Table DR1: Analyses of the newly defined type section for the Green Tuff (GT44; Williams, 2010) on which figure 1 is based. XRF analyses were carried out at the University of Leicester using a PANalytical Axios Advanced X-Ray Fluoresence spectrometer. The machine runs a 4Kw Rhodium (Rh) anode end window super sharp ceramic technology X-Ray tube. Operating conditions are optimised for sensitivity and resolution.

Sample	**GT44B**	**GT44Di**	**GT44D**	**GT44Dii**	**GT44E**	**GT44Ei**	**GT44Ev**	**GT44Eiii**	**GT44Evi**	**GT44Eiv**	**GT44F**	**GT44F**	**GT44G**	**GT44H**	**GT44I**
Height (cm)	**25**	**75**	**85**	**110**	**125**	**215**	**215**	**250**	**295**	**325**	**365**	**400**	**465**	**520**	**815**
SiO2	69.37	63.57	69.51	69.49	65.33	66.26	68.06	67.49	66.70	66.05	65.82	64.69	64.09	63.55	62.71
TiO2	0.46	0.48	0.50	0.51	0.67	0.59	0.60	0.61	0.65	0.66	0.65	0.68	0.69	0.75	0.76
Al2O3	8.41	8.11	9.02	9.16	13.51	10.06	10.78	11.53	12.29	12.29	12.20	14.10	13.57	15.30	15.66
Fe2O3	8.62	8.25	8.38	8.62	6.83	8.19	8.08	7.99	7.90	7.67	7.47	6.75	6.94	6.34	6.26
MnO	0.29	0.29	0.30	0.29	0.26	0.29	0.28	0.29	0.29	0.28	0.28	0.26	0.27	0.230	0.205
MgO	0.11	0.18	0.08	0.26	0.24	0.35	0.28	0.22	0.22	0.33	0.19	0.21	0.33	0.20	0.25
CaO	0.38	0.38	0.39	0.40	0.91	0.58	0.55	0.66	0.73	0.80	0.77	0.94	0.95	1.10	1.10
Na2O	6.27	5.48	6.04	5.41	6.80	5.28	5.79	6.01	5.97	6.18	6.68	6.71	6.86	7.08	7.14
K2O	4.22	3.96	4.54	4.40	4.83	4.08	4.43	4.49	4.61	4.41	4.69	4.76	4.81	4.57	4.44
P2O5	0.03	0.03	0.04	0.04	0.10	0.05	0.06	0.06	0.07	0.07	0.06	0.09	0.09	0.17	0.16
SO3	0.05	0.03	0.03	0.01	0.06	0.01	0.04	0.02	0.00	0.05	0.02	0.00	0.03	0.01	0.07
LOI	0.23	1.06	0.65	1.01	0.24	0.47	0.53	0.28	0.21	0.82	1.01	0.12	0.86	0.18	0.53
Total	98.44	91.83	99.47	99.61	99.78	96.22	99.47	99.66	99.64	99.62	99.84	99.31	99.48	99.47	99.28
Peralkalinity Index = mol $(Na_20+K_20)/AL_2O_3$	1.77	1.64	1.65	1.49	1.21	1.30	1.33	1.28	1.21	1.21	1.32	1.15	1.21	1.08	1.06
Ba	38.62	73.03	60.04	66.32	568.57	237.04	159.03	136.42	174.68	178.80	164.90	650.86	572.75	1891.2	2267.82
Ce	392.32	337.86	410.06	380.44	157.09	288.46	280.42	257.73	226.59	206.23	233.93	131.35	159.52	103.10	91.38
Cl	7016.46	5983.29	—	4587.44	—	1610.26	6100.84	1048.50	17.42	6487.39	—	156.44	—	—	—
Co	5.13	4.56	10.25	4.19	8.02	4.56	6.68	4.23	3.90	2.88	8.40	2.33	6.29	7.07	7.00
Cr	21.09	13.49	—	—	—	3.77	1.98	—	3.62	—	2.99	—	—	0.86	—
Cs	5.73	5.47	12.13	5.65	0.28	2.90	3.44	2.91	2.93	1.69	4.91	0.51	—	—	—
Cu	0.89	2.43	1.50	0.49	—	0.36	—	-0.81	—	—	—	—	—	—	—
Ga	32.76	35.97	36.00	34.90	35.20	34.38	37.05	38.09	36.69	36.79	36.54	35.24	35.01	32.23	30.56
La	219.83	194.68	235.62	205.94	87.88	163.78	150.11	136.40	126.16	114.10	132.80	73.14	106.43	75.90	56.33
Mo	21.25	13.11	10.57	6.00	4.36	7.44	6.61	5.31	5.19	6.45	4.36	3.41	3.20	2.23	1.36
Nb	390.46	376.08	353.71	360.74	139.70	288.77	285.04	244.86	214.33	196.94	194.25	119.88	130.52	78.03	66.45
Nd	168.15	148.37	162.69	163.27	72.97	125.25	117.42	113.44	104.55	96.33	99.70	65.19	81.86	58.38	45.14
Ni	4.21	3.96	1.65	1.94	—	2.85	1.76	1.13	1.75	1.00	—	0.59	—	—	—
Pb	14.48	13.59	15.64	14.19	7.77	11.82	8.48	8.23	6.13	5.89	7.68	3.94	6.01	3.44	3.94
Rb	197.02	189.51	176.70	180.56	80.21	148.21	145.83	126.70	111.12	91.47	100.83	65.18	66.79	48.21	39.32
Sc	0.33	0.06	2.58	0.63	6.69	0.40	1.53	0.25	2.69	2.40	5.74	4.88	8.32	10.10	12.74
Sr	4.23	10.86	8.00	10.85	17.00	22.14	13.79	12.03	14.15	14.82	13.79	18.86	20.94	54.25	63.97
Th	35.13	34.12	34.36	32.55	10.98	25.48	24.06	19.18	16.47	13.89	16.26	7.62	9.63	4.93	4.90
U	10.31	9.84	9.80	8.24	4.39	8.35	5.73	4.18	2.64	2.82	3.29	2.32	2.93	1.52	1.88
V	0.37	0.69	3.26	—	4.37	—	1.89	1.66	2.33	1.14	3.12	—	4.50	7.26	9.36
Y	182.67	178.30	170.69	164.03	67.39	147.10	122.77	100.60	92.38	94.13	88.40	65.47	75.54	51.09	31.14
Zn	429.39	409.66	389.31	399.29	179.04	331.12	323.61	294.65	288.95	218.42	209.64	134.51	166.57	136.76	100.16
Zr	2060.78	1985.25	1871.19	1912.66	1594.13	1483.16	1456.83	1185.36	1012.15	904.05	905.72	486.60	550.77	317.80	290.96

