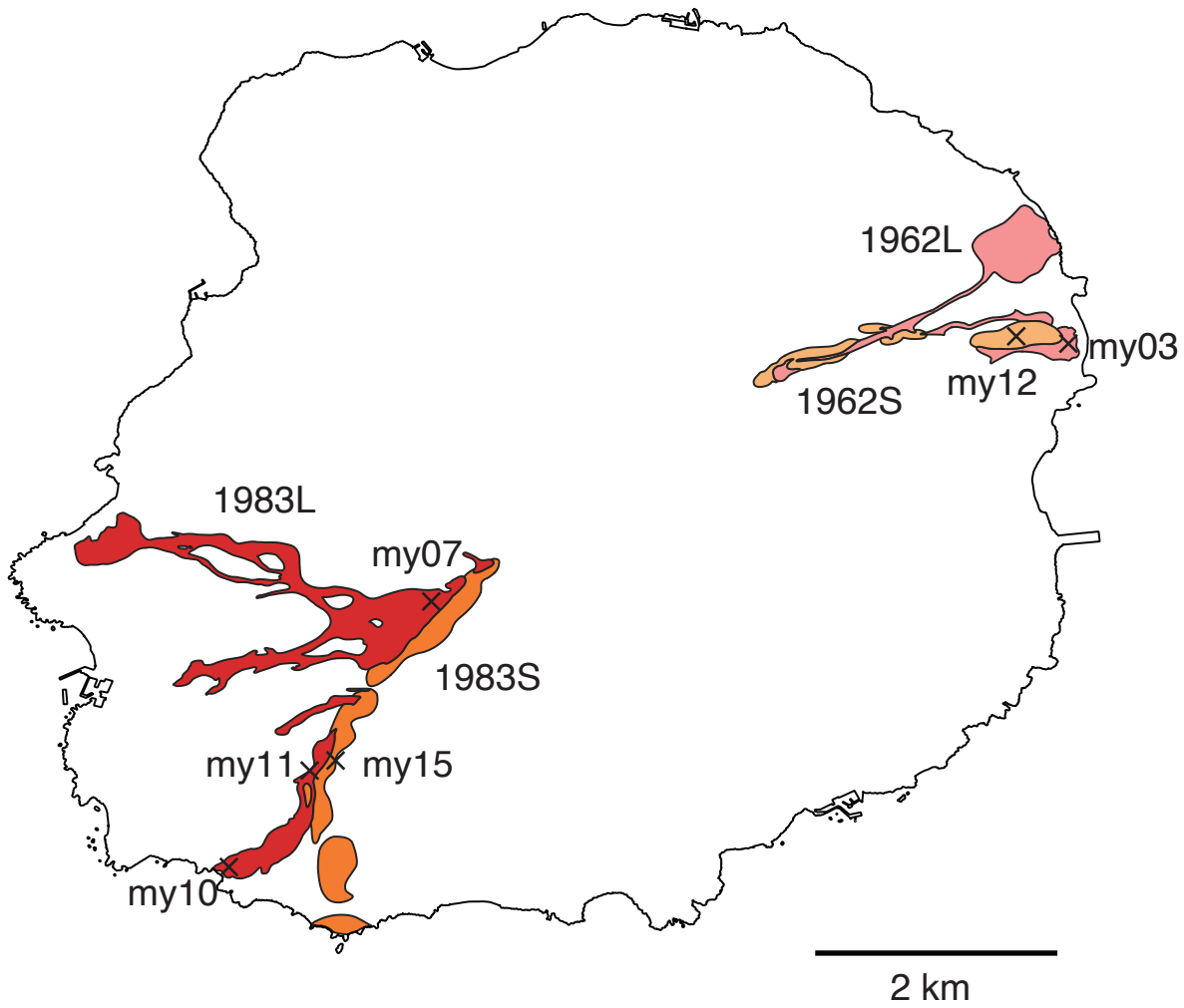


Figure S1. Sampling sites of 1962 and 1983 lava flows (L) and scoria (S) in Miyakejima, Japan.

