg	27	521	Madagascar	-07.0	353.0	14.0	05.3	349.4	50
Ntonya ring cx.	Nton	28	522	S. Africa	27.8	344.9	1.8	27.8	344.9	51
Wyatt Ackerman	Wyatt	29	525	Antarctica	01.1	039.3	4.0	48.2	007.5	48
Itabaiana dykes	Itab	30	525	S. America	34.9	314.6	7.3	30.6	331.9	52
Todd River dolost.	Todd	31	525	Australia	-43.2	339.9	5.9	-15.1	334.9	53
upper Arumbera	uAr	32	534	Australia	-46.6	337.4	3.5	-18.7	336.1	53
lower Arumbera	lAr	33	ca. 545	Australia	-44.3	341.9	10.2	-14.9	336.7	53
Sinyai metadolerite	Sin	34	547	S. Africa	-29.0	319.0	3.9	-29.0	319.0	54
Wonoka dolost.	Wonok	35	ca. 560	Australia (S)	-05.2	030.5	4.9	39.4	357.7	55
Bunyeroo redbeds	Buny	36	ca. 580	Australia (S)	-18.1	016.3	8.8	22.6	347.4	56
Brachina redbeds	Brach	37	ca. 600	Australia (S)	-46.0	315.4	3.3	-30.3	325.3	55
Nuccaleena dolost.	Nucc	38	ca. 635	Australia (S)	-32.3	350.8	2.9	-01.2	334.4	57
Elatina Fm	ElatFm	39	ca. 640	Australia (S)	-43.7	359.3	3.0	-06.7	346.4	57
Elatina (sites)	ElatS	40	ca. 640	Australia (S)	-39.7	001.9	3.9	-02.3	345.9	58
Yaltipena redbeds	Yalti	41	ca. 650	Australia (S)	-44.2	352.7	8.2	-09.8	342.7	58

Rodinia breakup TPW								***rotated to N. America***		
Svanbergfjellet	Svan	42	ca. 790	Svalbard	-25.9	046.8	5.8	-22.7	359.1	59
Grusdievbreen2	Gru2	43	ca. 800	Svalbard	01.1	072.6	6.2	04.2	024.8	59
Grusdievbreen1	Gru1	44	ca. 805	Svalbard	-19.6	024.9	11.0	-16.8	337.5	59
post-Nuna TPW								***rotated to N. America***		
Haliburton 'A'	Hal	45	1015	N. America	-32.6	141.9	6.3	-32.6	141.9	60
Chequamegon	Cheq	46	ca. 1020	N. America	-12.3	177.7	4.6	-12.3	177.7	61
Jacobsville Fm	Jac	47	ca. 1020	N. America	-10.0	184.0	4.2	-10.0	184.0	62
Freda Fm	Fred	48	ca. 1050	N. America	02.2	179.0	4.2	02.2	179.0	63
Nonesuch Fm	None	49	ca. 1050	N. America	07.6	178.1	5.5	07.6	178.1	63
Lake Shore traps	Lshor	50	1087	N. America	22.2	180.8	4.5	22.2	180.8	64
Unkar volc.	Unkar	51	1090	N. America	32.0	185.0	8.0	32.0	185.0	65
Portage L. volc.	Port	52	1095	N. America	26.7	178.0	4.7	26.7	178.0	66,67
Chengwatana v.	CheV	53	1095	N. America	30.9	186.1	8.2	30.9	186.1	68
North Shore v. M+	Nshor	54	1098	N. America	35.9	181.7	3.1	35.9	181.7	69
Mamainse upper N	uMamN	55	ca. 1098	N. America	33.4	183.4	2.1	33.4	183.4	70
Mamainse upper R	uMamR	56	ca. 1100	N. America	34.7	189.2	8.0	34.7	189.2	70
Mamainse lower N	lMamN	57	ca. 1100	N. America	39.2	192.0	9.2	39.2	192.0	70
Mamainse lower R2	lMamR2	58	ca. 1100	N. America	37.5	206.7	5.1	37.5	206.7	70
Mamainse lower R1	lMamR1	59	ca. 1105	N. America	47.5	226.7	8.0	47.5	226.7	70
R Osler volc.	Osler	60	1105	N. America	43.1	194.5	5.8	43.1	194.5	71
Logan sills	Logan	61	1108	N. America	49.0	220.0	4.0	49.0	220.0	72
Abitibi dykes	Abit	62	1141	N. America	42.8	208.5	14.3	42.8	208.5	73
Giant gabbro dykes	Giant	63	1163	Greenland	42.3	226.1	9.4	44.1	218.0	74

Table S2. TPW I_{min} coordinates and error ellipses (two different methods) calculated from data in Table S1, and shown in Figure 2. Mardia and Gadsden[37] method is favored because Kirschvink[38] may overestimate error for large N.

Poles Used, #		eigenvalues			I_{min} (v3) Coordinates		A_{95}	
from Table S1	N	v1	v2	v3	Lat	Long	Kirschvink (1980)	Mardia & Gadsden (1977)
1-12	12	0.9774	0.0199	0.0026	10.2	000.5	20.1	3.8
13-17	5	0.9855	0.0143	0.0002	20.0	348.9	6.8	3.2
21-34	14	0.7891	0.1817	0.0292	-30	075.0	24.0	11.8
35-41	7	0.8587	0.1351	0.0062	-19.1	072.3	13.0	9.8
42-44	3	0.8599	0.1294	0.0107	59.2	293.2	17.1	N/A (only 3 VGPs)
45-63	19	0.8203	0.1658	0.0138	-28.1	262.5	17.6	6.3

Table S3. Euler plate rotations in 10 Ma intervals after longitude correction according to location of TPW I_{min} (corrections applied to data from Torsvik et al.[24]).The rotations reconstruct global running mean apparent polar wander path from Torsvik et al.[24] to great circle of Pangea I_{min} from Pavoni[25] at 0° N 10° E. SAFR, South Africa; EUR, Europe; GRE, Greenland; NAM, North America; NWAFR, Northwest Africa; NEAFR, Northeast Africa; SAC, South American craton; PAR, Parana; COL, Colorado; MAD, Madagascar; AUS, Australia; EANT, East Antarctica.

Age (Ma)	SAFR			EUR			GRE			NAM			NWAFR		
	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)
10	-48.8	54.0	3.8	-40.8	30.9	3.8	-5.9	48.4	2.9	-5.9	48.4	2.9	-48.8	54.0	3.8
20	-31.4	73.8	5.5	-24.5	46.1	5.4	25.4	63.9	5.9	25.4	63.9	5.9	-31.4	73.8	5.5
30	-20.5	95.2	8.5	-11.1	65.1	7.3	31.8	78.4	10.0	31.8	78.4	10.0	-20.5	95.2	8.5
40	-18.6	105.9	9.7	0.5	59.4	7.7	38.1	79.7	12.3	44.0	78.7	12.6	-18.6	105.9	9.7
50	-13.5	109.4	13.5	6.1	66.3	10.8	33.9	84.2	17.4	43.8	84.2	17.4	-13.5	109.4	13.5
60	-12.8	121.9	16.0	13.7	77.1	11.2	35.8	95.1	20.9	44.9	102.4	21.1	-12.8	121.9	16.0
70	-13.1	132.9	17.6	20.8	85.2	10.3	34.1	104.1	21.0	49.1	112.5	23.4	-13.1	132.9	17.6
80	-13.1	138.3	18.7	27.1	87.0	10.2	36.9	105.0	21.4	57.5	112.0	26.1	-13.1	138.3	18.7
90	-13	143	20	42.1	76.5	12.2	44.5	101.9	23.0	65.4	107.3	30.0	-13.0	143.4	20.1
100	-13	149	22	52.1	60.9	15.0	52.9	96.5	25.0	71.6	99.7	33.6	-13.0	149.8	22.4
110	-12	165	33	57.5	117.0	17.8	50.1	124.7	29.9	65.7	131.9	39.3	-12.0	165.5	33.7
120	-11	168	37	58.8	114.0	22.3	53.1	123.0	34.8	67.0	128.1	44.7	-11.0	168.6	38.0
130	-11	170	40	57.4	118.8	24.7	52.3	125.2	37.3	65.6	129.4	47.0	-11.0	170.5	41.1
140	13	158	32	61.8	72.6	40.9	62.7	92.9	51.6	72.5	87.2	61.6	12.3	159.2	32.9
150	13	161	35	62.2	79.3	44.1	62.4	97.2	55.1	71.7	92.2	65.1	12.4	162.1	35.9
160	9	165	42	58.7	94.3	47.4	58.1	106.3	59.3	67.3	102.3	68.8	8.6	165.8	43.0
170	16	171	30	67.7	62.6	52.7	69.7	86.3	62.8	76.8	76.2	73.6	15.0	171.9	31.0
180	18	170	27	66.2	52.4	57.0	70.3	74.0	66.6	76.6	59.9	77.4	16.8	171.0	28.0
190	26	163	21	63.0	37.6	60.7	70.0	54.4	69.3	75.0	36.8	79.9	24.2	164.7	21.8
220	32	135	33	53.5	58.3	64.7	59.9	60.1	81.6	65.2	47.9	90.5	31.3	137.1	33.4
230	28	140	35	53.0	68.4	59.3	59.4	65.7	80.2	65.2	54.1	89.0	27.4	141.8	35.6
240	23	148	39	52.0	85.1	54.1	58.7	75.7	78.4	65.1	65.5	87.3	22.4	149.4	39.7
250	19	152	43	49.8	94.1	53.4	56.9	83.1	77.4	63.9	74.2	86.0	18.5	153.2	43.8
260	18	153	44	49.2	96.3	53.2	56.5	85.0	77.0	63.6	76.3	85.6	17.6	154.1	44.8