Table DR2: A subset of the analyses of newly defined Green Tuff type section (GT44; Williams 2010) by LA ICP MS showing spot data for individual samples. Laser ablation analysis was performed on polished 100 µm sections. Prior to analysis, the major element concentrations of the individual mineral grains and glassy areas were determined by electron microprobe in order to help calibrate the LA-ICP-MS data. Back-scattered images were also obtained in order to help locate the laser spots as close as possible to the probe points. LA-ICP-MS work was carried out at the Open University on an Agilent 7500A quadropole ICP-MS, coupled with a New Wave UP213 Nd:Yag deep UV (213 nm) laser system. Values obtained by LA ICP MS are generally higher than those obtained by XRF. This is likely due to two reasons. Firstly, the type section samples were not ideal for analyses as they were not glassy. Spots commonly contained microcrysts. Secondly, the XRF data are an average of glass and phenocrysts. Full discussion of this can be found in Williams, 2010.

Sample	GT44B	GT44B	GT44B	GT44D	GT44D	GT44E	GT44E	GT44E	GT44F	GT44F	GT44G	GT44G	GT44G	GT44H	GT44H	GT44H	GT44I	GT44I
Li7	36.3	44.2	44.3	21.4	22.0	19.4	33.9	18.8	37.4	24.4	16.8	4.6	62.1	2.8	4.5	30.4	1.1	3.6
Be9	12.8	12.6	13.4	12.7	13.4	10.4	9.8	10.3	7.0	5.1	9.2	4.9	24.1	2.1	1.3	2.3	2.0	2.2
Mg24	2375.0	3201.2	1054.7	777.1	713.0	1845.7	2007.4	1602.8	2213.2	6470.4	4210.3	3974.4	4978.2	1869.9	6444.1	2026.4	3059.0	2992.4
Mg26	2405.1	3130.9	1124.6	832.8	745.0	2069.9	2256.0	1804.0	2362.8	6701.0	4330.0	4046.1	5001.2	1729.3	6012.6	1868.0	3231.2	3115.4
Si29	318466.4	323374.6	316222.7	325945.5	328843.6	317204.3	334686.5	317718.5	279762.5	262233.5	321691.8	269946.3	286587.1	291869.1	280042.9	298553.5	294954.2	289064.5
Ca43	5979.0	7595.6	2789.1	2261.9	2547.6	5207.4	5016.2	4268.0	4964.0	13322.6	7731.6	12939.5	11398.7	7742.5	16525.3	4509.9	10279.1	8859.7
Ca44	5771.5	7569.5	2714.0	2185.2	2493.7	5089.1	3857.3	4180.8	4978.5	13413.1	7581.3	12718.2	11272.3	7501.2	16120.3	4420.5	10147.5	8961.6
Sc45	4.4	4.3	4.4	4.3	4.3	9.6	8.1	7.7	7.8	8.8	12.7	14.0	9.7	10.1	12.4	9.3	16.1	16.3
