

73155
Catastrophic-ruptured Breccia
79.3 grams



Figure 1: Photo of 73155 showing micrometeorite crater with spall zone. NASA S73-23887. Cube and scale are 1 cm.

Introduction

73155 was picked up from the rover at LRV stop 4 along the traverse from station 2 to station 3. It is part of the “light mantle” deposit. It has been dated at 3.9 b.y.

The interest in 73155 is related to two prominent micrometeorite craters that nearly ruptured the rock (figures 1 and 4). The rock is, in fact, peppered with zap pits (Horz et al. 1975). Note the spall zone around the glass-lined sap pits.

Petrography

Ryder et al. (1992, 1993) gives the only description. The rock is a collection clasts of plutonic rocks (Bickel and Warner 1978), cemented together with a feldspathic melt with poikilitic texture (figure 2). There are numerous plagioclase clasts in the matrix.

Plagioclase: Steele et al. (1980) analyzed plagioclase.

Gabbro Clast:

Ryder (1992) reported on a gabbro clast (figure 3).

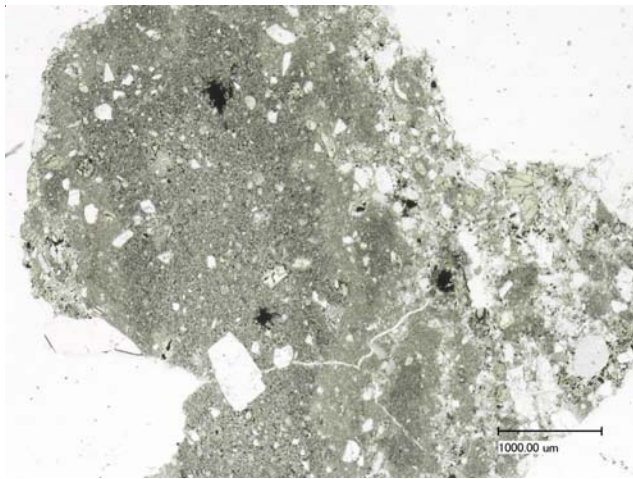


Figure 2: Photomicrographs of thin section 73155,28 by C Meyer.

Summary of Age Data for 73155.

	Ar/Ar
Poikilitic	3937 ± 16 m.y.
Poikilitic	3854 ± 16
Gabbro	3885 ± 16
Gabbro	3900 ± 16

Chemistry

Dalrymple and Ryder (1996) and Norman et al. (2002) have determined the composition of 73155 (table 1). The melted portion is relatively rich in Al and in trace elements.

Radiogenic age dating

Ages of 4 samples in Dalrymple and Ryder (1996)(figure 6).

Processing

The sample broke exactly in half (figure 5). There are 8 thin sections.

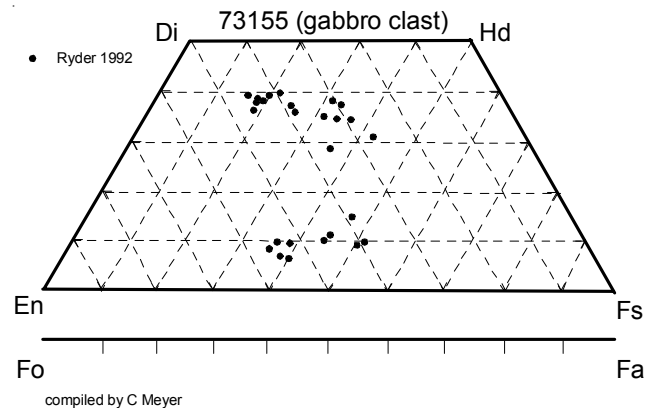
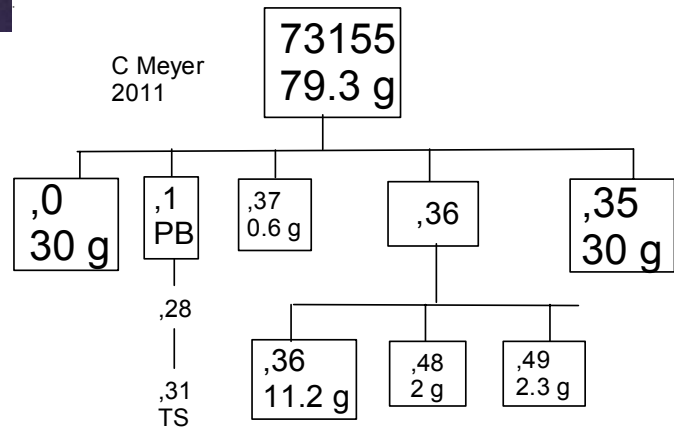


Figure 3: Composition of pyroxene in “gabbro clast” in 73155 (Ryder 1992).