Age (Ma)	NEAFR			SAC			PAR			COL			MAD		
	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)
10	-48.8	54.0	3.8	0.3	19.5	2.8	0.3	19.5	2.8	0.3	19.5	2.8	-48.8	54.0	3.8
20	-31.4	73.8	5.5	33.9	23.3	6.1	33.9	23.3	6.1	33.9	23.3	6.1	-31.4	73.8	5.5
30	-20.5	95.2	8.5	44.7	38.2	9.4	44.7	38.2	9.4	44.7	38.2	9.4	-20.5	95.2	8.5
40	-18.6	105.9	9.7	55.0	33.8	12.6	55.0	33.8	12.6	55.0	33.8	12.6	-18.6	105.9	9.7
50	-13.5	109.4	13.5	54.2	47.0	16.5	54.2	47.0	16.5	54.2	47.0	16.5	-13.5	109.4	13.5
60	-12.8	121.9	16.0	61.2	70.1	18.6	61.2	70.1	18.6	61.2	70.1	18.6	-12.8	121.9	16.0
70	-13.1	132.9	17.6	66.9	86.3	20.3	66.9	86.3	20.3	66.9	86.3	20.3	-13.1	132.9	17.6
80	-13.1	138.3	18.7	73.9	79.5	24.0	73.9	79.5	24.0	73.9	79.5	24.0	-13.1	138.3	18.7
90	-13.1	142.9	20.1	78.5	51.1	27.4	78.5	51.1	27.4	78.5	51.1	27.4	-13.0	143.0	20.0
100	-13.4	148.8	22.2	80.1	17.5	30.8	80.1	17.5	30.8	80.1	17.5	30.8	-13.0	149.0	22.0
110	-12.6	164.7	33.3	83.9	171.2	34.1	83.9	171.2	34.1	83.9	351.2	34.1	-12.0	165.0	33.0
120	-11.8	167.6	37.4	81.7	179.7	36.5	81.7	179.7	36.5	81.7	359.7	36.5	-11.0	168.0	37.0
130	-11.7	169.6	40.4	81.0	177.8	36.9	82.1	192.6	36.5	82.1	12.6	36.5	-9.7	174.7	37.8
140	11.9	157.7	32.3	79.4	30.9	49.3	78.2	16.4	48.8	78.2	16.4	48.8	18.4	165.9	26.5
150	12.0	160.7	35.3	81.7	51.2	50.0	81.4	30.3	49.5	81.4	30.3	49.5	19.1	175.5	27.8
160	8.2	164.8	42.3	80.0	112.3	49.5	82.7	102.8	48.7	82.7	282.8	48.7	10.2	179.4	29.2
170	14.8	170.5	30.2	83.2	343.3	52.0	80.4	335.5	51.8	80.4	335.5	51.8	19.8	198.0	18.8
180	16.7	169.4	27.2	79.6	341.2	52.3	76.8	336.0	52.3	76.8	336.0	52.3	22.8	201.8	16.0
190	24.3	162.2	21.2	71.7	344.1	54.2	69.1	340.7	54.3	69.1	340.7	54.3	39.3	213.0	9.9
220	30.8	135.1	33.2	66.6	28.9	59.8	65.3	23.3	59.4	65.3	23.3	59.4	44.6	126.8	18.9
230	26.9	140.0	35.2	68.6	36.9	58.2	67.7	30.2	57.6	67.7	30.2	57.6	38.1	138.4	20.3
240	22.0	147.9	39.3	72.1	54.8	56.5	72.0	46.1	55.7	72.0	46.1	55.7	29.8	153.1	24.2
250	18.1	151.9	43.3	72.5	73.9	55.4	73.4	65.2	54.5	73.4	65.2	54.5	23.5	158.9	28.3
260	17.2	152.9	44.3	72.5	78.9	55.1	73.5	70.6	54.2	73.5	70.6	54.2	22.1	160.3	29.4

Age (Ma)	IND			AUS			EANT		
	Lat	Long	Angle (°)	Lat	Long	Angle (°)	Lat	Long	Angle (°)
10	-65.3	184.3	5.2	-47.8	229.2	5.4	-46.2	19.9	3.7
20	-50.3	157.1	8.3	-33.8	209.8	9.3	-31.7	37.7	4.6
30	-34.0	177.5	13.1	-23.8	202.8	15.0	-23.8	61.3	5.4
40	-32.2	186.5	17.7	-21.2	206.2	19.5	-18.8	54.2	5.2
50	-23.7	179.2	25.5	-20.0	200.2	20.3	-18.1	65.3	7.0
60	-15.0	181.2	40.4	-14.3	199.6	24.7	-18.5	101.5	5.7
70	-14.5	181.8	54.5	-16.6	200.7	28.3	-38.8	128.4	6.4
80	-15.6	183.3	61.1	-19.7	206.0	28.6	-66.8	125.0	5.6
90	-12.9	193.2	70.3	-18.3	217.4	28.4	-53.1	307.5	4.8
100	-13.6	194.0	70.9	-18.9	223.7	29.7	-45.8	303.1	8.3
110	-12.2	195.3	81.6	-12.4	225.1	38.4	-37.3	254.2	13.8
120	-12.0	196.2	83.5	-10.2	232.6	40.6	-35.9	268.2	17.6
130	-9.1	200.0	92.3	-8.3	235.8	44.0	-25.9	267.7	20.3
140	-1.8	204.4	78.7	5.0	256.9	32.6	5.7	321.6	18.3
150	-2.2	207.0	81.6	7.2	257.0	37.2	12.0	310.7	20.6
160	-4.7	206.3	85.1	3.0	252.9	40.2	4.2	299.3	21.0
170	-8.9	213.0	76.8	-0.1	270.8	43.3	4.5	314.5	32.3
180	-10.0	213.8	74.0	-1.8	274.8	43.3	2.9	318.3	34.5
190	-12.1	215.2	67.3	-5.1	284.2	42.8	0.3	326.9	39.2
220	-0.5	206.3	61.2	3.3	290.0	27.4	4.1	351.0	31.3
230	-0.2	205.2	65.0	4.7	281.6	26.9	4.7	348.5	27.5
240	0.6	204.5	71.8	8.4	267.8	28.2	8.7	340.9	21.7
250	1.2	203.4	77.1	10.2	257.2	29.6	12.1	332.6	17.0
260	1.2	203.2	78.5	10.5	254.6	30.3	13.1	329.3	16.0

Table S4. Euler rotations for blocks held fixed to West Africa from 270-500 Ma (parameters from McElhinny et al.[75])

Plate	**Lat**	**Long**	Angle (°)
Northeast Africa	19.2	-7.4	-6.3
South Africa	9.3	5.7	-7.8
South American craton	53	-35	51
Paran-Salando	48.8	-35.1	52.8
Colorado	49.2	-35.8	54.1
Madagascar	-14.9	-82.4	15.7
India	26.7	37.3	-69.4
East Antarctica	-12.4	-33.8	53.3
Australia	28.1	113.2	-52.1
East Africa	9.3	5.7	-7.8

Table S5. Euler plate rotations for different blocks from 270-500 Ma derived from running mean paths (20 Ma window), corrected in longitude when TPW motion is visible. All other blocks are fixed relative to West Africa.