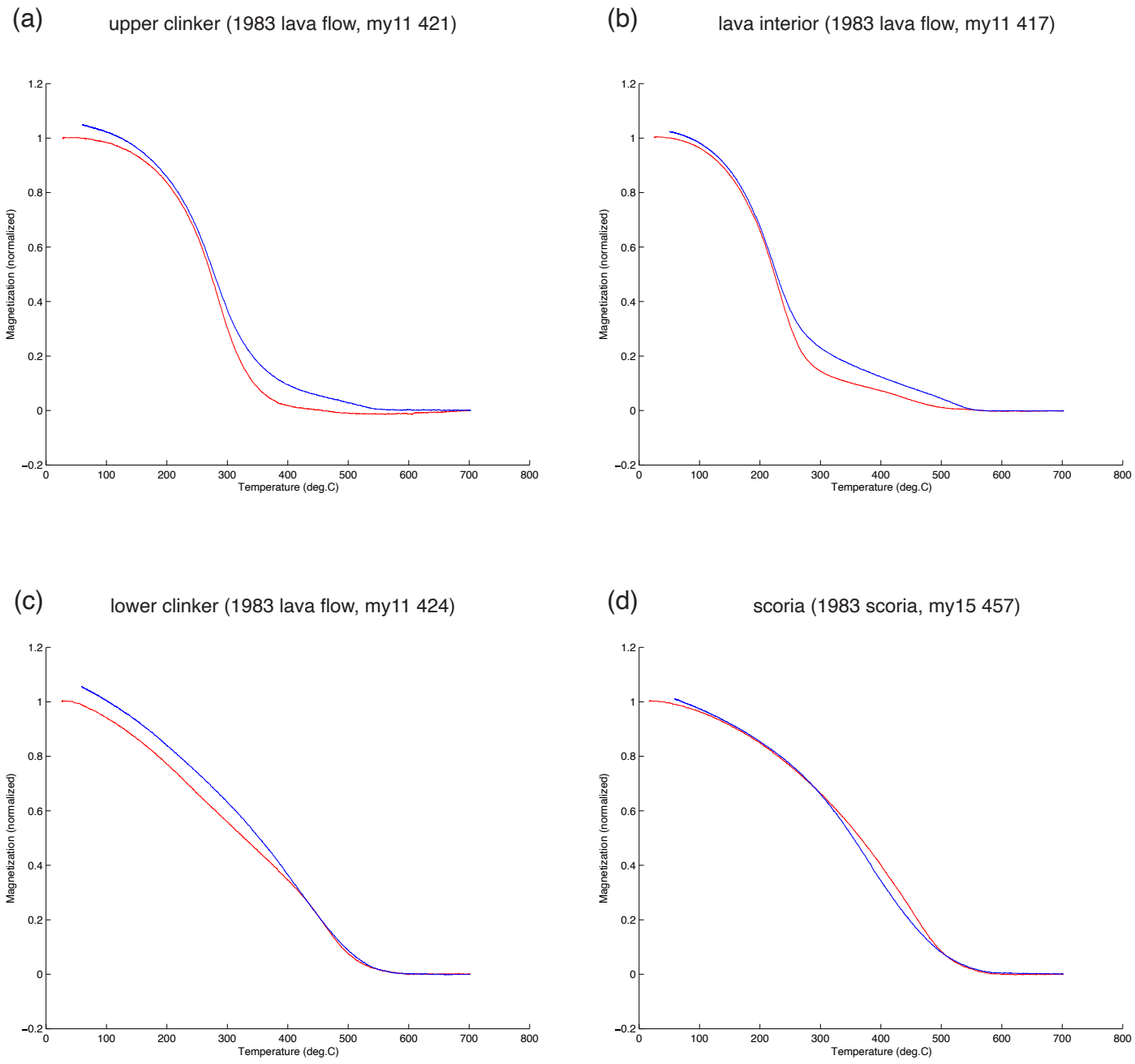


Figure S2. Thermomagnetic curves for (a) the upper clinker, (b) the lava interior, and (c) the lower clinker of the 1983 lava flow at site my11, and (d) the 1983 scoria at site my15. Heating and cooling curves are shown as red and blue curves, respectively.