References for 73155

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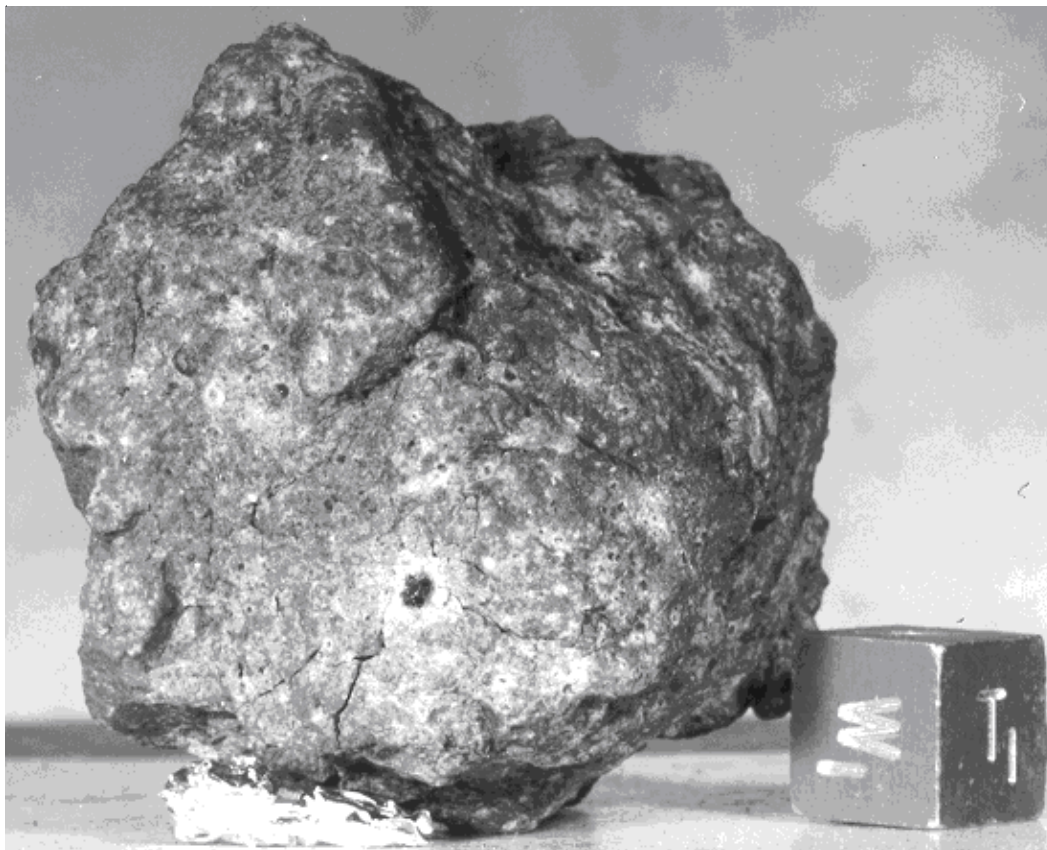


Figure 4: The zap pit that nearly ruptured the rock! NASA S73-23898. Cube is 1 cm.