North America

Age	Lat	Long	Angle (°)	Relative to	Refrence
270	59.9	77.6	81.4	grid	76
280	55.9	73.0	79.0	grid	76
290	52.4	69.5	74.0	grid	76
300	51.4	69.0	67.0	grid	76
310	46.0	68.5	71.3	grid	76
320	41.9	65.5	73.8	grid	76
340	13.3	37.0	74.4	grid	76
350	5.8	28.4	77.8	grid	76
360	2.3	23.8	79	grid	76
370	8.8	27.8	81.8	grid	76
380	-6.6	10.9	84.6	grid	76
390	-12.1	1.5	90.1	grid	76
400	-18.6	-6.4	94.4	grid	76
410	-22.2	-3.4	92.7	grid	76
420	-33.8	8	90	grid	76
430	-34.6	10.5	92	grid	76
440	-35.3	12.9	93.9	grid	76
450	-36.5	17.6	98.1	grid	76
460	-37.4	22.2	102.6	grid	76
470	-37.6	23.1	103.5	grid	76
480	-39.2	26.3	105.6	grid	76
490	-40.1	33.7	114.5	grid	76
500	-36.2	31.2	115.7	grid	76

West Africa

Age	Lat	Long	Angle (°)	Relative to	Refrence
270	11.43	152.40	49.98	grid	77
280	5.16	147.80	54.21	grid	77
290	-1.41	141.40	54.91	grid	77
300	-6.47	139.60	56.66	grid	77
310	-5.51	134.10	58.78	grid	77
320	-5.00	130.20	63.83	grid	77
340	-6.29	110.30	99.78	grid	77
360	-21.3	86.7	86.8	grid	77
370	-15.3	88	82.5	grid	77
380	-0.4	86.9	77.3	grid	12
390	0.6	85.5	72.8	grid	12
400	0.8	85.4	71.9	grid	12
410	-0.1	86.5	78.5	grid	12
420	-2.2	89	100.1	grid	12
430	-1.3	88.3	103.3	grid	12
440	-0.4	87.7	106.5	grid	12
450	1.2	86.5	113	grid	12
460	-1.3	81.3	122.5	grid	77
470	-3.1	82.3	123	grid	77

480	-7	84.4	120.5	grid	77
490	-9.1	85.8	123.1	grid	77
500	-8.3	84.7	116.8	grid	77

Greenland

Age	Lat	Long	Angle (°)	Relative to	Refrence
270	-70.5	85.7	18	fixed to NAm	78
280	-70.5	85.7	18	fixed to NAm	78
290	-70.5	85.7	18	fixed to NAm	78
300	-70.5	85.7	18	fixed to NAm	78
310	-70.5	85.7	18	fixed to NAm	78
320	-70.5	85.7	18	fixed to NAm	78
340	-70.5	85.7	18	fixed to NAm	78
350	-70.5	85.7	18	fixed to NAm	78
360	-70.5	85.7	18	fixed to NAm	78
370	-70.5	85.7	18	fixed to NAm	78
380	-70.5	85.7	18	fixed to NAm	78
390	-70.5	85.7	18	fixed to NAm	78
400	-70.5	85.7	18	fixed to NAm	78
410	-70.5	85.7	18	fixed to NAm	78
420	-70.5	85.7	18	fixed to NAm	78
430	-70.5	85.7	18	fixed to NAm	78
440	-70.5	85.7	18	fixed to NAm	78
450	-70.5	85.7	18	fixed to NAm	78
460	-70.5	85.7	18	fixed to NAm	78
470	-70.5	85.7	18	fixed to NAm	78
480	-70.5	85.7	18	fixed to NAm	78
490	-70.5	85.7	18	fixed to NAm	78
500	-70.5	85.7	18	fixed to NAm	78

Siberia

Age	Lat	Long	Angle (°)	Relative to	Refrence
260	-62.42	-90.30	-76.54	grid	79
270	3.0	56.1	37.5	grid	79
350	-8.8	52.5	79.6	grid	79
400	-31	-118	-99	grid	79
420	-22.5	-118.5	-111.6	grid	79
450	-19.2	-118	-117.2	grid	79
460	-7.8	-111	-118.4	grid	79
470	-6.2	-110	-120.7	grid	79
480	-7.3	-111.3	-125.8	grid	79
490	-10.1	-113.2	-131.7	grid	79
500	-9.2	-112.8	-131.9	grid	79

Baltica

Age	Lat	Long	Angle (°)	Relative to	Refrence
270	42.3	97.6	50.9	grid	78
280	35.7	92.9	50.7	grid	78
290	28.4	89.3	48.1	grid	78
300	22.5	89.0	42.6	grid	78
310	18.9	88.3	49.5	grid	78
320	15.5	85.1	54.2	grid	78

340	-12.25	56.20	73.06	grid	78
350	-17.40	47.60	80.76	grid	78
360	-19.9	42.9	83.9	grid	78
370	-13.2	46.9	82.3	grid	78
380	-25.5	30	94.4	grid	78
390	-28.6	20.5	102.5	grid	78
400	-32.9	12.6	110.3	grid	78
410	-36.2	15.7	110.7	grid	78
420	-46.1	27.3	113.9	grid	78
430	-41.9	38.5	117.2	grid	80
440	-38.4	50.2	118.6	grid	80
450	-37.1	65	126.8	grid	80
460	-35	76.4	132.9	grid	80
470	-29	86.2	143.6	grid	80
480	-26.6	91.4	140.5	grid	80
500	-11.3	146.1	149	grid	80

Table S6. GPlates rotation file used to generate 'Orthoversion.mov'.

114	0	0	0	0	0	!North America to grid
114	10	-5.9	48	2.9	0	!North America to grid
114	20	25	64	5.9	0	!North America to grid
114	30	32	78	10	0	!North America to grid
114	40	44	79	13	0	!North America to grid
114	50	44	84	17	0	!North America to grid
114	60	45	102	21	0	!North America to grid
114	70	49	113	23	0	!North America to grid
114	80	58	112	26	0	!North America to grid
114	90	65	107	30	0	!North America to grid
114	100	72	100	34	0	!North America to grid
114	110	66	132	39	0	!North America to grid
114	120	67	128	45	0	!North America to grid
114	130	66	129	47	0	!North America to grid
114	140	72	87	62	0	!North America to grid
114	150	72	92	65	0	!North America to grid
114	160	67	102	69	0	!North America to grid
114	170	77	76	74	0	!North America to grid
114	180	77	60	77	0	!North America to grid
114	190	75	37	80	0	!North America to grid
114	220	65	48	91	0	!North America to grid
114	230	65	54	89	0	!North America to grid
114	240	65	65	87	0	!North America to grid
114	250	64	74	86	0	!North America to grid
114	260	64	76	86	0	!North America to grid
114	270	60	78	81	0	!North America to grid
114	280	56	73	79	0	!North America to grid
114	290	52	70	74	0	!North America to grid
114	300	51	69	67	0	!North America to grid
114	310	46	69	71	0	!North America to grid
114	320	42	66	74	0	!North America to grid
114	340	13	37	74	0	!North America to grid
114	350	5.8	28	78	0	!North America to grid
114	360	2.3	24	79	0	!North America to grid
114	370	8.8	28	82	0	!North America to grid
114	380	-6.6	11	85	0	!North America to grid
114	390	-12	1.5	90	0	!North America to grid
114	400	-19	-6.4	94	0	!North America to grid
114	410	-22	-3.4	93	0	!North America to grid
114	420	-34	8	90	0	!North America to grid
114	430	-35	11	92	0	!North America to grid

114	440	-35	13	94	0	!North America to grid
114	450	-37	18	98	0	!North America to grid
114	460	-37	22	103	0	!North America to grid
114	470	-38	23	104	0	!North America to grid
114	480	-39	26	106	0	!North America to grid
114	490	-40	34	115	0	!North America to grid
114	500	-36	31	116	0	!North America to grid
401	0	0	0	0	0	!Siberia to grid
401	10	-41	31	3.8	0	!Siberia to grid
401	20	-25	46	5.4	0	!Siberia to grid
401	30	-11	65	7.3	0	!Siberia to grid
401	40	0.5	59	7.7	0	!Siberia to grid
401	50	6.1	66	11	0	!Siberia to grid
401	60	14	77	11	0	!Siberia to grid
401	70	21	85	10	0	!Siberia to grid
401	80	27	87	10	0	!Siberia to grid
401	90	42	77	12	0	!Siberia to grid
401	100	52	61	15	0	!Siberia to grid
401	110	57	117	18	0	!Siberia to grid
401	120	59	114	22	0	!Siberia to grid
401	130	57	119	25	0	!Siberia to grid
401	140	62	73	41	0	!Siberia to grid
401	150	62	79	44	0	!Siberia to grid
401	160	59	94	47	0	!Siberia to grid
401	170	68	63	53	0	!Siberia to grid
401	180	66	52	57	0	!Siberia to grid
401	190	63	38	61	0	!Siberia to grid
401	220	54	58	65	0	!Siberia to grid
401	230	53	68	59	0	!Siberia to grid
401	240	52	85	54	0	!Siberia to grid
401	250	-62	-90	-77	0	!Siberia to grid
401	260	-62	-90	-77	0	!Siberia to grid
401	320	3	56	38	0	!Siberia to grid
401	340	-8.8	53	80	0	!Siberia to grid
401	400	-31	-118	-99	0	!Siberia to grid
401	420	-23	-119	-112	0	!Siberia to grid
401	450	-19	-118	-117	0	!Siberia to grid
401	460	-7.8	-111	-118	0	!Siberia to grid
401	470	-6.2	-110	-121	0	!Siberia to grid
401	480	-7.3	-111	-126	0	!Siberia to grid
401	490	-10	-113	-132	0	!Siberia to grid
401	500	-9.2	-113	-132	0	!Siberia to grid