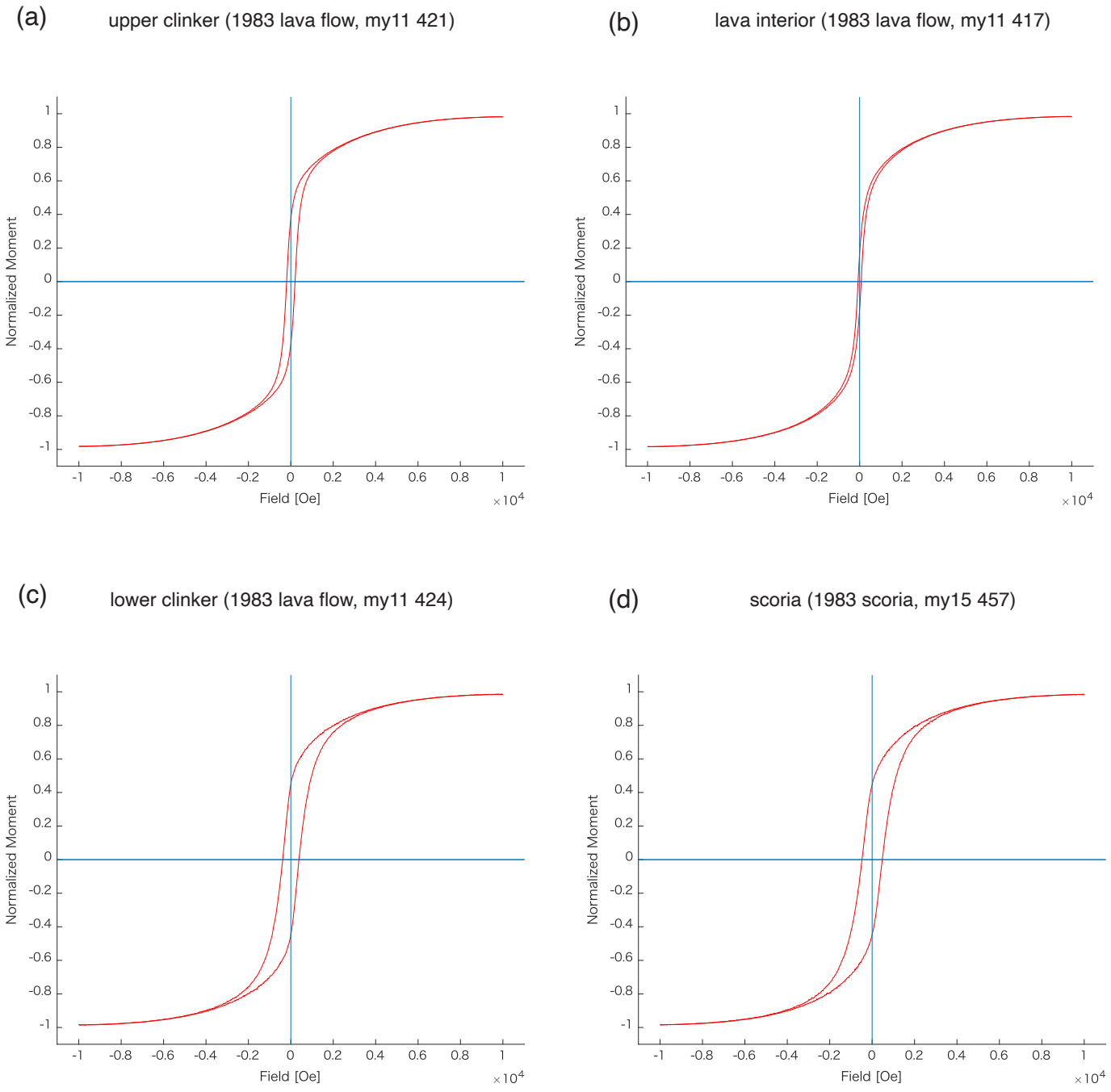


Figure S3. Hysteresis loops for (a) the upper clinker, (b) the lava interior, and (c) the lower clinker of the 1983 lava flow at site my11, and (d) the 1983 scoria at site my15.

