TABLE S1. Timescales and relevant variables of the dynamic modelling best-fitting curves based on linear and exponential cooling models.

Unit	Sample name	Line	Cooling model	T_0 (K)	T_{min} (K)	Cooling rate (m/s)	τ (days)	(G_0)	r^2	time (days)
TD	TD-2A-Ol1	2	Linear cooling	1432	1377	1.6223E-06		5.474E-13	0.997	403.7
			Exponential cooling	1433	1369		9803.0	5.739E-13	0.995	433.0
	TD-3A-Ol1	1	Linear cooling	1457	1374	1.71003E-06		9.139E-13	0.999	560.2
			Exponential cooling	1453	1373		10028.5	8.375E-13	0.999	584.0
	TD-3B-Ol2	1	Linear cooling	1443	1380	5.17354E-06		3.807E-13	0.998	421.3
			Exponential cooling	1430	1380		9961.8	1.349E-13	0.948	365.0
	TD-4A-Ol1	1	Linear cooling	1435	1363	1.25055E-06		4.266E-13	0.999	674.3
			Exponential cooling	1443	1364		11631.2	4.73E-13	0.998	672.0
	TD-4B-Ol2	1	Linear cooling	1415	1371	1.10515E-06		4.693E-13	0.999	471.8
			Exponential cooling	1429	1374		10665.8	6.212E-13	0.999	428.0
	TD-4C-Ol2	1	Linear cooling	1429	1369	1.24936E-06		1.362E-13	0.999	562.5
			Exponential cooling	1439	1369		11579.4	1.671E-13	0.999	593.0
BS	BS-2A-Ol1	1	Linear cooling	1460	1372	2.22727E-06		6.985E-14	0.998	469.3
			Exponential cooling	1465	1371		6472.8	9.076E-14	0.999	442.0
	BS-5A-Ol1	1	Linear cooling	1441	1371	1.7787E-06		4.266E-13	0.998	466.6
			Exponential cooling	1441	1371		11375.7	2.57E-13	0.997	543.0
	BS-5B-Ol1	1	Linear cooling	1457	1360	2.48352E-06		5.502E-13	0.998	465.9
			Exponential cooling	1442	3819		8432.5	3.111E-13	0.999	504.0
	BS-7A-Ol3	1	Linear cooling	1409	1352	9.55156E-07	`	5.562E-13	0.995	572.8
			Exponential cooling	1424	1352		10510.1	8.405E-13	0.999	561.0
	BS-7B-Ol5	1	Linear cooling	1463	1366	1.76166E-06		7.761E-14	0.998	645.9
			Exponential cooling	1462	1365		9193.5	8.664E-14	0.999	595.0

TABLE S2. Ranges of all parameters used in Monte Carlo simulations.

Parameter		Range	Unit
H	height	20000	m
T_0	initial magma temperature	1138-1227	℃
T_f	freezing magma temperature	998-1121	℃
$\Delta\rho$	density contrast	1-260	kg/m^3
μ	magma dynamic viscosity	18.3-205.3	Pa·s
C_p	isobaric heat capacity	1300-1700	J/kg K
L	magma latent heat	2.5×10^5-5.5×10^5	J/Kg
K_c	fracture toughness	10^6-10^9	Pa m$^{1/2}$
κ	thermal diffusivity	0.3×10^{-6}-2×10^{-6}	m^2/s
T_{inf}	crustal far-field temperature	50-600	℃
g	gravitational acceleration	9.8	m^2/s