302	0	0	0	0	0	!Baltica to grid
302	10	-41	31	3.8	0	!Baltica to grid
302	20	-25	46	5.4	0	!Baltica to grid
302	30	-11	65	7.3	0	!Baltica to grid
302	40	0.5	59	7.7	0	!Baltica to grid
302	50	6.1	66	11	0	!Baltica to grid
302	60	14	77	11	0	!Baltica to grid
302	70	21	85	10	0	!Baltica to grid
302	80	27	87	10	0	!Baltica to grid
302	90	42	77	12	0	!Baltica to grid
302	100	52	61	15	0	!Baltica to grid
302	110	57	117	18	0	!Baltica to grid
302	120	59	114	22	0	!Baltica to grid
302	130	57	119	25	0	!Baltica to grid
302	140	62	73	41	0	!Baltica to grid
302	150	62	79	44	0	!Baltica to grid
302	160	59	94	47	0	!Baltica to grid
302	170	68	63	53	0	!Baltica to grid
302	180	66	52	57	0	!Baltica to grid
302	190	63	38	61	0	!Baltica to grid
302	220	54	58	65	0	!Baltica to grid
302	230	53	68	59	0	!Baltica to grid
302	240	52	85	54	0	!Baltica to grid
302	250	50	94	53	0	!Baltica to grid
302	260	49	96	53	0	!Baltica to grid
302	270	42	98	51	0	!Baltica to grid
302	280	36	93	51	0	!Baltica to grid
302	290	28	89	48	0	!Baltica to grid
302	300	23	89	43	0	!Baltica to grid
302	310	19	88	50	0	!Baltica to grid
302	320	16	85	54	0	!Baltica to grid
302	340	-12	56	73	0	!Baltica to grid
302	350	-17	48	81	0	!Baltica to grid
302	360	-20	43	84	0	!Baltica to grid
302	370	-13	47	82	0	!Baltica to grid
302	380	-26	30	94	0	!Baltica to grid
302	390	-29	21	103	0	!Baltica to grid
302	400	-33	13	110	0	!Baltica to grid
302	410	-36	16	111	0	!Baltica to grid
302	420	-46	27	114	0	!Baltica to grid
302	430	-42	39	117	0	!Baltica to grid
302	440	-38	50	119	0	!Baltica to grid

302	450	-37	65	127	0	!Baltica to grid
302	460	-35	76	133	0	!Baltica to grid
302	470	-29	86	144	0	!Baltica to grid
302	480	-27	91	141	0	!Baltica to grid
302	500	-11	146	149	0	!Baltica to grid
111	0	0	0	0	0	!West Africa to grid
111	10	-49	54	3.8	0	!West Africa to grid
111	20	-31	74	5.5	0	!West Africa to grid
111	30	-21	95	8.5	0	!West Africa to grid
111	40	-19	106	9.7	0	!West Africa to grid
111	50	-14	109	14	0	!West Africa to grid
111	60	-13	122	16	0	!West Africa to grid
111	70	-13	133	18	0	!West Africa to grid
111	80	-13	138	19	0	!West Africa to grid
111	90	-13	143	20	0	!West Africa to grid
111	100	-13	150	22	0	!West Africa to grid
111	110	-12	166	34	0	!West Africa to grid
111	120	-11	169	38	0	!West Africa to grid
111	130	-11	171	41	0	!West Africa to grid
111	140	12	159	33	0	!West Africa to grid
111	150	12	162	36	0	!West Africa to grid
111	160	8.6	166	43	0	!West Africa to grid
111	170	15	172	31	0	!West Africa to grid
111	180	17	171	28	0	!West Africa to grid
111	190	24	165	22	0	!West Africa to grid
111	220	31	137	33	0	!West Africa to grid
111	230	27	142	36	0	!West Africa to grid
111	240	22	149	40	0	!West Africa to grid
111	250	19	153	44	0	!West Africa to grid
111	260	18	154	45	0	!West Africa to grid
111	270	11	152	50	0	!West Africa to grid
111	280	5.2	148	54	0	!West Africa to grid
111	290	-1.4	141	55	0	!West Africa to grid
111	300	-6.5	140	57	0	!West Africa to grid
111	310	-5.5	134	59	0	!West Africa to grid
111	320	-5	130	64	0	!West Africa to grid
111	340	-6.3	110	100	0	!West Africa to grid
111	360	-21	87	87	0	!West Africa to grid
111	370	-15	88	83	0	!West Africa to grid
111	380	-0.4	87	77	0	!West Africa to grid
111	390	0.6	86	73	0	!West Africa to grid
111	400	0.8	85	72	0	!West Africa to grid

111	410	-0.1	87	79	0	!West Africa to grid
111	420	-2.2	89	100	0	!West Africa to grid
111	430	-1.3	88	103	0	!West Africa to grid
111	440	-0.4	88	107	0	!West Africa to grid
111	450	1.2	87	113	0	!West Africa to grid
111	460	-1.3	81	123	0	!West Africa to grid
111	470	-3.1	82	123	0	!West Africa to grid
111	480	-7	84	121	0	!West Africa to grid
111	490	-9.1	86	123	0	!West Africa to grid
111	500	-8.3	85	117	0	!West Africa to grid
112	0	0	0	0	0	!Eurasia to grid
112	10	-41	31	3.8	0	!Eurasia to grid
112	20	-25	46	5.4	0	!Eurasia to grid
112	30	-11	65	7.3	0	!Eurasia to grid
112	40	0.5	59	7.7	0	!Eurasia to grid
112	50	6.1	66	11	0	!Eurasia to grid
112	60	14	77	11	0	!Eurasia to grid
112	70	21	85	10	0	!Eurasia to grid
112	80	27	87	10	0	!Eurasia to grid
112	90	42	77	12	0	!Eurasia to grid
112	100	52	61	15	0	!Eurasia to grid
112	110	57	117	18	0	!Eurasia to grid
112	120	59	114	22	0	!Eurasia to grid
112	130	57	119	25	0	!Eurasia to grid
112	140	62	73	41	0	!Eurasia to grid
112	150	62	79	44	0	!Eurasia to grid
112	160	59	94	47	0	!Eurasia to grid
112	170	68	63	53	0	!Eurasia to grid
112	180	66	52	57	0	!Eurasia to grid
112	190	63	38	61	0	!Eurasia to grid
112	220	54	58	65	0	!Eurasia to grid
112	230	53	68	59	0	!Eurasia to grid
112	240	52	85	54	0	!Eurasia to grid
112	250	50	94	53	0	!Eurasia to grid
112	260	49	96	53	0	!Eurasia to grid
113	0	0	0	0	0	!Greenland to grid
113	10	-5.9	48	2.9	0	!Greenland to grid
113	20	25	64	5.9	0	!Greenland to grid
113	30	32	78	10	0	!Greenland to grid
113	40	38	80	12	0	!Greenland to grid
113	50	34	84	17	0	!Greenland to grid
113	60	36	95	21	0	!Greenland to grid

```
113   70   34  104   21     0 !Greenland to grid
113   80   37  105   21     0 !Greenland to grid
113   90   44  102   23     0 !Greenland to grid
113  100   53   97   25     0 !Greenland to grid
113  110   50  125   30     0 !Greenland to grid
113  120   53  123   35     0 !Greenland to grid
113  130   52  125   37     0 !Greenland to grid
113  140   63   93   52     0 !Greenland to grid
113  150   62   97   55     0 !Greenland to grid
113  160   58  106   59     0 !Greenland to grid
113  170   70   86   63     0 !Greenland to grid
113  180   70   74   67     0 !Greenland to grid
113  190   70   54   69     0 !Greenland to grid
113  220   60   60   82     0 !Greenland to grid
113  230   59   66   80     0 !Greenland to grid
113  240   59   76   78     0 !Greenland to grid
113  250   57   83   77     0 !Greenland to grid
113  260   56   85   77     0 !Greenland to grid
113  270   51   91   71     0 !Greenland to grid
113  270  -71   86   18   114 !Greenland to North America
113  280  -71   86   18   114 !Greenland to North America
113  290  -71   86   18   114 !Greenland to North America
113  300  -71   86   18   114 !Greenland to North America
113  310  -71   86   18   114 !Greenland to North America
113  320  -71   86   18   114 !Greenland to North America
113  330  -71   86   18   114 !Greenland to North America
113  340  -71   86   18   114 !Greenland to North America
113  350  -71   86   18   114 !Greenland to North America
113  360  -71   86   18   114 !Greenland to North America
113  370  -71   86   18   114 !Greenland to North America
113  380  -71   86   18   114 !Greenland to North America
113  390  -71   86   18   114 !Greenland to North America
113  400  -71   86   18   114 !Greenland to North America
113  410  -71   86   18   114 !Greenland to North America
113  420  -71   86   18   114 !Greenland to North America
113  430  -71   86   18   114 !Greenland to North America
113  440  -71   86   18   114 !Greenland to North America
113  450  -71   86   18   114 !Greenland to North America
113  460  -71   86   18   114 !Greenland to North America
113  470  -71   86   18   114 !Greenland to North America
113  480  -71   86   18   114 !Greenland to North America
113  490  -71   86   18   114 !Greenland to North America
```

