

**Unravelling the magnetic signal of individual grains in a Hawaiian lava using Micromagnetic Tomography**Martha E. Kusters<sup>1</sup>, Rosa A. de Boer<sup>1</sup>, Frenk Out<sup>1</sup>, David I. Cortés-Ortuño<sup>1</sup>, and Lennart V. de Groot<sup>1</sup><sup>1</sup>Utrecht University**Contents of this file**

Supplementary Table S1

**Introduction**

This supplementary information contains one supplementary table.

**Caption table S1.** Table showing results for a single subarea with coordinates (300, 660)(450, 810) (x0, y0)(x1,y1). The Raw data is the magnetic moment in three components as is produced by the inversion of this subarea. From this the magnetic moment is calculated. For each grain the results from subareas in which the grain was fully in the FOV are compiled separately from which a median result is extracted. The  $\Delta m$  is the percentual difference between the individual result and the median result of that specific grain.  $M_r/M_s$  is the calculated ratio of the individual result divided by the maximum magnetic moment for that specific grain. The directional results contains firstly the two columns with the declination and inclination of that individual solution. Then next two columns contain the Fisher mean declination and inclination that was calculated from the compiled results per grain, based on  $n$  solutions, with corresponding  $k$  and  $\alpha_{95}$  (all specific to a certain grain).  $\Delta \text{Angle}$  then is the number of degrees between the individual direction (dec, inc) and the Fisher mean (dec,inc) for that grain. Lastly a number of physical properties are listed that are specific for the individual grains, such as depth ( $R$ ), volume ( $V$ ), the number of voxels the grain consists of (# voxels), the calculated diameter (assuming the volume is a perfect sphere), the signal strength ratio (SSR), the saturation magnetic moment and the distance to the closest boundary for that specific grain in that specific subarea.