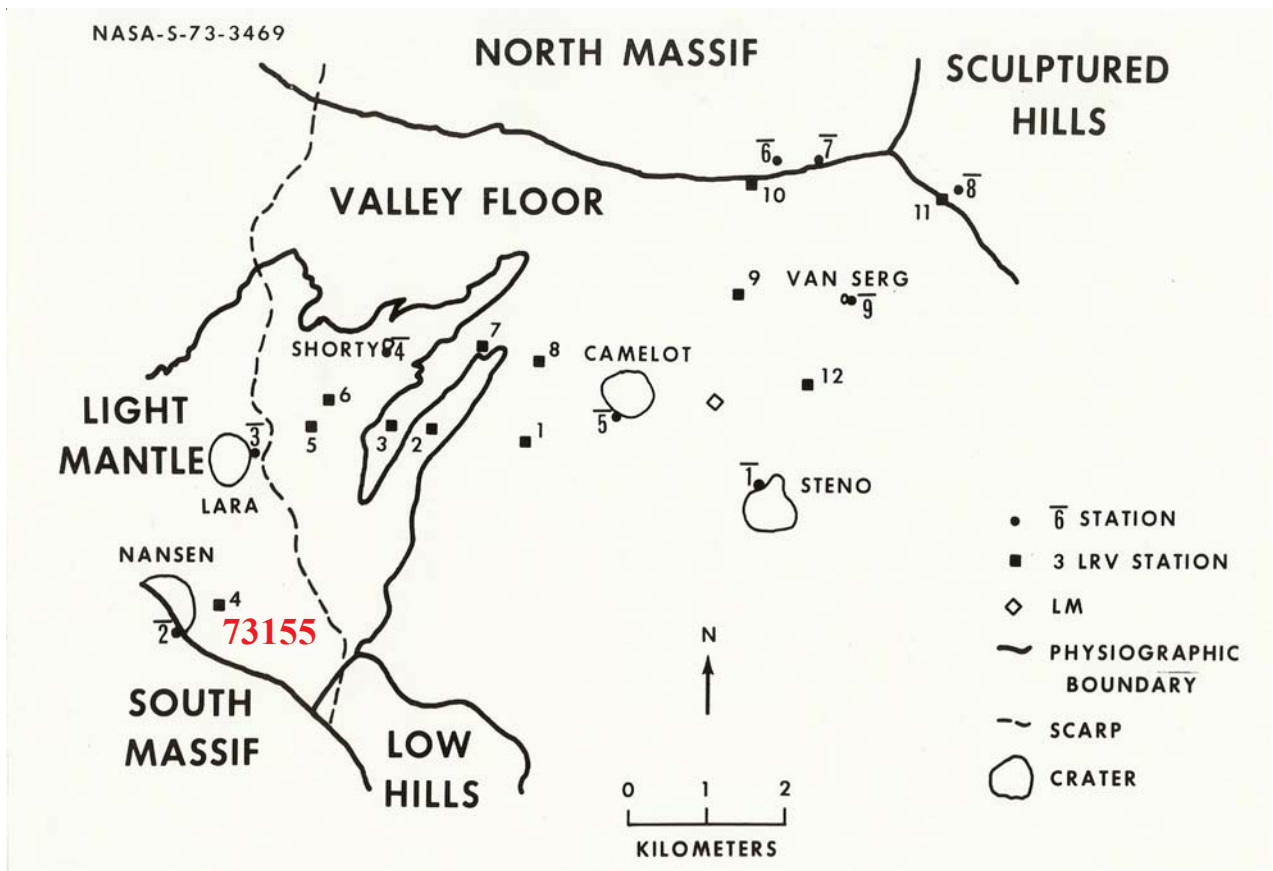




Figure 5: Broken surface of 73155. NASA S92-35157. Sample is about 5 cm across.