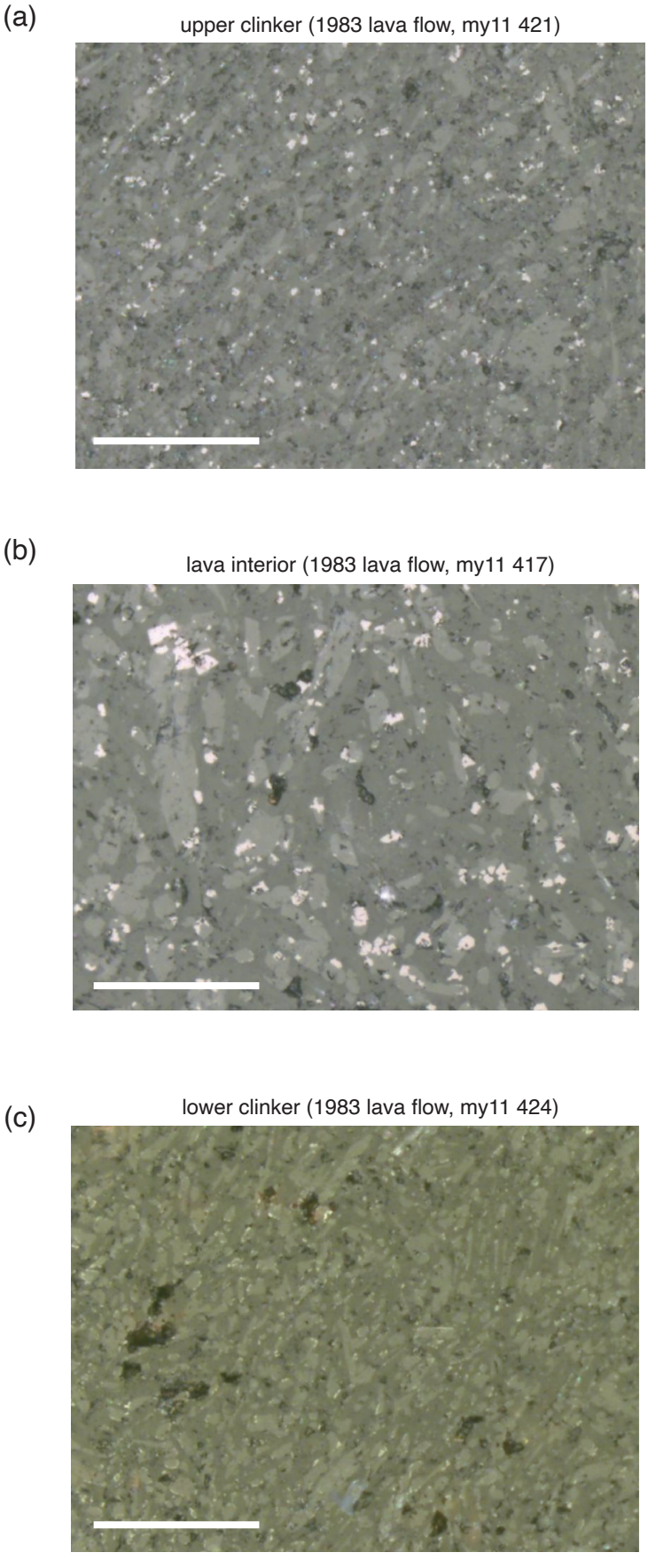


Figure S4. Microscope photographs for (a) the upper clinker, (b) the lava interior, and (c) the lower clinker of the 1983 lava flow at site my11. Each white scale bar indicates 100 μm.

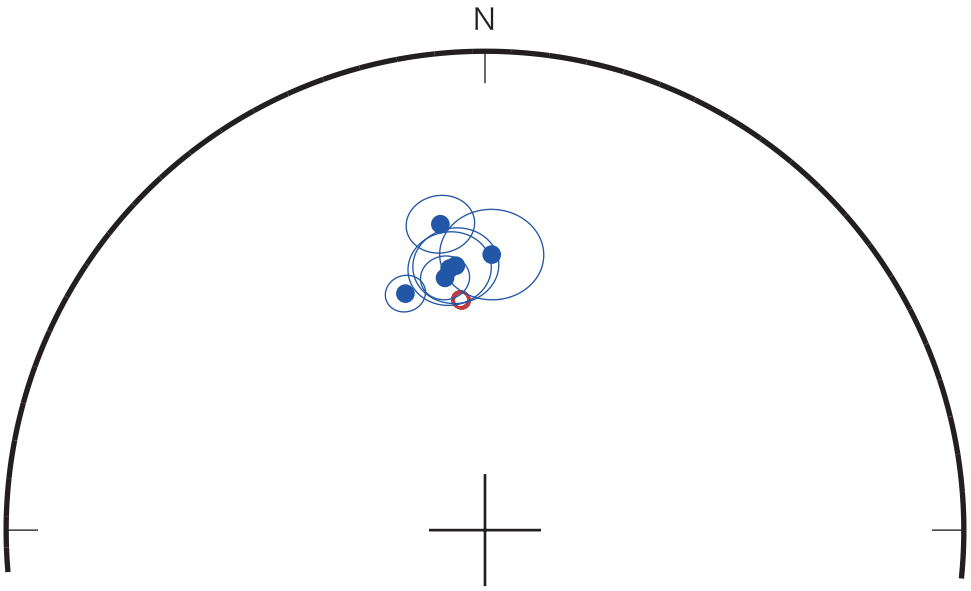


Figure S5. Site mean directions with their 95% confidence limits of characteristic remanent magnetizations deduced from zero-field steps of Thellier measurements plotted on an equal-area projection. Red open symbols indicate the 1962 and 1983 geomagnetic field directions in Miyakejima, Japan, derived from the IGRF model (Alken et al. 2021).

