S6 SUPPLEMENTARY MATERIAL; Giordano&DeAstis 2020, Bull Volc
BALLISTICS USED FOR EJECT 1.4 EXIT VELOCITY CALCULATIONS (Mastin, 2001)

ID	explosion	sample/site	type	diameters cm	eq diameter (	landing dis	elevation respect to vent (m)	exit angles	lag fall time (s)	density (kg m^{-3})
1	June 25		lava block	30x20x21	23.6	250	115 (895 asl)			2500*
2	June 25		HP spatter	80x20x50	50	250	115 (895 asl)			1500
3	June 25		HP scoria bomb	44x20x20	21	250	115 (895 asl)			1500
4	June 25		HP scoria bomb	45x18x30	31	250	115 (895 asl)			1500
5	June 25		lava block	25x20x18	21	350	60 (840 asl)			2500*
6	July 3	Fig. 5 in main text	spatters		10-100	ca. 500	-30 (750 asl)	>30	07-20 s	600-1500
7	July 3	MEG 17s	spatter	101x60x20	60	500	70 (850 asl)			600-1500
8	July 3	MEG 17s	spatter	105x75x20	66	500	70 (850 asl)			600-1500
9	July 3	MEG 17s	spatter	120x80x20	73	500	70 (850 asl)			600-1500
10	July 3	MEG 17s	spatter	82x45x20	49	500	70 (850 asl)			600-1500
11	July 3	MEG 17s	spatter	65x70x20	53	500	70 (850 asl)			600-1500
12	July 3	MEG16a	spatter	89x68x22	60	682	-20 (760 asl)			600-1500
13	July 3	MEG16b	spatter	38x28x15	27	682	-20 (760 asl)			600-1500
14	July 3	GIN2	LP bomb		27	1638	-682 (98 asl)			650
15	July 3	GIN3	LP bomb		18	1640	-647 (133 asl)			600
16	July 3	GIN5	LP bomb		19	1145	-364 (416 asl)			740
17	July 3	Fig. 3 in main text	lava blocks?	m-sized?	NA phimax	>1300	-780 (0 asl)	20-60	20-25 s	2500*
18	Aug 28	MEG17B	lava blocks		55.3	328	94 (874 asl)	>50		2500*
19	Aug 28	MEG17	lava blocks		80.2	488	71 (851 asl)	>50		2500*
20	Aug 28	MEG16	lava blocks		23.3	681	-46 (734 asl)	>50		2500*
21	Aug 28	MEG15	HP scoria bomb		10.4	1015	-273 (507 asl)	>50		1500
22	Aug 28	MEG14	HP scoria bomb		7.3	1314	-410 (370 asl)			1500
23	Aug 28	MEG25	LP bomb		6.8	1344	-484 (296 asl)			600
24	Aug 28	MEG26	HP scoria bomb		6.8	1420	-540 (240 asl)			1500
25	Aug 28	MEG27	HP scoria bomb		6.2	1446	-527 (253 asl)			1500
26	Aug 28	MEG12	LP bomb		8.6	1536	-517 (263 asl)			600

* average density of lava from Apuani et al 2005

BALLISTIC SIMULATIONS SELECTED RESULTS (input data from ID 1-26)
crater at 780 m a.s.l.

	Input conditions						selected best fit results			
	eq diameter (m)	**shape**	**density (kg m3)**	**dH of landing (r**	**exit angle (°)**	**exit velocit**	**distance (m)**	**max height**	**travel time (s)**	**Ugas***
JULY 3	0.5 (average ID6)	sphere	600	0	45-80	**100**	**348**	494.3	no fit	
	0.2 (small size ID6)	sphere	1500	0	40-80	**100**	**587.6**	419.5	no fit	
						100	**314.6**	460.7	no fit	
	0.2 (average GIN2-GIN3)	sphere	600	-650	30-50	100	no fit	no fit	no fit	
	0.2 (average GIN2-GIN3)	sphere	1500	-650	30-60	100	no fit	no fit	no fit	
	0.2 (average GIN2-GIN3)	sphere	600	-650	30-60	120	no fit	no fit	no fit	

0.2 (average GIN2-GIN3)	sphere	1500	-650	30	**120**	**1548.6**	162	19.3	144
		1500	-650	40	**120**	**1531.6**	261	21.6	
		1500	-650	50-60	120	no fit	no fit	no fit	
0.2 (average GIN2-GIN3)	sphere	600	-350	30	**120**	**1078.5**	140.6	16	135
		600	-350	40	**120**	**1072.9**	222.4	18.1	
				50-60	120	no fit	no fit	no fit	
0.27 (GIN2)	sphere	650	-682	30-40	120-150	no fit	no fit	no fit	
		650	-682	30	**160**	**1656**	226.2	21.7	178.5
		650	-682	40	**160**	**1629.6**	353	24.3	
0.19 (GIN5)	sphere	740	-364	40-50	140-160	no fit	no fit	no fit	
		740	-364	50	**130**	**1154.5**	359.2	21.3	146
		740	-364	40	130	no fit	no fit	no fit	
		740	-364	40	**120**	**1145.9**	231.7	18.5	136
0.73 (MEG17s)	sphere	1000	70	30-60	100	no fit	no fit	no fit	
		1000	70	70	**100**	**555.7**	416.6	no fit	
		1000	70	30-70	120	no fit	no fit	no fit	
		600-1500	70	30	120	no fit	no fit	no fit	
0.73 (MEG17s)	low cube	600	70	30	**120**	**572.9**	125	**8.1**	
		600	70	40	**120**	**637.4**	193.6	**11**	
		600	70	50	**120**	**621.8**	263	**13.3**	
0.73 (MEG17s)	high cube	600	70	30	**120**	**609.1**	129.5	**8.4**	
0.73 (MEG17s)	low cube	1000	70	30	**100**	**606.7**	231.7	**12.5**	
0.27 (MEG16b)	sphere	600	-46	45	**100**	**742.4**	208	**13.3**	
0.89 (MEG16a)	low cube	600	-46	40	100	no fit	no fit	no fit	
				40	**110**	**668.4**	176.4	**12.3**	
				40	**120**	**735**	199.6	**13**	
1 (ID 17)	sphere	2500	-780	20-45	100	no fit	no fit	no fit	
1 (ID 17)	sphere	2500	-780	35	110	**1765.9**	198.6	**20.7**	
				55	110	**1483**	402	**24.8**	
2 (ID 17)	sphere	2500	-780	20-40	120	no fit	no fit	no fit	
				45		**1967**	361.4	**23.9**	
				50		**1872.6**	423.8	**25.1**	
				55		**1740.6**	484.2	**26.1**	
1 (ID 17)	sphere	2500	-780	35	120	**1991.5**	235	**21.5**	
				55		**1691**	476.5	**26**	

	1-2 (ID 17)	sphere	2500	-780	20-45	130	no fit	no fit	no fit	
AUG 28	0.82 (MEG17)	sphere	2500	70	75	**100**	**468.3**	462	18.6	
			2500		45	**80**	**555.7**	160.6	10	
	0.23 (MEG16)	sphere	2500	-46	45	100	no fit	no fit	no fit	
			2500		45	**90**	**713.3**	196.9	11.9	**123**
	0.1 (MEG15)	sphere	1500	-273	45-50	140-150	no fit	no fit	no fit	
			1500		45	**130**	**1023.5**	335.8	22.4	**147**
			1500		45	120	no fit	no fit	no fit	

*(Ugas= Uejecta + [√(4gρejecta/3CDρgas)] √D