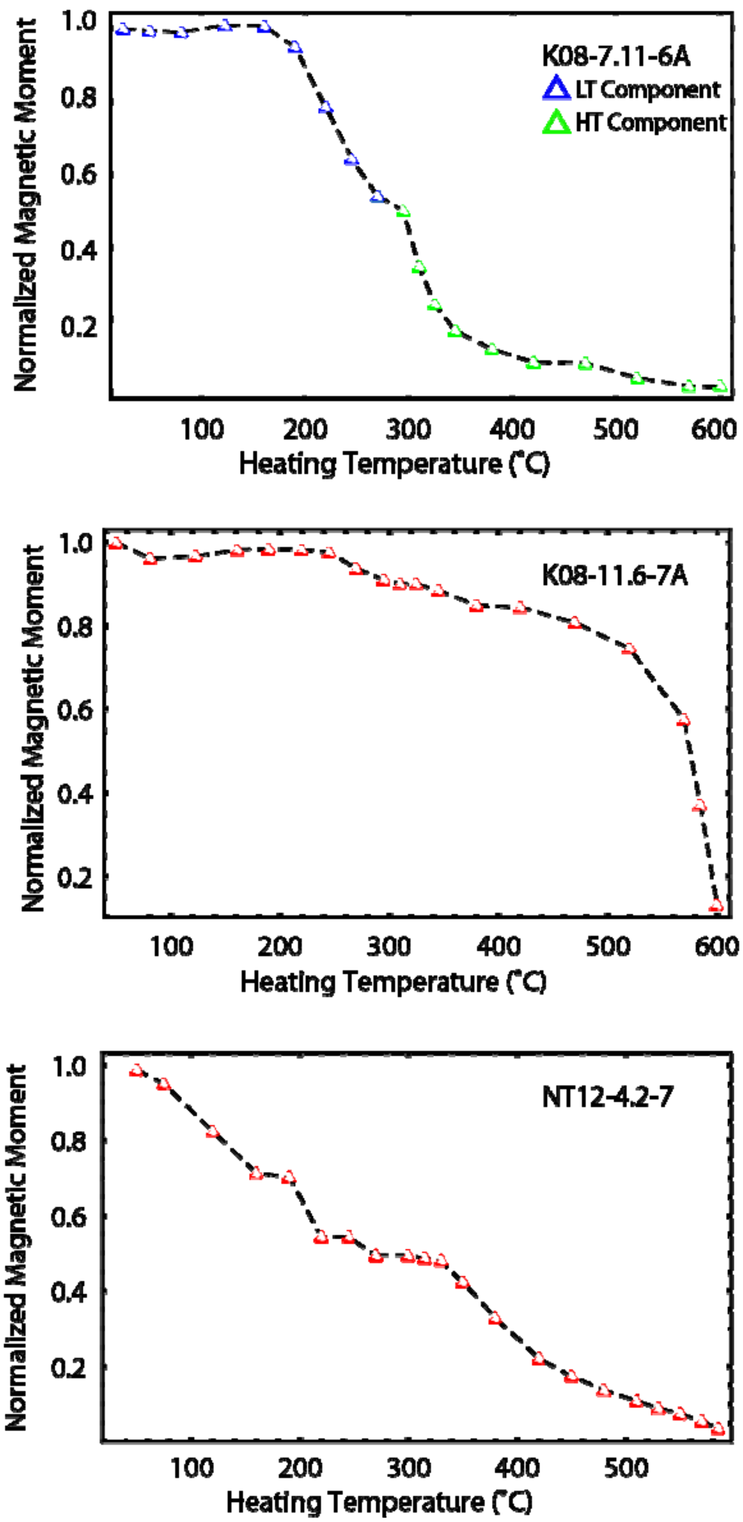
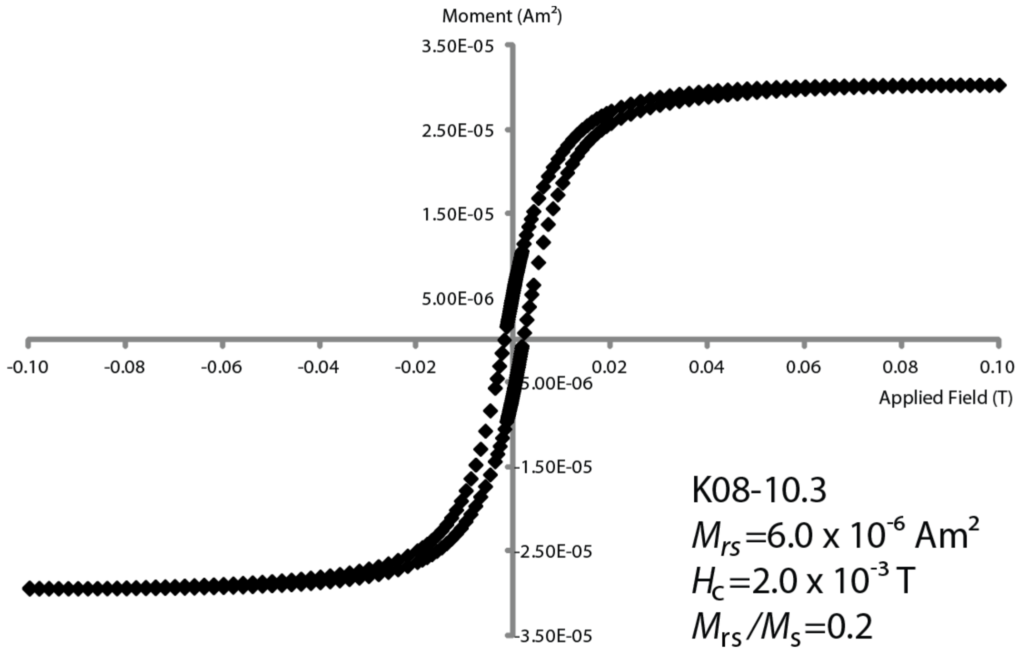