Table S1. Curie temperatures and hysteresis parameters for 1962 and 1983 lava flows and scorias in Miyakejima, Japan.

site	ID		lithology	pos (cm)	Tc1 (°C)	Tc2 (°C)	Tc3 (°C)	Mr/Ms	Hc (mT)	Hcr/Hc	s_hys
my07	484	block	upper clinker	70	358	472		0.2447	11.22	1.871	0.0890
	483	block	upper clinker	65	348	491		0.2162	11.86	2.649	0.0903
	333	block	upper clinker	55	424			0.2188	11.97	2.570	-0.2087
	334	block	upper clinker	55	322			0.3015	17.75	2.137	-0.0052
	331	block	upper clinker	45	297	580		0.2173	10.36	2.501	0.1026
	332	block	upper clinker	45	312	560		0.2016	9.46	2.399	0.1123
	330	block	lava interior	40	272	566		0.1669	7.66	2.307	-0.1199
	482	block	lava interior	40	261	513	572	0.1290	6.92	2.534	-0.2330
	329	block	lava interior	35	281	579		0.1896	9.48	2.415	0.0165
	511	drillcore	lava interior	30	255	499		0.1635	7.63	2.360	-0.2850
	512	drillcore	lava interior	30	315	548		0.1684	9.16	2.219	-0.2165
	516	drillcore	lava interior	25	287	559		0.1731	8.48	2.416	-0.0326
	513	drillcore	lava interior	20	258	523		0.1224	5.64	2.358	-0.4601
	514	drillcore	lava interior	20	339	524		0.1368	8.29	2.188	-0.3915
	517	drillcore	lava interior	10	252	551		0.1424	6.39	2.095	-0.3527
	515	drillcore	lava interior	7	217			0.1593	6.40	2.200	0.0751
	327	block	lower clinker	0	305	524		0.2745	14.44	1.774	-0.0186
	328	block	lower clinker	0	278	528		0.2231	9.25	1.779	-0.1930
	325	block	lower clinker	-5	263	472	586	0.4931	25.26	1.238	-0.1956
	326	block	lower clinker	-5	305	526		0.1858	11.64	1.965	-0.2465
	481	block	lower clinker	-5	370	537		0.2827	15.02	1.645	-0.1746
	480	block	lower clinker	-10	327	511		0.3359	18.54	1.520	-0.3340
my11	421	block	upper clinker	140	337			0.3727	19.79	1.384	-0.3482
	420	block	upper clinker	130	278	515		0.2696	10.85	1.586	-0.0049
	419	block	upper clinker	120	323			0.2751	15.26	1.815	0.2546
	418	block	upper clinker	100	356	505		0.1977	13.59	2.074	-0.2863
	417	drillcore	lava interior	80	270	505		0.1667	7.39	1.961	-0.1963
	416	drillcore	lava interior	62	287	569		0.1529	7.90	2.722	0.0437
	415	drillcore	lava interior	42	514			0.1267	11.43	2.829	-0.4975
	414	drillcore	lava interior	20	317	538		0.1599	9.67	2.289	-0.1612
	413	drillcore	lower clinker	0	332	520		0.1860	13.52	1.928	-0.3603
	424	block	lower clinker	-5	521			0.4455	38.30	1.419	-0.1672
	425	block	lower clinker	-5	517			0.5086	91.95	1.334	-0.2747