113	500	-71	86	18	114	!Greenland to North America
115	0	0	0	0	0	!Northeast Africa to grid
115	10	-49	54	3.8	0	!Northeast Africa to grid
115	20	-31	74	5.5	0	!Northeast Africa to grid
115	30	-21	95	8.5	0	!Northeast Africa to grid
115	40	-19	106	9.7	0	!Northeast Africa to grid
115	50	-14	109	14	0	!Northeast Africa to grid
115	60	-13	122	16	0	!Northeast Africa to grid
115	70	-13	133	18	0	!Northeast Africa to grid
115	80	-13	138	19	0	!Northeast Africa to grid
115	90	-13	143	20	0	!Northeast Africa to grid
115	100	-13	149	22	0	!Northeast Africa to grid
115	110	-13	165	33	0	!Northeast Africa to grid
115	120	-12	168	37	0	!Northeast Africa to grid
115	130	-12	170	40	0	!Northeast Africa to grid
115	140	12	158	32	0	!Northeast Africa to grid
115	150	12	161	35	0	!Northeast Africa to grid
115	160	8.2	165	42	0	!Northeast Africa to grid
115	170	15	170	30	0	!Northeast Africa to grid
115	180	17	169	27	0	!Northeast Africa to grid
115	190	24	162	21	0	!Northeast Africa to grid
115	220	31	135	33	0	!Northeast Africa to grid
115	230	27	140	35	0	!Northeast Africa to grid
115	240	22	148	39	0	!Northeast Africa to grid
115	250	18	152	43	0	!Northeast Africa to grid
115	260	17	153	44	0	!Northeast Africa to grid
115	260	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	270	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	280	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	290	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	300	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	310	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	320	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	370	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	380	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	390	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	400	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	410	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	420	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	430	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	440	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	450	19	-7.4	-6.3	111	!Northeast Africa to West Africa

115	460	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	470	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	480	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	490	19	-7.4	-6.3	111	!Northeast Africa to West Africa
115	500	19	-7.4	-6.3	111	!Northeast Africa to West Africa
116	0	0	0	0	0	!South Africa to grid
116	10	-49	54	3.8	0	!South Africa to grid
116	20	-31	74	5.5	0	!South Africa to grid
116	30	-21	95	8.5	0	!South Africa to grid
116	40	-19	106	9.7	0	!South Africa to grid
116	50	-14	109	14	0	!South Africa to grid
116	60	-13	122	16	0	!South Africa to grid
116	70	-13	133	18	0	!South Africa to grid
116	80	-13	138	19	0	!South Africa to grid
116	90	-13	143	20	0	!South Africa to grid
116	100	-13	149	22	0	!South Africa to grid
116	110	-12	165	33	0	!South Africa to grid
116	120	-11	168	37	0	!South Africa to grid
116	130	-11	170	40	0	!South Africa to grid
116	140	13	158	32	0	!South Africa to grid
116	150	13	161	35	0	!South Africa to grid
116	160	9	165	42	0	!South Africa to grid
116	170	16	171	30	0	!South Africa to grid
116	180	18	170	27	0	!South Africa to grid
116	190	26	163	21	0	!South Africa to grid
116	220	32	135	33	0	!South Africa to grid
116	230	28	140	35	0	!South Africa to grid
116	240	23	148	39	0	!South Africa to grid
116	250	19	152	43	0	!South Africa to grid
116	260	18	153	44	0	!South Africa to grid
116	260	9.3	5.7	-7.8	111	!South Africa to West Africa
116	270	9.3	5.7	-7.8	111	!South Africa to West Africa
116	280	9.3	5.7	-7.8	111	!South Africa to West Africa
116	290	9.3	5.7	-7.8	111	!South Africa to West Africa
116	300	9.3	5.7	-7.8	111	!South Africa to West Africa
116	310	9.3	5.7	-7.8	111	!South Africa to West Africa
116	320	9.3	5.7	-7.8	111	!South Africa to West Africa
116	370	9.3	5.7	-7.8	111	!South Africa to West Africa
116	380	9.3	5.7	-7.8	111	!South Africa to West Africa
116	390	9.3	5.7	-7.8	111	!South Africa to West Africa
116	400	9.3	5.7	-7.8	111	!South Africa to West Africa
116	410	9.3	5.7	-7.8	111	!South Africa to West Africa

116	420	9.3	5.7	-7.8	111	!South Africa to West Africa
116	430	9.3	5.7	-7.8	111	!South Africa to West Africa
116	440	9.3	5.7	-7.8	111	!South Africa to West Africa
116	450	9.3	5.7	-7.8	111	!South Africa to West Africa
116	460	9.3	5.7	-7.8	111	!South Africa to West Africa
116	470	9.3	5.7	-7.8	111	!South Africa to West Africa
116	480	9.3	5.7	-7.8	111	!South Africa to West Africa
116	490	9.3	5.7	-7.8	111	!South Africa to West Africa
116	500	9.3	5.7	-7.8	111	!South Africa to West Africa
117	0	0	0	0	0	!SAC to grid
117	10	0.3	20	2.8	0	!SAC to grid
117	20	34	23	6.1	0	!SAC to grid
117	30	45	38	9.4	0	!SAC to grid
117	40	55	34	13	0	!SAC to grid
117	50	54	47	17	0	!SAC to grid
117	60	61	70	19	0	!SAC to grid
117	70	67	86	20	0	!SAC to grid
117	80	74	80	24	0	!SAC to grid
117	90	79	51	27	0	!SAC to grid
117	100	80	18	31	0	!SAC to grid
117	110	84	171	34	0	!SAC to grid
117	120	82	180	37	0	!SAC to grid
117	130	81	178	37	0	!SAC to grid
117	140	79	31	49	0	!SAC to grid
117	150	82	51	50	0	!SAC to grid
117	160	80	112	49	0	!SAC to grid
117	170	83	-17	52	0	!SAC to grid
117	180	80	-19	52	0	!SAC to grid
117	190	72	-16	54	0	!SAC to grid
117	220	67	29	60	0	!SAC to grid
117	230	69	37	58	0	!SAC to grid
117	240	72	55	57	0	!SAC to grid
117	250	73	74	55	0	!SAC to grid
117	260	73	79	55	0	!SAC to grid
117	260	53	-35	51	111	!SAC to West Africa
117	270	53	-35	51	111	!SAC to West Africa
117	280	53	-35	51	111	!SAC to West Africa
117	290	53	-35	51	111	!SAC to West Africa
117	300	53	-35	51	111	!SAC to West Africa
117	310	53	-35	51	111	!SAC to West Africa
117	320	53	-35	51	111	!SAC to West Africa
117	370	53	-35	51	111	!SAC to West Africa

117	380	53	-35	51	111	!SAC to West Africa
117	390	53	-35	51	111	!SAC to West Africa
117	400	53	-35	51	111	!SAC to West Africa
117	410	53	-35	51	111	!SAC to West Africa
117	420	53	-35	51	111	!SAC to West Africa
117	430	53	-35	51	111	!SAC to West Africa
117	440	53	-35	51	111	!SAC to West Africa
117	450	53	-35	51	111	!SAC to West Africa
117	460	53	-35	51	111	!SAC to West Africa
117	470	53	-35	51	111	!SAC to West Africa
117	480	53	-35	51	111	!SAC to West Africa
117	490	53	-35	51	111	!SAC to West Africa
117	500	53	-35	51	111	!SAC to West Africa
118	0	0	0	0	0	!PAR_SAL to grid
118	10	0.3	20	2.8	0	!PAR_SAL to grid
118	20	34	23	6.1	0	!PAR_SAL to grid
118	30	45	38	9.4	0	!PAR_SAL to grid
118	40	55	34	13	0	!PAR_SAL to grid
118	50	54	47	17	0	!PAR_SAL to grid
118	60	61	70	19	0	!PAR_SAL to grid
118	70	67	86	20	0	!PAR_SAL to grid
118	80	74	80	24	0	!PAR_SAL to grid
118	90	79	51	27	0	!PAR_SAL to grid
118	100	80	18	31	0	!PAR_SAL to grid
118	110	84	171	34	0	!PAR_SAL to grid
118	120	82	180	37	0	!PAR_SAL to grid
118	130	82	-167	37	0	!PAR_SAL to grid
118	140	78	16	49	0	!PAR_SAL to grid
118	150	81	30	50	0	!PAR_SAL to grid
118	160	83	103	49	0	!PAR_SAL to grid
118	170	80	-24	52	0	!PAR_SAL to grid
118	180	77	-24	52	0	!PAR_SAL to grid
118	190	69	-19	54	0	!PAR_SAL to grid
118	220	65	23	59	0	!PAR_SAL to grid
118	230	68	30	58	0	!PAR_SAL to grid
118	240	72	46	56	0	!PAR_SAL to grid
118	250	73	65	54	0	!PAR_SAL to grid
118	260	74	71	54	0	!PAR_SAL to grid
118	260	49	-35	53	111	!PAR_SAL to West Africa
118	270	49	-35	53	111	!PAR_SAL to West Africa
118	280	49	-35	53	111	!PAR_SAL to West Africa
118	290	49	-35	53	111	!PAR_SAL to West Africa