Ti47	2499.1	2508.8	2639.8	2904.1	2667.6	4494.3	4935.1	4535.5	2988.1	4416.4	3478.6	2350.9	6422.5	3712.5	2907.1	10187.9	6248.7	6179.0
V51	0.3	0.4	0.3	0.1	0.1	0.5	0.4	0.4	0.3	0.8	0.5	0.6	1.5	0.6	1.9	0.6	1.2	1.5
Cr53	0.3	0.8	0.4	<0.27	0.5	<0.20	0.3	<0.17	<0.136	0.5	<0.31	0.3	2.8	<0.171	0.6	0.4	0.3	0.2
Mn55	2019.0	2016.6	2089.9	2151.0	2214.5	2490.5	2377.6	2361.8	2385.2	2051.5	2364.2	1879.7	3511.3	1063.0	905.9	2057.1	1414.4	1372.6
Fe57	54049.0	54921.8	57106.3	60795.7	61960.8	55707.2	58505.5	56054.6	52203.2	81802.9	54525.8	40046.2	85981.6	33120.2	29539.4	53925.5	49053.4	46932.0
Co59	0.2	0.2	0.2	0.2	0.2	0.5	0.6	0.5	0.3	0.5	0.3	0.4	0.9	0.3	0.3	0.6	0.6	0.6
Ni60	0.2	0.7	<0.046	0.0	0.2	0.2	0.2	0.2	0.4	3.1	0.5	0.3	4.9	0.2	1.0	0.5	0.3	0.3
Cu63	3.1	3.8	8.2	2.3	3.6	1.7	4.2	2.0	1.9	5.4	7.7	2.4	78.3	1.9	5.7	3.0	2.3	2.0
Zn66	442.7	437.8	495.3	555.5	597.1	243.1	239.1	240.7	286.2	243.4	337.2	159.9	454.9	178.8	91.0	274.5	136.5	138.5
Ga71	26.0	25.5	26.8	28.0	28.7	27.4	30.2	29.1	31.2	25.8	34.8	25.8	29.7	25.0	23.2	19.0	27.3	27.4
Ge72	2.9	2.9	2.9	3.4	3.3	3.0	3.3	3.6	2.6	3.2	3.0	2.3	3.3	1.8	1.7	1.6	1.9	1.9
As75	9.2	9.1	9.1	9.5	10.4	2.3	2.6	2.9	1.7	1.7	2.1	1.9	3.2	1.2	1.1	1.7	0.9	1.2
Rb85	178.5	174.2	184.1	172.5	203.6	81.6	89.2	82.4	118.4	91.5	116.3	86.5	79.5	40.8	45.1	40.7	48.2	49.7
Sr88	5.4	7.1	3.2	2.6	2.8	5.5	5.5	5.4	9.3	14.2	13.3	16.5	14.5	60.6	32.7	11.2	23.0	21.7
Y89	186.3	182.6	194.6	168.0	183.5	118.8	106.8	154.1	172.7	183.2	126.4	70.6	114.3	41.5	26.6	29.4	29.8	26.2
Zr90	2232.6	2189.0	2311.2	2036.3	2175.2	1911.1	1700.3	1927.4	1377.4	1540.1	1218.1	812.0	1289.7	258.9	251.3	255.6	319.7	312.2
Nb93	462.7	456.9	482.2	466.2	496.1	378.9	411.0	432.6	266.6	391.9	279.6	128.7	314.5	79.5	51.2	155.5	100.3	97.5
Mo95	21.7	21.2	21.3	23.2	23.1	7.3	6.3	6.0	3.1	5.6	3.7	3.2	10.0	2.3	1.6	2.1	1.7	1.8
Cd111	0.5	0.6	0.6	0.5	0.6	0.1	0.1	0.1	0.2	0.1	0.2	<0.126	0.2	<0.110	<0.123	0.2	0.1	0.1
In115	0.4	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.2	0.4	0.3	0.3	0.6	0.1	0.2	0.1	0.2	0.1
Sn118	14.9	15.6	14.3	14.0	15.9	11.3	12.2	12.8	6.6	27.9	6.6	6.6	31.0	6.4	8.7	5.0	4.9	4.8
Sb121	0.7	0.8	0.7	0.7	0.8	0.3	0.3	0.4	0.2	0.4	0.3	0.2	2.9	0.1	0.1	0.2	0.1	0.1