	422	block	lower clinker	-10	258	475		0.3759	21.30	1.619	-0.0256
	423	block	lower clinker	-10	299	536		0.3849	17.25	1.391	-0.1834
my10	412	block	upper clinker	65	476			0.3174	15.26	1.444	-0.2148
	410	block	upper clinker	60	370	571		0.3405	15.48	1.367	-0.2586
	411	block	upper clinker	60	312	527		0.3606	16.10	1.511	-0.0800
	408	drillcore	lava interior	38	291	570		0.1936	8.80	2.902	0.0541
	407	drillcore	lava interior	25	300	534		0.2191	13.30	2.410	-0.0420
	406	drillcore	lava interior	15	325	515		0.1665	10.20	2.447	-0.1397
	404	drillcore	lava interior	5	357	511		0.1740	12.11	2.401	-0.1581
	405	drillcore	lower clinker	0	342	508		0.1446	10.42	2.953	-0.0819
	401	block	lower clinker	-25	501			0.1662	13.22	2.353	-0.5220
	402	block	lower clinker	-25	370	518		0.2160	16.46	3.055	-0.0947
	403	block	lower clinker	-25	486	532		0.1701	10.00	1.844	-0.6523
	409	block	lower clinker	-25	504			0.1114	7.73	2.558	-0.4194
my15	454	block	scoria		493			0.5004	75.44	1.331	-0.2650
	455	block	scoria		512			0.3071	30.22	2.512	-0.0998
	456	block	scoria		531			0.4870	70.01	1.354	-0.2997
	457	block	scoria		521			0.4463	47.78	1.398	-0.2211
	458	block	scoria		494			0.4852	84.12	1.406	-0.2662
	459	block	scoria		505			0.5068	71.12	1.305	-0.2736
my03	441	block	upper clinker	70	334			0.3101	20.63	4.034	0.4065
	553	drillcore	lava interior	60	327	536		0.1490	7.22	2.236	-0.4172
	554	drillcore	lava interior	60	315	543		0.1456	7.03	2.383	-0.1940
	555	drillcore	lava interior	60	316	490		0.1633	8.46	2.849	-0.1303
	559	drillcore	lava interior	40	308			0.2113	9.54	2.146	0.1351
	443	block	lava interior	35	281			0.2432	9.88	1.993	0.1393
	560	drillcore	lava interior	30	309	551		0.1460	6.37	2.273	-0.2524
	556	drillcore	lava interior	15	313	534		0.1380	7.37	2.176	-0.4848
	558	drillcore	lava interior	15	356	490		0.2165	10.37	2.213	0.1769
	440	block	lower clinker	0	316	511		0.1680	8.21	2.072	-0.1827
	438	block	lower clinker	-15	477			0.1689	9.78	2.029	-0.5337
	439	block	lower clinker	-15	297	374		0.2414	10.15	1.747	-0.1071
my12	426	block	scoria		501			0.3279	26.25	1.594	-0.3956
	427	block	scoria		493			0.3226	24.12	1.627	-0.3376
	428	block	scoria		357	543		0.4466	43.65	1.488	-0.1649
	429	block	scoria		483			0.4256	52.41	1.515	-0.3040
	430	block	scoria		481			0.4504	47.51	1.376	-0.3323
	431	block	scoria		515			0.4281	51.25	1.631	-0.2144