118	300	49	-35	53	111	!PAR_SAL to West Africa
118	310	49	-35	53	111	!PAR_SAL to West Africa
118	320	49	-35	53	111	!PAR_SAL to West Africa
118	370	49	-35	53	111	!PAR_SAL to West Africa
118	380	49	-35	53	111	!PAR_SAL to West Africa
118	390	49	-35	53	111	!PAR_SAL to West Africa
118	400	49	-35	53	111	!PAR_SAL to West Africa
118	410	49	-35	53	111	!PAR_SAL to West Africa
118	420	49	-35	53	111	!PAR_SAL to West Africa
118	430	49	-35	53	111	!PAR_SAL to West Africa
118	440	49	-35	53	111	!PAR_SAL to West Africa
118	450	49	-35	53	111	!PAR_SAL to West Africa
118	460	49	-35	53	111	!PAR_SAL to West Africa
118	470	49	-35	53	111	!PAR_SAL to West Africa
118	480	49	-35	53	111	!PAR_SAL to West Africa
118	490	49	-35	53	111	!PAR_SAL to West Africa
118	500	49	-35	53	111	!PAR_SAL to West Africa
119	0	0	0	0	0	!COL to grid
119	10	0.3	20	2.8	0	!COL to grid
119	20	34	23	6.1	0	!COL to grid
119	30	45	38	9.4	0	!COL to grid
119	40	55	34	13	0	!COL to grid
119	50	54	47	17	0	!COL to grid
119	60	61	70	19	0	!COL to grid
119	70	67	86	20	0	!COL to grid
119	80	74	80	24	0	!COL to grid
119	90	79	51	27	0	!COL to grid
119	100	80	18	31	0	!COL to grid
119	110	84	-8.8	34	0	!COL to grid
119	120	82	-0.3	37	0	!COL to grid
119	130	82	13	37	0	!COL to grid
119	140	78	16	49	0	!COL to grid
119	150	81	30	50	0	!COL to grid
119	160	83	-77	49	0	!COL to grid
119	170	80	-24	52	0	!COL to grid
119	180	77	-24	52	0	!COL to grid
119	190	69	-19	54	0	!COL to grid
119	220	65	23	59	0	!COL to grid
119	230	68	30	58	0	!COL to grid
119	240	72	46	56	0	!COL to grid
119	250	73	65	54	0	!COL to grid
119	260	74	71	54	0	!COL to grid

119	260	49	-36	54	111	!COL to West Africa
119	270	49	-36	54	111	!COL to West Africa
119	280	49	-35	53	111	!COL to West Africa
119	290	49	-35	53	111	!COL to West Africa
119	300	49	-35	53	111	!COL to West Africa
119	310	49	-35	53	111	!COL to West Africa
119	320	49	-35	53	111	!COL to West Africa
119	370	49	-35	53	111	!COL to West Africa
119	380	49	-35	53	111	!COL to West Africa
119	390	49	-35	53	111	!COL to West Africa
119	400	49	-35	53	111	!COL to West Africa
119	410	49	-35	53	111	!COL to West Africa
119	420	49	-35	53	111	!COL to West Africa
119	430	49	-35	53	111	!COL to West Africa
119	440	49	-35	53	111	!COL to West Africa
119	450	49	-35	53	111	!COL to West Africa
119	460	49	-35	53	111	!COL to West Africa
119	470	49	-35	53	111	!COL to West Africa
119	480	49	-35	53	111	!COL to West Africa
119	490	49	-35	53	111	!COL to West Africa
119	500	49	-35	53	111	!COL to West Africa
120	0	0	0	0	0	!Madagascar to grid
120	10	-49	54	3.8	0	!Madagascar to grid
120	20	-31	74	5.5	0	!Madagascar to grid
120	30	-21	95	8.5	0	!Madagascar to grid
120	40	-19	106	9.7	0	!Madagascar to grid
120	50	-14	109	14	0	!Madagascar to grid
120	60	-13	122	16	0	!Madagascar to grid
120	70	-13	133	18	0	!Madagascar to grid
120	80	-13	138	19	0	!Madagascar to grid
120	90	-13	143	20	0	!Madagascar to grid
120	100	-13	149	22	0	!Madagascar to grid
120	110	-12	165	33	0	!Madagascar to grid
120	120	-11	168	37	0	!Madagascar to grid
120	130	-9.7	175	38	0	!Madagascar to grid
120	140	18	166	27	0	!Madagascar to grid
120	150	19	176	28	0	!Madagascar to grid
120	160	10	179	29	0	!Madagascar to grid
120	170	20	-162	19	0	!Madagascar to grid
120	180	23	-158	16	0	!Madagascar to grid
120	190	39	-147	9.9	0	!Madagascar to grid
120	220	45	127	19	0	!Madagascar to grid

```
120  230   38  138   20     0 !Madagascar to grid
120  240   30  153   24     0 !Madagascar to grid
120  250   24  159   28     0 !Madagascar to grid
120  260   22  160   29     0 !Madagascar to grid
120  260  -15  -82   16   111 !Madagascar to West Africa
120  270  -15  -82   16   111 !Madagascar to West Africa
120  280  -15  -82   16   111 !Madagascar to West Africa
120  290  -15  -82   16   111 !Madagascar to West Africa
120  300  -15  -82   16   111 !Madagascar to West Africa
120  310  -15  -82   16   111 !Madagascar to West Africa
120  320  -15  -82   16   111 !Madagascar to West Africa
120  370  -15  -82   16   111 !Madagascar to West Africa
120  380  -15  -82   16   111 !Madagascar to West Africa
120  390  -15  -82   16   111 !Madagascar to West Africa
120  400  -15  -82   16   111 !Madagascar to West Africa
120  410  -15  -82   16   111 !Madagascar to West Africa
120  420  -15  -82   16   111 !Madagascar to West Africa
120  430  -15  -82   16   111 !Madagascar to West Africa
120  440  -15  -82   16   111 !Madagascar to West Africa
120  450  -15  -82   16   111 !Madagascar to West Africa
120  460  -15  -82   16   111 !Madagascar to West Africa
120  470  -15  -82   16   111 !Madagascar to West Africa
120  480  -15  -82   16   111 !Madagascar to West Africa
120  490  -15  -82   16   111 !Madagascar to West Africa
120  500  -15  -82   16   111 !Madagascar to West Africa
121    0    0    0    0     0 !India to grid
121   10  -65 -176  5.2     0 !India to grid
121   20  -50  157  8.3     0 !India to grid
121   30  -34  178   13     0 !India to grid
121   40  -32 -174   18     0 !India to grid
121   50  -24  179   26     0 !India to grid
121   60  -15 -179   40     0 !India to grid
121   70  -15 -178   55     0 !India to grid
121   80  -16 -177   61     0 !India to grid
121   90  -13 -167   70     0 !India to grid
121  100  -14 -166   71     0 !India to grid
121  110  -12 -165   82     0 !India to grid
121  120  -12 -164   84     0 !India to grid
121  130 -9.1 -160   92     0 !India to grid
121  140 -1.8 -156   79     0 !India to grid
121  150 -2.2 -153   82     0 !India to grid
121  160 -4.7 -154   85     0 !India to grid
```