Grain	Raw data			Magnetic results			Directional results						Physical properties								
	Mx (A m <sup>2</sup> )	My (A m <sup>2</sup> )	Mz (A m <sup>2</sup> )	Magn. moment (A m <sup>2</sup> )	Δm (%)	Mr/Ms	Declination (°)	Inclination (°)	Fisher Decd (°)	Fisher Incl (°)	n	k	α95 (°)	ΔAngle (°)	R (μm)	V (μm <sup>3</sup> )	# voxels	Diameter (μm)	SSR (μm)	Saturation Magn (Am <sup>2</sup> )	Distance to boundary (μm)
320.00	-4.301E+06	-8.310E+06	-2.019E+07	2.225E+07	13.241	2.790E-02	207.37	-65.13	227.00	-32.91	182	10.674	3.356	34.36	23.24	1661.68	5403.00	14.70	9.01E-03	7.976E+08	2.02
346.00	-2.080E+06	-3.158E+06	-8.801E+05	3.883E+06	16.929	2.939E-02	213.37	-13.10	206.00	-14.81	196	30.595	1.848	7.36	17.35	275.25	895.00	8.07	6.53E-03	1.321E+08	15.08
354.00	9.465E+07	-2.001E+07	-7.191E+07	1.205E+08	44.111	2.057E+00	101.94	-36.62	106.61	-26.92	196	6.276	4.377	10.47	30.54	122.10	397.00	6.16	6.97E-04	5.861E+07	27.40
356.00	-1.473E+07	4.334E+07	-1.579E+07	4.842E+07	51.048	2.050E+01	341.23	-19.03	330.94	-15.91	210	1.607	12.445	10.30	33.71	4.92	16.00	2.11	6.09E-05	2.362E+06	6.73
369.00	-6.437E+07	4.884E+07	4.543E+07	9.270E+07	18.300	3.925E+01	307.19	29.34	302.05	25.27	210	12.643	2.846	6.12	25.19	4.92	16.00	2.11	1.46E-04	2.362E+06	38.32
375.00	4.704E+06	7.623E+06	-3.880E+06	9.762E+06	9.404	1.852E-03	31.68	-23.42	34.78	-32.17	132	28.433	2.344	9.17	12.97	10978.50	35697.00	27.57	1.82E-01	5.270E+09	43.37
381.00	4.757E+04	-8.942E+03	1.719E+05	1.786E+05	28.385	4.801E-04	100.65	74.28	359.56	78.95	169	2.335	9.367	20.81	6.70	775.02	2520.00	11.40	2.26E-01	3.720E+08	46.74
393.00	2.284E+05	4.884E+05	1.613E+05	5.627E+05	55.815	3.177E-01	25.06	16.65	3.44	18.21	210	1.872	10.388	20.67	17.46	3.69	12.00	1.92	3.62E-04	1.771E+06	34.36
397.00	4.002E+07	3.237E+07	-1.100E+07	5.264E+07	52.206	2.972E+01	51.03	-12.06	75.22	-26.19	225	9.262	3.263	26.78	27.65	3.69	12.00	1.92	9.11E-05	1.771E+06	27.73
408.00	1.060E+06	8.044E+04	-1.370E+06	1.734E+06	40.123	4.657E-03	85.66	-52.18	44.86	-49.68	182	1.924	10.842	25.49	32.25	775.63	2522.00	11.40	2.03E-03	3.723E+08	9.12
416.00	2.789E+05	7.003E+05	-4.096E+05	8.579E+05	6.649	9.784E-03	21.71	-28.52	9.41	-7.76	210	4.164	5.458	23.78	6.08	182.68	594.00	7.04	1.16E-01	8.769E+07	39.14
423.00	9.584E+06	4.873E+07	9.955E+06	5.065E+07	55.204	8.169E+00	11.13	11.34	21.91	40.87	225	2.730	7.128	31.02	25.35	12.92	42.00	2.91	2.72E-04	6.200E+06	46.53
434.00	-3.096E+06	-9.843E+05	-2.421E+05	3.258E+06	8.078	2.174E-02	252.36	-4.26	269.26	53.12	195	1.606	12.920	59.12	12.07	312.16	1015.00	8.42	2.11E-02	1.498E+08	0.57
435.00	1.791E+06	1.871E+06	-6.235E+05	2.664E+06	13.465	2.442E-02	43.74	-13.54	348.00	-6.73	196	1.859	10.835	55.18	18.76	227.28	739.00	6.57	4.55E-03	1.091E+08	40.93
455.00	-1.122E+07	4.660E+05	-3.915E+06	1.189E+07	62.212	1.492E-01	272.38	-19.22	246.21	-0.79	196	3.755	6.055	31.58	15.01	166.08	540.00	6.82	7.20E-03	7.972E+07	29.48
464.00	-2.030E+07	-3.461E+06	-5.279E+06	2.128E+07	68.352	1.461E-01	260.33	-14.38	324.15	-39.16	196	1.628	12.665	60.78	17.46	303.24	986.00	8.34	6.83E-03	1.456E+08	16.81
471.00	1.511E+05	4.023E+05	-1.829E+05	4.670E+05	33.131	3.268E-03	20.58	-23.05	275.75	14.82	182	1.882	11.101	109.14	5.02	297.71	968.00	8.28	2.83E-01	1.429E+08	17.46
481.00	-8.759E+07	2.187E+07	8.796E+07	1.260E+08	251.834	7.115E+01	284.02	44.26	47.83	60.94	225	2.092	8.968	65.39	31.67	3.69	12.00	1.92	6.06E-05	1.771E+06	4.81
483.00	4.984E+06	2.904E+07	5.139E+06	2.991E+07	62.599	4.824E+00	9.74	9.89	42.40	35.22	210	3.698	5.911	39.05	32.07	12.92	42.00	2.91	1.35E-04	6.200E+06	19.63
484.00	-1.586E+06	-5.503E+05	-4.709E+05	1.745E+06	36.580	6.953E-01	250.86	-15.86	306.92	32.94	210	2.869	7.099	72.41	8.75	5.23	17.00	2.15	3.63E-03	2.510E+06	12.96
487.00	-1.618E+07	-1.866E+07	-3.070E+07	3.940E+07	45.833	6.510E+00	220.92	-51.18	184.66	-2.50	210	2.121	9.163	57.39	32.01	12.61	41.00	2.89	1.33E-04	6.053E+06	16.90
492.00	-2.669E+06	-4.835E+06	-1.349E+07	1.458E+07	59.889	7.447E-02	208.89	-67.74	16.77	-12.15	196	1.862	10.816	99.63	21.22	407.81	1326.00	9.20	4.64E-03	1.957E+08	6.01
495.00	-1.512E+06	-3.61E+06	3.407E+06	5.189E+06	8.924	2.929E+00	202.73	41.04	154.97	70.78	196	4.138	5.481	38.11	24.40	3.69	12.00	1.92	1.32E-04	1.771E+06	14.86