Tc1, Tc2, Tc3: Curie temperatures from lowet to highest
Ms, Mr, Hc, Hcr: saturation magnetization, saturation remanence, coercivity, coercivity of remanence
s_hys: hysteresis shape parameter (Fabian, 2003)

Table S2. Thellier paleointensity results for 1962 and 1983 lava flows and scorias in Miyakejima, Japan

site	id		lithology	pos (cm)	P	S	T	Tmin	Tmax	b	n	f	beta	q	MADa	alpha	dCK	dpal	k	Ba (uT)	Dec (°)	Inc (°)
my07	484	block	upper clinker	70	o	o	o	130	380	1.1001	6	0.5633	0.0208	19.07	0.700	2.5056	5.9608	9.4621	-0.0107	49.5	335.6	37.6
	483	block	upper clinker	65	o	o	o	20	380	1.2713	7	0.7091	0.0182	26.81	0.739	1.5858	5.3063	6.2103	-0.0968	57.2		
	333	block	upper clinker	55	x	x	x															
	334	block	upper clinker	55	x	o	o	20	380	1.1157	7	0.8529	0.0044	144.69	1.317	2.2571	2.7527	2.1268	0.0015	50.2		
	331	block	upper clinker	45	x	x	x														328.4	51.5
	332	block	upper clinker	45	x	o	o	20	380	1.0989	7	0.5530	0.0143	27.61	0.516	1.9996	1.6569	2.2749	0.0527	49.5	335.7	45.6
	330	block	lava interior	40	x	x	x														347.5	37.5
	482	block	lava interior	40	x	x	x															
	329	block	lava interior	35	x	x	x														344.6	38.4
	511	drillcore	lava interior	30	x	x	x														335.5	39.3
	512	drillcore	lava interior	30	x	x	x														343.4	44.6
	516	drillcore	lava interior	25	x	x	x														343.6	45.3
	513	drillcore	lava interior	20	x	x	x														341.9	40.0
	514	drillcore	lava interior	20	x	x	x														346.0	40.7
	517	drillcore	lava interior	10	x	x	x														343.4	41.0
	515	drillcore	lava interior	7	x	x	x														341.3	45.1
	327	block	lower clinker	0	x	o	o	20	380	1.1727	7	0.3629	0.0231	12.58	0.531	3.3590	2.7385	7.3827	0.0767	52.8		
	328	block	lower clinker	0	x	o	o	130	380	0.9779	6	0.6874	0.0284	18.39	0.700	1.1615	1.5071	3.8769	-0.1264	44.0	357.3	53.0
	325	block	lower clinker	-5	x	x	x															
	326	block	lower clinker	-5	x	o	o	20	380	1.0654	7	0.4246	0.0228	15.12	0.431	2.1230	1.6209	4.4022	0.0818	47.9		
	481	block	lower clinker	-5	o	o	o	20	430	0.9068	8	0.4897	0.0218	18.51	0.399	1.4755	2.4473	2.3656	0.1121	40.8	335.6	41.0
	480	block	lower clinker	-10	x	o	o	130	380	1.1177	6	0.4190	0.0151	21.53	0.764	3.7517	2.3963	7.2082	-0.0175	50.3		
my11	421	block	upper clinker	140	o	o	o	20	380	0.9306	7	0.7532	0.0132	40.13	0.450	0.6465	0.7002	1.5019	-0.0632	41.9	2.4	43.4
	420	block	upper clinker	130	x	o	x															
	419	block	upper clinker	120	o	o	o	20	530	0.9534	10	0.9997	0.0067	128.90	1.314	1.2210	2.7156	3.2499	0.0030	42.9		
	418	block	upper clinker	100	x	x	x														352.3	45.4
	417	drillcore	lava interior	80	x	x	x														353.0	47.3
	416	drillcore	lava interior	62	x	x	x														348.5	36.0
	415	drillcore	lava interior	42	x	o	x														336.7	31.7
	414	drillcore	lava interior	20	x	x	x														359.8	37.6
	413	drillcore	lower clinker	0	o	o	x														4.5	36.1
	424	block	lower clinker	-5	o	o	o	130	580	1.0533	10	0.9747	0.0073	107.03	0.372	0.3318	3.2156	2.9426	0.0203	47.4		
	425	block	lower clinker	-5	x	o	o	180	380	1.1406	5	0.5262	0.0201	19.12	0.564	1.7160	4.8038	8.4105	-0.1086	51.3		
	422	block	lower clinker	-10	o	o	o	180	480	1.1823	7	0.7404	0.0303	17.70	1.547	1.5705	2.4545	4.3703	-0.0831	53.2		
	423	block	lower clinker	-10	x	x	o	20	380	1.1330	5	0.5635	0.0217	17.09	0.816	2.4975	4.5645	4.8475	0.0658	51.0		
my10	412	block	upper clinker	65	x	o	o	20	380	0.8531	7	0.8098	0.0149	43.17	0.918	1.3427	2.3485	3.8083	-0.0599	38.4		
	410	block	upper clinker	60	x	o	o	20	380	0.8547	7	0.8839	0.0074	95.18	0.995	1.5552	2.2249	3.1089	0.0069	38.5	332.6	26.2