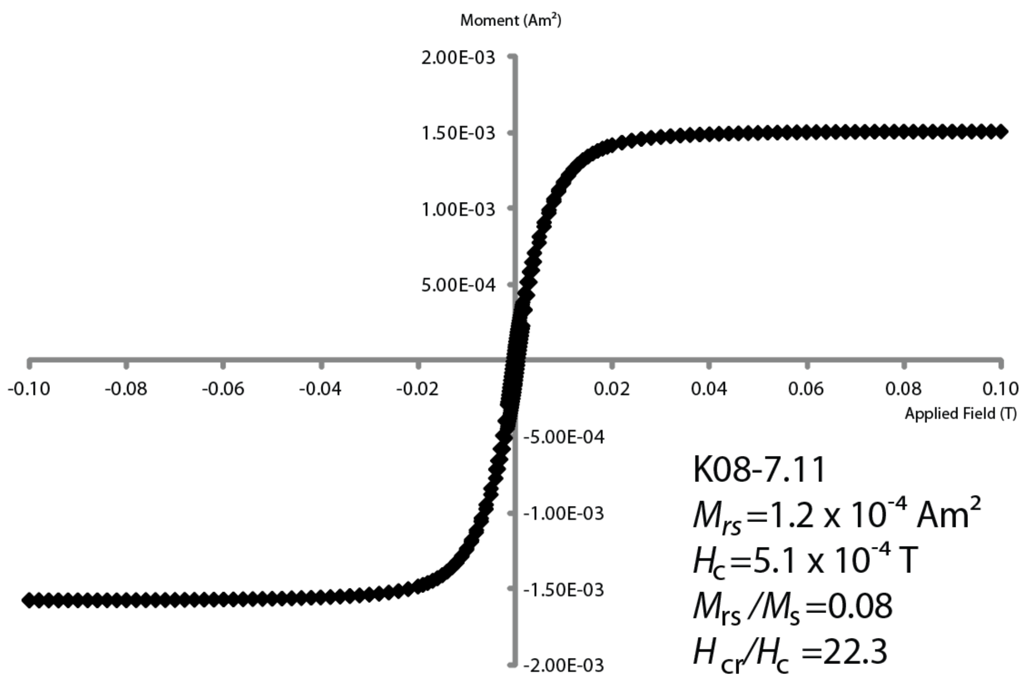
Supplementary Materials