Cs133	2.3	2.2	2.3	2.1	2.2	0.5	0.4	0.5	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.2
Ba137	51.4	51.6	48.3	51.7	52.4	91.7	92.8	97.2	65.3	78.7	277.0	415.7	186.1	2223.5	1060.4	424.8	1082.3	853.4
La139	231.5	226.8	241.5	223.4	236.8	215.6	230.7	398.7	303.5	251.6	162.3	85.6	112.6	53.0	35.8	36.2	48.7	44.8
Ce140	429.0	423.0	447.8	445.5	475.2	413.1	415.4	694.3	505.1	374.7	259.3	164.0	204.4	107.6	69.4	54.2	76.1	72.4
Pr141	47.1	46.9	49.4	48.3	51.5	47.3	45.7	75.6	61.1	51.4	34.1	21.0	29.2	12.0	9.4	8.5	11.4	10.7
Nd146	170.7	169.9	178.8	167.3	176.8	176.6	157.2	257.6	217.7	201.8	136.8	85.0	110.6	49.0	36.1	35.9	44.6	41.0
Sm147	34.5	33.7	36.1	33.8	35.5	32.0	34.8	44.6	41.6	40.1	28.5	16.5	24.7	10.3	7.6	7.5	9.3	8.3
Eu153	5.0	4.9	5.2	5.0	5.4	5.4	4.5	7.1	6.7	6.6	6.2	3.7	5.1	5.3	2.9	2.3	3.0	2.9
Gd157	33.0	32.2	34.3	30.5	33.2	27.6	25.5	36.8	38.6	36.9	27.5	15.6	22.5	10.0	7.7	7.4	8.1	7.4
Tb159	5.4	5.2	5.4	5.0	5.4	4.1	3.6	5.4	6.2	5.9	4.3	2.4	3.4	1.5	1.1	1.2	1.2	1.1
Dy163	34.8	34.3	35.2	31.8	34.7	24.7	21.9	31.0	34.9	36.1	25.0	14.7	21.8	9.2	6.8	7.2	6.7	6.0
Ho165	6.9	6.8	7.2	6.4	7.0	4.7	4.2	5.8	6.8	7.7	4.9	2.8	4.5	1.8	1.3	1.4	1.2	1.1
Er166	20.1	19.9	21.0	18.5	20.2	13.6	12.3	16.4	18.2	20.5	14.2	8.0	13.6	4.8	3.3	4.0	3.3	3.0
Tm169	2.9	2.8	3.1	2.8	3.0	2.1	1.9	2.4	2.5	3.0	2.0	1.2	2.0	0.7	0.5	0.6	0.5	0.4
Yb172	19.2	18.5	19.8	18.1	19.4	14.4	13.1	15.7	15.2	20.3	14.4	8.2	13.8	4.5	3.4	3.3	3.2	2.8
Lu175	2.7	2.7	2.9	2.6	2.7	2.2	2.0	2.3	2.1	3.1	2.1	1.3	2.1	0.6	0.5	0.5	0.5	0.4
Hf178	49.0	48.8	52.0	46.8	49.8	44.8	40.2	43.4	33.5	37.1	26.5	18.9	31.4	7.0	7.5	8.6	7.8	7.3
Ta181	26.6	26.4	28.4	26.7	28.2	24.7	24.1	25.6	18.6	20.3	18.6	8.5	15.7	5.5	4.5	10.1	5.7	5.6
W182	5.2	5.1	5.4	5.4	6.2	2.8	1.3	3.0	1.2	1.3	3.8	1.3	2.7	1.0	0.5	1.4	0.8	0.7
Tl205	0.2	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Pb208	13.8	14.2	14.1	14.6	15.1	3.7	4.0	3.9	6.1	7.4	7.0	3.3	16.1	1.9	3.0	3.3	1.8	2.2
Bi209	0.1	0.1	0.1	0.1	0.1	0.0	<0.0030	<0.0030	0.0	0.0	0.0	<0.0046	0.1	<0.0058	<0.0081	<0.0063	0.0	0.0
Th232	39.3	37.7	41.3	37.3	39.2	34.3	31.0	42.0	36.2	28.7	20.2	10.7	47.9	6.4	3.1	4.7	5.5	5.4
U238	9.7	9.5	10.1	11.0	11.6	4.9	4.5	6.0	4.8	3.6	4.1	2.6	6.7	1.0	0.6	0.8	1.2	1.1