121	170	-8.9	-147	77	0	!India to grid
121	180	-10	-146	74	0	!India to grid
121	190	-12	-145	67	0	!India to grid
121	220	-0.6	-154	61	0	!India to grid
121	230	-0.2	-155	65	0	!India to grid
121	240	0.6	-155	72	0	!India to grid
121	250	1.2	-157	77	0	!India to grid
121	260	1.2	-157	79	0	!India to grid
121	260	27	37	-69	111	!India to West Africa
121	270	27	37	-69	111	!India to West Africa
121	280	27	37	-69	111	!India to West Africa
121	290	27	37	-69	111	!India to West Africa
121	300	27	37	-69	111	!India to West Africa
121	310	27	37	-69	111	!India to West Africa
121	320	27	37	-69	111	!India to West Africa
121	370	27	37	-69	111	!India to West Africa
121	380	27	37	-69	111	!India to West Africa
121	390	27	37	-69	111	!India to West Africa
121	400	27	37	-69	111	!India to West Africa
121	410	27	37	-69	111	!India to West Africa
121	420	27	37	-69	111	!India to West Africa
121	430	27	37	-69	111	!India to West Africa
121	440	27	37	-69	111	!India to West Africa
121	450	27	37	-69	111	!India to West Africa
121	460	27	37	-69	111	!India to West Africa
121	470	27	37	-69	111	!India to West Africa
121	480	27	37	-69	111	!India to West Africa
121	490	27	37	-69	111	!India to West Africa
121	500	27	37	-69	111	!India to West Africa
122	0	0	0	0	0	!East Antarctica to grid
122	10	-46	20	3.7	0	!East Antarctica to grid
122	20	-32	38	4.6	0	!East Antarctica to grid
122	30	-24	61	5.4	0	!East Antarctica to grid
122	40	-19	54	5.2	0	!East Antarctica to grid
122	50	-18	65	7	0	!East Antarctica to grid
122	60	-19	102	5.7	0	!East Antarctica to grid
122	70	-39	128	6.4	0	!East Antarctica to grid
122	80	-67	125	5.6	0	!East Antarctica to grid
122	90	-53	-52	4.8	0	!East Antarctica to grid
122	100	-46	-57	8.4	0	!East Antarctica to grid
122	110	-37	-106	14	0	!East Antarctica to grid
122	120	-36	-92	18	0	!East Antarctica to grid

```
122  130  -26  -92  20    0 !East Antarctica to grid
122  140  5.7  -38  18    0 !East Antarctica to grid
122  150   12  -49  21    0 !East Antarctica to grid
122  160  4.2  -61  21    0 !East Antarctica to grid
122  170  4.5  -45  32    0 !East Antarctica to grid
122  180    3  -42  35    0 !East Antarctica to grid
122  190  0.3  -33  39    0 !East Antarctica to grid
122  220  4.1   -9  31    0 !East Antarctica to grid
122  230  4.7  -12  28    0 !East Antarctica to grid
122  240  8.7  -19  22    0 !East Antarctica to grid
122  250   12  -27  17    0 !East Antarctica to grid
122  260   13  -31  16    0 !East Antarctica to grid
122  260  -12  -34  53  111 !East Antarctica to West Africa
122  270  -12  -34  53  111 !East Antarctica to West Africa
122  280  -12  -34  53  111 !East Antarctica to West Africa
122  290  -12  -34  53  111 !East Antarctica to West Africa
122  300  -12  -34  53  111 !East Antarctica to West Africa
122  310  -12  -34  53  111 !East Antarctica to West Africa
122  320  -12  -34  53  111 !East Antarctica to West Africa
122  370  -12  -34  53  111 !East Antarctica to West Africa
122  380  -12  -34  53  111 !East Antarctica to West Africa
122  390  -12  -34  53  111 !East Antarctica to West Africa
122  400  -12  -34  53  111 !East Antarctica to West Africa
122  410  -12  -34  53  111 !East Antarctica to West Africa
122  420  -12  -34  53  111 !East Antarctica to West Africa
122  430  -12  -34  53  111 !East Antarctica to West Africa
122  440  -12  -34  53  111 !East Antarctica to West Africa
122  450  -12  -34  53  111 !East Antarctica to West Africa
122  460  -12  -34  53  111 !East Antarctica to West Africa
122  470  -12  -34  53  111 !East Antarctica to West Africa
122  480  -12  -34  53  111 !East Antarctica to West Africa
122  490  -12  -34  53  111 !East Antarctica to West Africa
122  500  -12  -34  53  111 !East Antarctica to West Africa
123    0    0    0   0    0 !Australia to grid
123   10  -48 -131 5.4    0 !Australia to grid
123   20  -34 -150 9.3    0 !Australia to grid
123   30  -24 -157  15    0 !Australia to grid
123   40  -21 -154  20    0 !Australia to grid
123   50  -20 -160  20    0 !Australia to grid
123   60  -14 -160  25    0 !Australia to grid
123   70  -17 -159  28    0 !Australia to grid
123   80  -20 -154  29    0 !Australia to grid
```