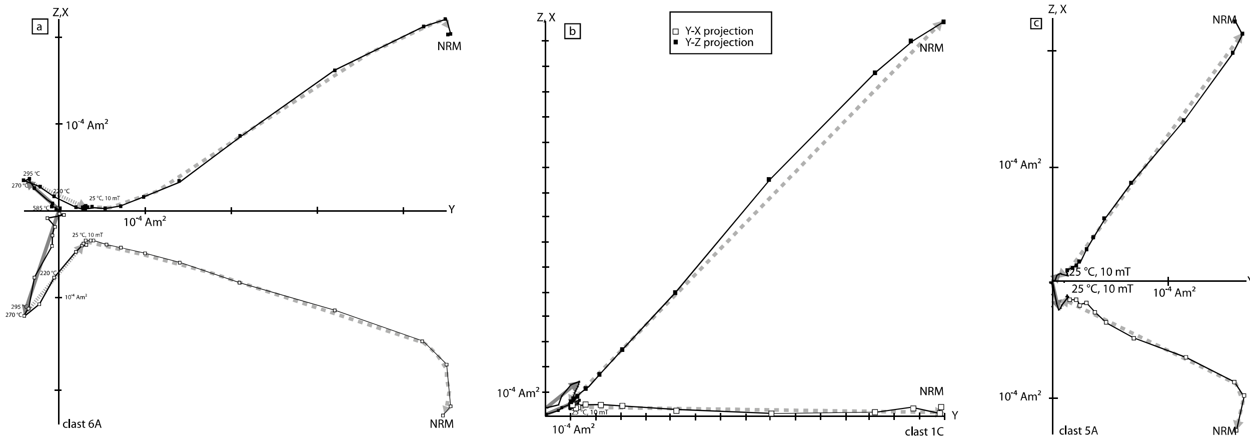


Supplementary Figure A1. Intensity of natural remanent magnetization during thermal demagnetization for three clasts sampled from parent blocks K08-7.11, K08-11.6, and NT12-4.2.





Supplementary Figure A2. Hysteresis loops for selected samples measured with a vibrating sample magnetometer, after correction for paramagnetic high field slope. H_{cr} and H_c were measured on different clasts from block K08-7.11.



Supplementary Figure A3. AF demagnetization and NRM for clasts from parent block K08-7.11 shown in Figure 5 of the main text.

Sample	Clast	Component	Temperature Range (˚C)	Declination, Inclination (˚) *	*N* steps	MAD (˚)
K08-7.11	1A	LT	25 ˚C – 270 ˚C	213.1, 14.1	9	11.4
		HT	270 ˚C – 570 ˚C	52.7, -21.7	5	6.8
	1B	LT	25 ˚C – 270 ˚C	202.3, 14.1	9	6.4
		HT	270 ˚C – 585 ˚C	31.5, -21.9	6	4.8
	1C	LT	25 ˚C – 270 ˚C	201.6, 11.0	9	11.7
		HT	270 ˚C – 345 ˚C	44.5, -17.9	5	7.4
	2	LT	25 ˚C – 245 ˚C	174.5, -65.0	8	14.2
		HT	245 ˚C – 585 ˚C	42.7, 17.3	8	3.9
	3	LT	25 ˚C – 270 ˚C	60.2, 14.9	9	6.2
		HT	270 ˚C – 380 ˚C	247.1, -14.1	5	10.3
	5	LT	25 ˚C – 270 ˚C	31.3, 2.0	9	11.2
		HT	270 ˚C – 585 ˚C	164.7, -16.2	7	8.9
	6	LT	25 ˚C – 270 ˚C	39.7, 15.6	10	4.2
		HT	270 ˚C – 585 ˚C	198.4, -16.4	11	5.8
	7	LT	25 ˚C – 220 ˚C	346.4, -72.2	6	29.6
		HT	220 ˚C – 585 ˚C	100.5, 41.9	4	8.6
	8	HT	25 ˚C – 585 ˚C	70.4, -19.7	10	4.3
	9B	HT	25 ˚C – 585 ˚C	116.2, 31.6	19	1.5
	10A	LT	25 ˚C – 295 ˚C	79.6, 50.2	9	30.2
		HT	295 ˚C – 420 ˚C	109.7, -60.7	7	22.1
	11A	HT	25 ˚C – 350 ˚C	222.6, -28.9	12	3.4
K08-11.6	1A	HT	81 ˚C – 585 ˚C	198.4, 0.7	19	5.8
	1B	HT	50 ˚C – 585 ˚C	199.9, 1.7	19	4.9
	2	HT	25 ˚C – 600 ˚C	190.3, -3.0	14	5.2
	3A	HT	25 ˚C – 570 ˚C	193.9, 11.6	16	11.1
		VHT	570 ˚C – 620 ˚C	10.1, 21.3	5	12.3
	3B	HT	123 ˚C – 585 ˚C	205.8, 9.4	15	8.2
		VHT	585 ˚C – 620 ˚C	10.7, 16.9	4	6.6
	4A	HT	50 ˚C – 585 ˚C	194.9, 3.7	18	6.2
	4B	HT	50 ˚C – 600 ˚C	199.8, 4.6	17	6.6
	5	HT	25 ˚C – 585 ˚C	195.1, -3.4	20	3.9
	6	HT	123 ˚C – 585 ˚C	190.4, 8.7	16	7.0
	7	HT	50 ˚C – 600 ˚C	197.9, -2.5	20	7.2
	8	HT	81 ˚C – 620 ˚C	196.2, -2.5	19	3.9
K08-10.3	1A	HT	50 ˚C – 585 ˚C	348.5, -53.7	22	23.2 †
	1B	HT	50 ˚C – 585 ˚C	288.3, 21.1	21	7.1 †
	3	HT	50 ˚C – 585 ˚C	218.3, 1.2	13	5.2 †
	5	LT	50 ˚C – 530 ˚C	231.9, -25.5	12	13.1