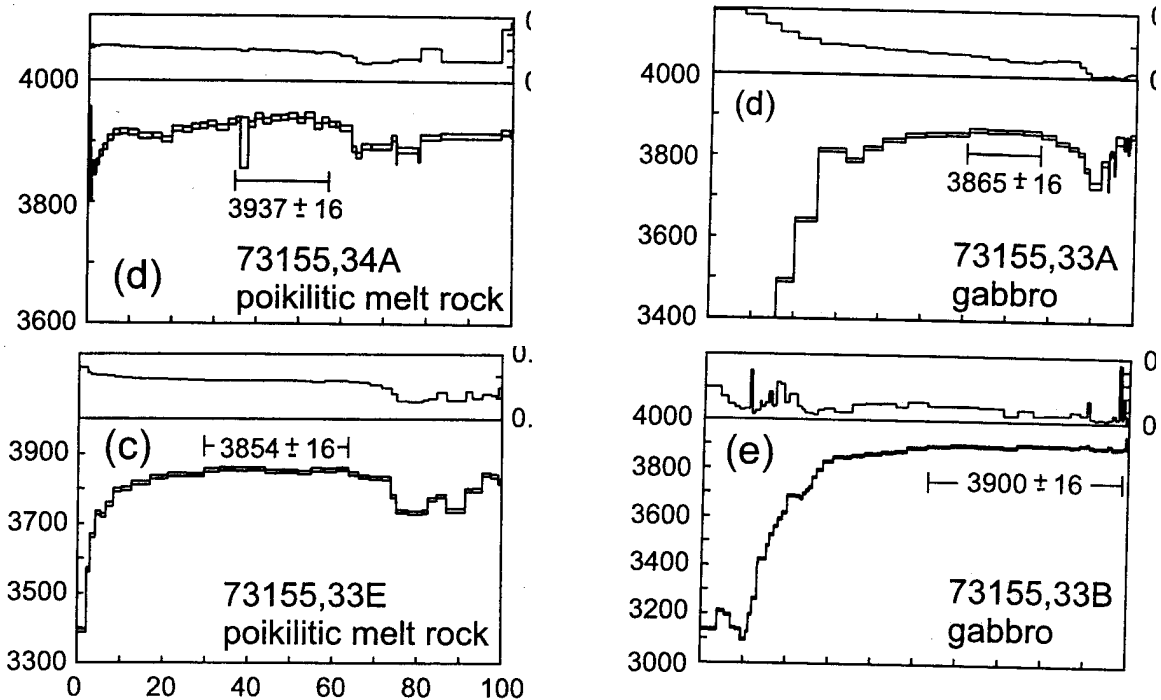


Figure 6: Ar/Ar release curves for 73155 (from Dalrymple and Ryder 1996).

Table 1. Chemical composition of 73155.

reference	Dalrymple96			Norman2002	
weight	melt	melt	gabbro		
SiO ₂ %	47.4	48.2	50.9	(b) 46.1	(b)
TiO ₂	1.6	1.5	0.7	(b) 1.69	(b)
Al ₂ O ₃	19.2	18.4	15.4	(b) 17.9	(b)
FeO		9.5	10.3	(a) 8.76	(b)
MnO	0.11	0.13	0.16	(b) 0.12	(b)
MgO	10.3	10.5	10.2	(b) 10.9	(b)
CaO	11.5	11	12.5	(b) 10.9	(b)
Na ₂ O	0.66	0.69	0.76	(a) 0.63	(a)
K ₂ O	0.27	0.4	0.7	(a) 0.29	(a)
P ₂ O ₅					
S %					
sum					
Sc ppm	19.2	18.5	29	(a) 19.2	(c)
V				45	(c)
Cr	1282	1211	1878	(a) 1334	(c)
Co	27	28	21	(a) 30.6	(c)
Ni	253	270	190	(a) 276	(c)
Cu				12.2	(c)
Zn				15.4	(c)
Ga				5.1	(c)
Ge ppb					
As					
Se					
Rb		22	25	(a) 9.2	(c)
Sr	170	180	190	(a) 174	(c)
Y				149	(c)
Zr	470	300	100	(a) 628	(c)
Nb				43.1	(c)
Mo					
Ru				11	(c)
Rh					
Pd ppb				11.4	(c)
Ag ppb					
Cd ppb					
In ppb					
Sn ppb					
Sb ppb					
Te ppb					
Cs ppm	0.4	0.92	0.9	(a) 0.37	(c)
Ba	408	347	254	(a) 392	(c)
La	50.8	31.8	8.2	(a) 38	(c)
Ce	134.7	83.1	23	(a) 97.5	(c)
Pr				13.3	(c)
Nd	89	56	20	(a) 61	(c)
Sm	22.9	14.4	4.6	(a) 17.1	(c)
Eu	1.94	2.02	1.71	(a) 1.77	(c)
Gd				18.8	(c)
Tb	4.8	3.1	1.2	(a) 3.32	(c)
Dy				20.9	(c)
Ho				4.47	(c)
Er				12.67	(c)
Tm					
Yb	16	11.5	4.4	(a) 11.31	(c)
Lu	2.1	1.5	0.6	(a) 1.63	(c)
Hf	18.3	12	3.2	(a) 12.64	(c)
Ta	2.25	1.47	0.25	(a) 1.82	(c)
W ppb				0.89	(c)
Re ppb				0.6	(c)
Os ppb					
Ir ppb	6.4	6.5		(a) 6.5	(c)
Pt ppb				12.7	(c)
Au ppb	6.5	5.5	4.1	(a)	
Th ppm	9.8	4.7	1.2	(a) 7.88	(c)
U ppm	2.69	1.57	0.38	(a) 2	(c)

technique: (a) INAA, (b) fused-bead e-probe, (c) ICP-ms

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