123	90	-18	-143	28	0	!Australia to grid
123	100	-19	-136	30	0	!Australia to grid
123	110	-12	-135	38	0	!Australia to grid
123	120	-10	-127	41	0	!Australia to grid
123	130	-8.3	-124	44	0	!Australia to grid
123	140	5.1	-103	33	0	!Australia to grid
123	150	7.2	-103	37	0	!Australia to grid
123	160	3	-107	40	0	!Australia to grid
123	170	-0.1	-89	43	0	!Australia to grid
123	180	-1.8	-85	43	0	!Australia to grid
123	190	-5.1	-76	43	0	!Australia to grid
123	220	3.3	-70	27	0	!Australia to grid
123	230	4.7	-78	27	0	!Australia to grid
123	240	8.4	-92	28	0	!Australia to grid
123	250	10	-103	30	0	!Australia to grid
123	260	11	-105	30	0	!Australia to grid
123	260	28	113	-52	111	!Australia to West Africa
123	270	28	113	-52	111	!Australia to West Africa
123	280	28	113	-52	111	!Australia to West Africa
123	290	28	113	-52	111	!Australia to West Africa
123	300	28	113	-52	111	!Australia to West Africa
123	310	28	113	-52	111	!Australia to West Africa
123	320	28	113	-52	111	!Australia to West Africa
123	370	28	113	-52	111	!Australia to West Africa
123	380	28	113	-52	111	!Australia to West Africa
123	390	28	113	-52	111	!Australia to West Africa
123	400	28	113	-52	111	!Australia to West Africa
123	410	28	113	-52	111	!Australia to West Africa
123	420	28	113	-52	111	!Australia to West Africa
123	430	28	113	-52	111	!Australia to West Africa
123	440	28	113	-52	111	!Australia to West Africa
123	450	28	113	-52	111	!Australia to West Africa
123	460	28	113	-52	111	!Australia to West Africa
123	470	28	113	-52	111	!Australia to West Africa
123	480	28	113	-52	111	!Australia to West Africa
123	490	28	113	-52	111	!Australia to West Africa
123	500	28	113	-52	111	!Australia to West Africa
124	0	0	0	0	0	!Somalia to grid
124	10	-49	54	3.8	0	!Somalia to grid
124	20	-31	74	5.5	0	!Somalia to grid
124	30	-21	95	8.5	0	!Somalia to grid
124	40	-19	106	9.7	0	!Somalia to grid

```
124    50   -14  109   14     0 !Somalia to grid
124    60   -13  122   16     0 !Somalia to grid
124    70   -13  133   18     0 !Somalia to grid
124    80   -13  138   19     0 !Somalia to grid
124    90   -13  143   20     0 !Somalia to grid
124   100   -13  149   22     0 !Somalia to grid
124   110   -12  165   33     0 !Somalia to grid
124   120   -11  168   37     0 !Somalia to grid
124   130   -11  170   40     0 !Somalia to grid
124   140    13  158   32     0 !Somalia to grid
124   150    13  161   35     0 !Somalia to grid
124   160     9  165   42     0 !Somalia to grid
124   170    16  171   30     0 !Somalia to grid
124   180    18  170   27     0 !Somalia to grid
124   190    26  163   21     0 !Somalia to grid
124   220    32  135   33     0 !Somalia to grid
124   230    28  140   35     0 !Somalia to grid
124   240    23  148   39     0 !Somalia to grid
124   250    19  152   43     0 !Somalia to grid
124   260    18  153   44     0 !Somalia to grid
124   260   9.3  5.7 -7.8   111 !Somalia to West Africa
124   270   9.3  5.7 -7.8   111 !Somalia to West Africa
124   280   9.3  5.7 -7.8   111 !Somalia to West Africa
124   290   9.3  5.7 -7.8   111 !Somalia to West Africa
124   300   9.3  5.7 -7.8   111 !Somalia to West Africa
124   310   9.3  5.7 -7.8   111 !Somalia to West Africa
124   320   9.3  5.7 -7.8   111 !Somalia to West Africa
124   370   9.3  5.7 -7.8   111 !Somalia to West Africa
124   380   9.3  5.7 -7.8   111 !Somalia to West Africa
124   390   9.3  5.7 -7.8   111 !Somalia to West Africa
124   400   9.3  5.7 -7.8   111 !Somalia to West Africa
124   410   9.3  5.7 -7.8   111 !Somalia to West Africa
124   420   9.3  5.7 -7.8   111 !Somalia to West Africa
124   430   9.3  5.7 -7.8   111 !Somalia to West Africa
124   440   9.3  5.7 -7.8   111 !Somalia to West Africa
124   450   9.3  5.7 -7.8   111 !Somalia to West Africa
124   460   9.3  5.7 -7.8   111 !Somalia to West Africa
124   470   9.3  5.7 -7.8   111 !Somalia to West Africa
124   480   9.3  5.7 -7.8   111 !Somalia to West Africa
124   490   9.3  5.7 -7.8   111 !Somalia to West Africa
124   500   9.3  5.7 -7.8   111 !Somalia to West Africa
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References

42 Torsvik, T. H., Müller, R. D., Van der Voo, R., Steinberger, B. & Gaina, C. Global plate motion frames: Toward a unified model. *Rev. Geophys.* **46**, doi:doi: 10.1029/2007RG000227 (2008).

43 Van der Voo, R. True polar wander during the middle Paleozoic? *Earth and Planetary Science Letters* **122**, 239-243 (1994).

44 Schmidt, P. W., Clark, D. A. & Rajagopalan, S. An historical perspective of the Early Palaeozoic APWP of Gondwana: New results from the Early Ordovician Black Hill Norite, South Australia. *Exploration Geophysics* **24**, 257-262 (1993).

45 Meert, J. G., Nedelec, A., Hall, C., Wingate, M. T. D. & Rakotondrazafy, M. Paleomagnetism, geochronology and tectonic implications of the Cambrian-age Carion granite, Central Madagascar. *Tectonophysics* **340**, 1-21 (2001).

46 Mitchell, R. N., Evans, D. A. D. & Kilian, T. M. Rapid Early Cambrian rotation of Gondwana. *Geology* **38**, 755-758 (2010).

47 Sanchez-Bettucci, L. & Rapalini, A. E. Paleomagnetism of the Sierra de Las Animas Complex, southern Uruguay: its implications in the assembly of western Gondwana. *Precambrian Research* **118**, 243-265 (2002).

48 Grunow, A. M. & Encarnacion, J. Terranes or Cambrian polar wander: New data from the Scott Glacier area, Transantarctic Mountains, Antarctica. *Tectonics* **19**, 168-181 (2000).

49 Embleton, B. J. J. & Giddings, J. W. Late Precambrian and Lower Palaeozoic palaeomagnetic results from South Australia and Western Australia. *Earth and Planetary Science Letters* **22**, 355-365 (1974).

50 Meert, J. G., Nedelec, A. & Hall, C. The stratoid granites of central Madagascar: paleomagnetism and further age constraints on neoproterozoic deformation. *Precambrian Research* **120**, 101-129 (2003).

51 Briden, J. C. & McClelland, E. Proving the age of a paleomagnetic pole: The case of the Ntonya ring structure, Malawi. *Journal of Geophysical Research* **98**, 1743-1749 (1993).

52 Trindade, R. I. F., D'Agrella, M. S., Epof, I. & Neves, B. B. B. Paleomagnetism of Early Cambrian Itabaiana mafic dikes (NE Brazil) and the final assembly of Gondwana. *Earth And Planetary Science Letters* **244**, 361-377 (2006).

53 Kirschvink, J. L. The Precambrian-Cambrian boundary problem: Paleomagnetic directions from the Amadeus Basin, central Australia. *Earth and Planetary Science Letters* **40**, 91-100 (1978).

54 Meert, J. & Van der Voo, R. Paleomagnetic and 40Ar/39Ar Study of the Sinyai Dolerite, Kenya: Implications for Gondwana Assembly. *Journal of Geology* **104**, 131-142 (1996).

55 Schmidt, P. W. & Williams, G. E. Ediacaran palaeomagnetism and apparent polar wander path for Australia: no large true polar wander. *Geophysical Journal International* **182**, 711-726 (2010).

56 Schmidt, P. W. & Williams, G. E. Paleomagnetic Correlation Of The Acraman Impact Structure And The Late Proterozoic Bunyeroo Ejecta Horizon, South-Australia. *Aust. J. Earth Sci.* **38**, 283-289 (1991).

57 Schmidt, P. W., Williams, G. E. & Williams, M. O. Palaeomagnetism and magnetic anisotropy of late Neoproterozoic strata, South Australia: implications for the palaeolatitude of the late Cryogenian glaciation, cap carbonate and the Ediacaran System. *Precambrian Research* **174**, 35-52 (2009).

58 Sohl, L. E., Christie-Blick, N. & Kent, D. V. Paleomagnetic polarity reversals in Marinoan (ca. 600 Ma) glacial deposits of Australia: implications for the duration of low-latitude glaciation in Neoproterozoic time. *Geological Society of America Bulletin* **111**, 1120-1139 (1999).

59 Maloof, A. C. *et al.* Combined paleomagnetic, isotopic, and stratigraphic evidence for true polar wander from the Neoproterozoic Akademikerbreen Group, Svalbard, Norway. *Geological Society Of America Bulletin* **118**, 1099-1124 (2006).

60 Warnock, A. C., Kodama, K. P. & Zeitler, P. K. Using thermochronometry and low-temperature demagnetization to accurately date Precambrian paleomagnetic poles. *Journal of Geophysical Research* **105**, 19435-19453 (2000).

61 McCabe, C. & Van der Voo, R. Paleomagnetic results from the upper Keweenawan Chequamegon Sandstone: implications for red bed diagenesis and Late Precambrian apparent polar wander of North America. *Canadian Journal of Earth Sciences* **20**, 105-112 (1983).

62 Roy, J. L. & Robertson, W. A. Paleomagnetism Of Jacobsville Formation And Apparent Polar Path For Interval -1100 To -670my For North-America. *Journal Of Geophysical Research* **83**, 1289-1304 (1978).

63 Henry, S. G., Mauk, F. J. & Van der Voo, R. Paleomagnetism Of Upper Keweenawan Sediments - Nonesuch Shale And Freda Sandstone. *Canadian Journal Of Earth Sciences* **14**, 1128-1138 (1977).

64 Diehl, J. F. & Haig, T. D. A paleomagnetic study of the lava flows within the Copper Harbor Conglomerate, Michigan: new results and implications. *Canadian Journal of Earth Sciences* **31**, 369-380 (1994).

65 Weil, A. B., Geissman, J. W., Heizler, M. & Van der Voo, R. Paleomagnetism of Middle Proterozoic mafic intrusions and Upper Proterozoic (Nankoweap) red beds from the Lower Grand Canyon Supergroup, Arizona. *Tectonophysics* **375**, 199-220 (2003).

66 Halls, H. C. & Pesonen, L. J. Paleomagnetism Of Keweenawan Rocks. *Geological Society Of America Memoirs* **156**, 173-201 (1982).

67 Hnat, J. S., van der Pluijm, B. A. & van der Voo, R. Primary curvature in the Mid-Continent Rift: Paleomagnetism of the Portage Lake Volcanics (northern Michigan, USA). *Tectonophysics* **425**, 71-82 (2006).

68 Kean, W. F., Williams, I., Chan, L. & Feeney, J. Magnetism of the Keweenawan age Chengwatana lava flows, northwest Wisconsin. *Geophysical Research Letters* **24**, 1523-1526 (1997).

69 Tauxe, L. & Kodama, K. P. Paleosecular variation models for ancient times: Clues from Keweenawan lava flows. *Physics of the Earth and Planetary Interiors* **177**, 31-45 (2009).

70 Swanson-Hysell, N. L., Maloof, A. C., Weiss, B. P. & Evans, D. A. D. No asymmetry in geomagnetic reversals recorded by 1.1-billion-year-old Keweenawan basalts. *Nature Geoscience* **2**, 713-717 (2009).

71 Halls, H. C. A paleomagnetic reversal in the Osler Volcanic Group, northern Lake Superior. *Canadian Journal of Earth Sciences* **11**, 1200-1207 (1974).
72 Buchan, K. L. *et al.* Comparing the drift of Laurentia and Baltica in the Proterozoic: the importance of key poles. *Tectonophysics* **319**, 167-198 (2000).
73 Ernst, R. E. & Buchan, K. L. Paleomagnetism Of The Abitibi Dyke Swarm, Southern Superior-Province, And Implications For The Logan Loop. *Canadian Journal Of Earth Sciences* **30**, 1886-1897 (1993).
74 Buchan, K. L. *et al.* Rodinia: the evidence from integrated palaeomagnetism and U-Pb geochronology. *Precambrian Research* **110**, 9-32 (2001).
75 McElhinny, M. W., Powell, C. M. & Pisarevsky, S. A. Paleozoic terranes of eastern Australia and the drift history of Gondwana. *Tectonophysics* **362**, 41-65 (2003).
76 Cocks, L. R. M. & Torsvik, T. H. The Palaeozoic geography of Laurentia and western Laurussia: A stable craton with mobile margins. *Earth-Sci. Rev.* **106**, 1-51 (2011).
77 Torsvik, T. & Van der Voo, R. Refining Gondwana and Pangea palaeogeography: estimates of Phanerozoic non-dipole (octupole) fields. *Geophysical Journal International* **151**, 771-794 (2002).
78 Bullard, E., Everett, J. E. & Smith, A. G. The fit of the continents around the Atlantic. *Philosophical Transactions of the Royal Society of London* **A258**, 41-51 (1965).
79 Cocks, L. R. M. & Torsvik, T. H. Siberia, the wandering northern terrane, and its changing geography through the Palaeozoic. *Earth-Sci. Rev.* **82**, 29-74 (2007).
80 Torsvik, T. H. & Rehnstrom, E. F. The Tornquist Sea and Baltica-Avalonia docking. *Tectonophysics* **362**, 67-82 (2003).