		HT	550 ˚C – 585 ˚C	16.5, -33.9	3	4.8 †
	6A	HT	75 ˚C – 585 ˚C	29.8, -48.0	20	5.0 †
	6B	HT	50 ˚C – 585 ˚C	25.5, -38.3	21	6.8 †
	7A	HT	50 ˚C – 585 ˚C	226.3, -21.7	21	6.3 †
	7B	HT	50 ˚C – 585 ˚C	259.2, -46.1	17	3.9 †
	8	LT	50 ˚C – 220 ˚C	356.2, 81.8	7	26.6
<u>NT12-4.2</u>	1A	HT	50 ˚C – 585 ˚C	15.7, 10.6	18	2.5 †
	1B	HT	50 ˚C – 585 ˚C	10.8, 8.8	17	3.0 †
	2A	HT	50 ˚C – 585 ˚C	4.3, 18.6	19	1.9 †
	2B	HT	50 ˚C – 585 ˚C	5.2, 19.8	17	2.2 †
	3	HT	50 ˚C – 585 ˚C	7.2, 12.7	21	2.2 †
	4	HT	50 ˚C – 585 ˚C	8.5, 10.6	21	2.7 †
	5	HT	50 ˚C – 585 ˚C	14.4, 4.5	21	4.3 †
	6	HT	50 ˚C – 585 ˚C	352.9, 22.4	20	3.2 †
	7	HT	50 ˚C – 585 ˚C	6.8, 13.9	21	2.1 †
	8A	HT	50 ˚C – 585 ˚C	7.3, 6.5	21	3.8 †
	8B	HT	75 ˚C – 585 ˚C	6.7, 9.9	20	2.3 †
	9	HT	50 ˚C – 585 ˚C	9.8, 9.6	21	2.8 †
<u>A10-A9B</u> §	127	VLT	20 ˚C – 290 ˚C	345.9, 75.8	4	0.5
		HT	400 ˚C – 580 ˚C	71.7, 87.0	6	2.1
	128	VLT	20 ˚C – 290 ˚C	340.0, 69.2	4	3.4
		HT	350 ˚C – 600 ˚C	36.1, 78.4	8	3.9
	129	VLT	20 ˚C – 210 ˚C	306.8, 69.7	3	6.3
		HT	400 ˚C – 600 ˚C	208.9, 78.4	7	1.7
	130	HT	400 ˚C – 640 ˚C	231.6, 81.1	9	1.3
	131	VLT	20 ˚C – 210 ˚C	336.7, 62.1	3	4.0
		HT	400 ˚C – 600 ˚C	34.7, 86.6	9	1.5
	132	HT	350 ˚C – 600 ˚C	146.1, 86.3	8	1.2
	133	HT	350 ˚C – 520 ˚C	93.3, 81.5	5	1.4
	134	VLT	20 ˚C – 210 ˚C	50.6, 80.9	3	12.2
		HT	350 ˚C – 580 ˚C	127.0, 83.8	7	1.1
	136	HT	350 ˚C – 520 ˚C	357.0, 83.2	5	1.5
	138	HT	350 ˚C – 640 ˚C	99.3, 56.4	10	1.0
	139	HT	290 ˚C – 640 ˚C	49.4, 83.0	11	0.8
	140	VLT	20 ˚C – 210 ˚C	56.0, 81.4	3	13.3
		HT	400 ˚C – 620 ˚C	67.6, 77.4	8	1.2
	141	HT	400 ˚C – 640 ˚C	49.6, 75.9	9	1.9

** Note that orientations are relative except for sample A10-A9B; all other samples are unoriented relative to true geographic coordinates.*

† Indicates that the fit for this component was forced through the origin.

§ This sample was analyzed at Moscow State University with a JR-6 spinner magnetometer.

*Supplementary Table A1***.** Paleomagnetic components and fits. Note that S10-2-5 is not included in the table above because clasts did not yield coherent components of magnetization.

Sample	**Component**	***N***	**Watson R**	**Watson $R_{95\%}$**	**Conglomerate Test**
A10-A9B	VLT	*6*	5.88	3.85	Fail
	HT	*13*	12.75	5.82	Fail
K08-7.11	LT	*8*	6.65	4.48	Fail
	HT	*10*	3.76	5.03	Pass
K08-10.3	HT	*6*	2.45	3.85	Pass
K08-11.6	HT	*8*	7.85	4.48	Fail
NT12-4.2	HT	*9*	8.92	5.59	Fail

Supplementary Table A2. Results of Watson's (1956) test. If R exceeds the 95% significance value $R_{95\%}$, the clasts are non-randomly magnetized and the sample fails the conglomerate test. We did not include matrix samples in the Watson test calculation.

Supplementary References

Watson, G., 1956, A Test for Randomness of Directions: Geophysical Supplements to the Monthly Notices of the Royal Astronomical Society, v. 7, p. 160-161.