	411	block	upper clinker	60	x	o	o	20	380	1.0777	7	0.9244	0.0084	81.30	1.134	1.4814	3.4370	4.1000	-0.0151	48.5	354.3	35.8
	408	drillcore	lava interior	38	x	o	x														346.5	32.0
	407	drillcore	lava interior	25	x	o	x														350.1	30.6
	406	drillcore	lava interior	15	o	o	x														355.7	28.0
	404	drillcore	lava interior	5	o	o	o	280	580	0.9123	7	0.9235	0.0148	46.36	0.611	0.5334	4.8273	7.8015	-0.0779	41.1	349.1	27.6
	405	drillcore	lower clinker	0	o	o	o	230	580	0.9475	8	0.9363	0.0109	64.39	0.501	0.4362	4.7937	7.4857	-0.0562	42.6	350.5	31.1
	401	block	lower clinker	-25	x	x	x															
	402	block	lower clinker	-25	x	x	x														356.3	39.8
	403	block	lower clinker	-25	o	o	x														10.7	32.8
	409	block	lower clinker	-25	x	x	x														352.5	31.9
my15	454	block	scoria		o	o	o	20	380	1.1021	7	0.4270	0.0088	36.16	0.296	1.6402	3.4430	8.0228	-0.0476	49.6	348.3	38.0
	455	block	scoria		x	x	x														352.8	43.1
	456	block	scoria		x	x	x														353.8	39.9
	457	block	scoria		o	o	o	20	580	0.9921	11	1.0045	0.0110	74.00	0.474	0.4885	5.8675	8.3344	0.0843	44.6	352.3	40.9
	458	block	scoria		x	o	o	180	380	1.0868	5	0.3501	0.0105	22.69	0.327	1.9272	2.3876	7.8418	-0.0411	48.9	346.5	39.7
	459	block	scoria		o	o	o	130	430	1.0547	6	0.4106	0.0193	16.65	1.045	5.3062	4.3368	8.1853	0.0883	47.5	353.1	50.4
my03	441	block	upper clinker	70	x	o	o	130	330	0.8669	5	0.7526	0.0061	75.24	3.310	6.8284	2.4213	0.9616	-0.0165	39.0		
	553	drillcore	lava interior	60	x	x	x														338.9	33.7
	554	drillcore	lava interior	60	o	o	x														345.3	35.5
	555	drillcore	lava interior	60	x	x	x														340.0	40.6
	559	drillcore	lava interior	40	o	o	o	180	380	1.0856	5	0.7182	0.0110	46.17	3.256	7.1201	1.4078	1.5198	0.0119	48.9	344.6	35.5
	443	block	lava interior	35	x	o	o	130	380	0.9183	6	0.9244	0.0210	29.67	0.409	0.2729	1.2567	1.5376	-0.1115	41.3	1.5	51.5
	560	drillcore	lava interior	30	x	x	x														354.9	38.9
	556	drillcore	lava interior	15	x	x	x														351.9	46.5
	558	drillcore	lava interior	15	x	o	o	180	380	0.8990	5	0.8877	0.0193	31.69	2.086	1.9618	0.3709	0.5581	0.0382	40.5	2.5	27.7
	440	block	lower clinker	0	x	o	x														14.5	39.4
	438	block	lower clinker	-15	x	o	x															
	439	block	lower clinker	-15	x	o	o	130	380	1.0047	6	0.6874	0.0162	28.60	2.782	7.7428	5.4498	8.5532	0.1019	45.2	351.3	50.1
my12	426	block	scoria		o	o	o	280	580	0.8112	7	0.9794	0.0065	88.21	0.168	0.0521	0.6238	0.6668	-0.0488	36.5	13.7	34.2
	427	block	scoria		o	o	o	380	580	0.9044	7	0.9432	0.0214	36.16	1.868	1.4622	6.4778	9.8819	-0.0778	40.7		
	428	block	scoria		o	o	o	230	580	1.0022	9	0.9566	0.0207	39.11	1.075	0.9926	4.3942	8.2418	-0.1239	45.1	3.5	44.5
	429	block	scoria		x	x	x														356.5	38.6
	430	block	scoria		o	o	o	20	405	1.1433	6	0.3850	0.0332	6.96	0.188	0.7226	0.6498	0.4469	0.1283	51.4	348.0	33.5
	431	block	scoria		x	o	o	455	580	0.8860	5	0.7752	0.0309	16.96	0.187	0.1074	1.9870	4.3479	-0.1638	39.9	5.7	38.6
					21	43	34															

P, S, T: pass or fail to PICRIT, SELCRIT2, TTA criteria as modified by Paterson et al., (2014)
Tmax, Tmin: maximum and minimum temperatures, b: slope, n: number of data points, f: NRM fraction, beta: relative data scatter, q: quality factor, of fitted segment
MADa: maximum angular dispersion of the anchored fitted segment, alpha: angular difference between anchored and non-anchored fitted segment
dCK: maximum differece of pTRM check normalized by total TRM, dpal: cummulative alteration by vectorial calculation
k: curvature of fitted segment
Dec, Inc: declination and inclination of ChRM direction