Table DR3: Parameters selected for runout and duration calculations. *Note*: the Bursik and Wood (1996) model takes the transport system of the current to be fully dilute; however, the lithofacies and very poor sorting of the Green Tuff indicate that lower parts of the current widely were granular fluid-based, and density-stratified to dilute upper levels (e.g. Branney and Kokelaar, 2002; Brown and Branney, 2013)

Parameter	**Value**	**Comments**
Original deposit radius	6.25 km	Conservatively assumes a circle with max. diameter of the island - to E and W material clearly entered the sea and likely flowed further down topographic lows
Average outflow thickness	4 m	
Caldera radius	3 km	
Caldera fill thickness	> 35 m	
Estimated volume	0.49 km^3	
Deposit density	2.25 g/cm^3	Measured by Orsi and Sheridan (1984)
Deposit mass	1.1×10^{12} kg	
Aspect-ratio of outflow sheet	0.00032	or lower aspect ratio than 1:3125
Mass flux	2×10^8 kg/s	Using fig. 3a of Bursik and Woods (1996), and a runout of 6.25 km (a minimum value for most of the duration of the eruption). But clearly this changed with time.
Grainsize	1-2 mm	Cannot be measured as it varies, is very poorly sorted, and welded. However, the low viscosity of pantellerite magmas favours bubble coalescence, collapse and formation of larger, more fluidal pyroclasts, which are evident within the deposit as spatter, fluidal lapilli etc.
Particle sedimentation speed	3 m/s	Using fig 2a of Bursik and Wood (1996)
Eruption temperature	1000 ^oK	
Volatile content	3%	Consistent with measured average of 3% “volatile contents ranging from 1.4 to as high as 4.2 wt % i.e. much higher than the 1.4 wt % of earlier published studies“ (Lanzo et al 2013).

References

Branney, M.J., and Kokelaar, B.P., 2002, Pyroclastic Density Currents and the Sedimentation of Ignimbrites: Geological Society of London Memoir, v. 27, 150 p.

Brown, R.J., and Branney, M.J., 2013, Internal flow variations and diachronous sedimentation within extensive, sustained, density-stratified pyroclastic density currents flowing down gentle slopes, as revealed by the internal architectures of ignimbrites on Tenerife: Bulletin of Volcanology, v. 75, p. 727, doi:10.1007/s00445-013-0727-0.

Bursik, M.I., and Woods, A.W., 1996, The dynamics and thermodynamics of volcanic ash flows: Bulletin of Volcanology, v. 58, p. 175–193, doi:10.1007/s004450050134.

Lanzo, G. Landi, P, Rotolo, S., 2013, Volatiles in pantellerite magmas: a case study of the Green Tuff Plinian eruption (Island of Pantelleria, Italy): Journal of Volcanology and Geothermal Research, v. 262, p. 153-163. doi: 10.1016/j.jvolgeores.2013.06.011

Orsi, G., and Sheridan, M.F., 1984, The Green Tuff of Pantelleria: Rheoignimbrite or rheomorphic fall?: Bulletin of Volcanology, v. 47, no. 3, p. 611–626, doi:10.1007/BF01961230.

Williams, R., 2010. Emplacement of radial pyroclastic density currents over irregular topography: the chemically-zoned, low aspect-ratio Green Tuff ignimbrite, Pantelleria, Italy. [Ph.D. thesis]: Uni. Leicester 224 p. doi:10.6084/m9.figshare.789054