77539

Poikilitic Impact Melt Breccia

39.6 grams

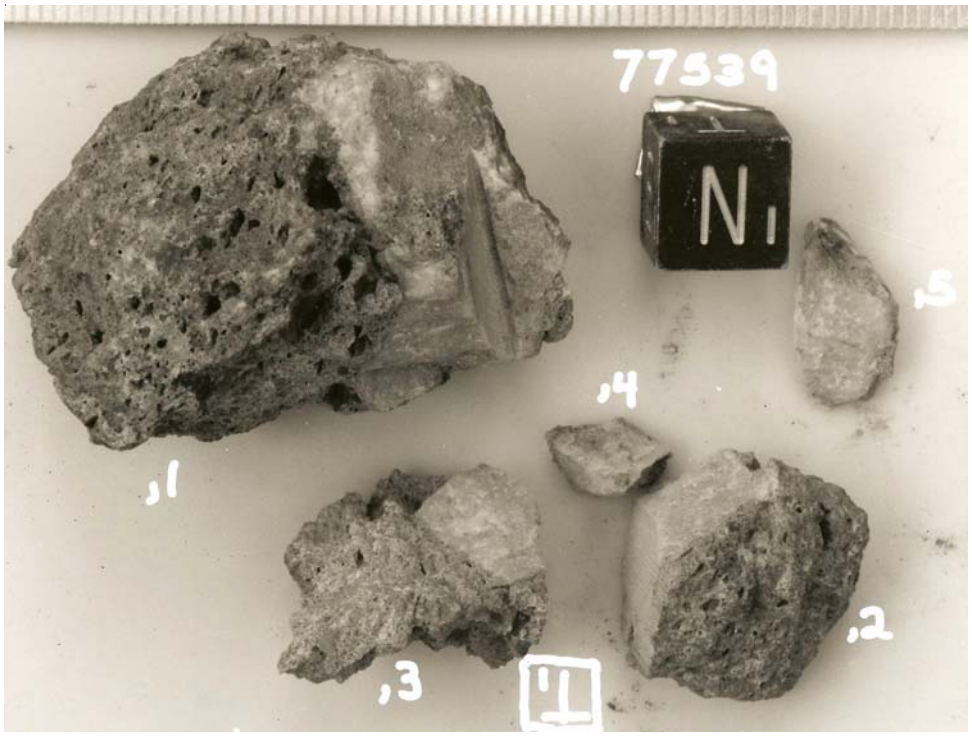

Figure 1: Photo 77539 showing two lithologies. Cube is 1 cm. S74-20427.

Introduction

77539 is an impact melt rock that contains a rare anorthosite clast (figure 1). It was found as a rake sample from station 7 (figure 2). It has not been dated.

Petrography

Keil et al. (1974), Warner et al. (1977, 1978) and Meyer (1994) describe 77539. The matrix is poikiloblastic with irregular pigeonite oikocrysts enclosing abundant plagioclase laths and tablets and minor rounded olivine grains.

Warner et al. (1977) give the mode of the matrix as 50.8% plagioclase, 45.2% pyroxene and 2.2% ilmenite. Mineral chemistry is given in figure 4.

Significant clast

The large white clast is 99% calcic plagioclase (An_{95}) with 1% olivine (Fo_{72}) and trace pyroxene (figure 5). The texture is fine-grained granulitic (figure 3). Metal grains are reported to be low in Ni.

Chemistry

Laul and Schmitt (1975) and Norman et al. (2002) have analyzed the impact melt, finding that it was comparable with 77135. Warren et al. (1991) analyzed

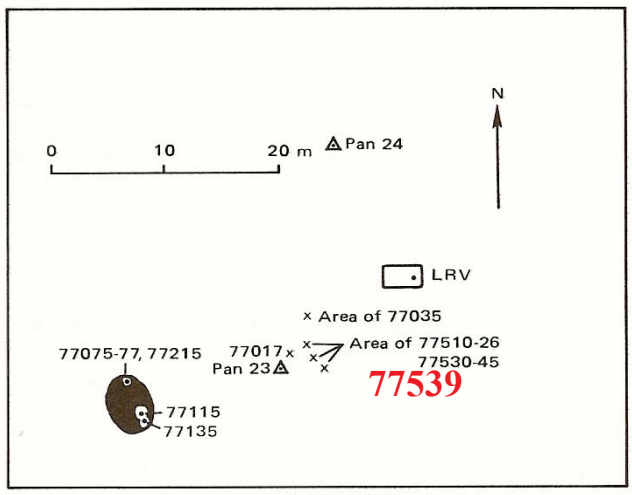

Figure 2: Map of station 7, Apollo 17.

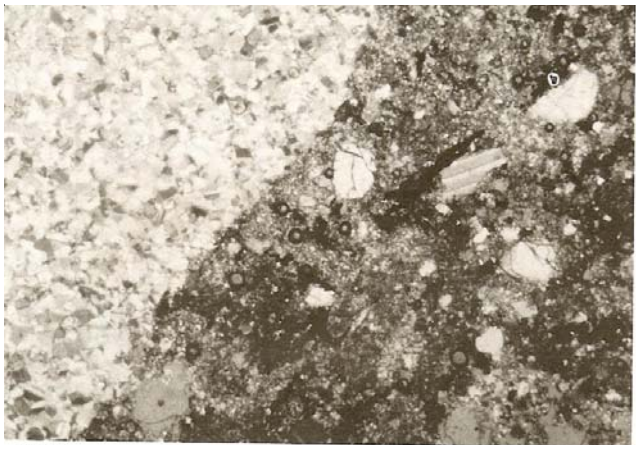

Figure 3: Photomicrograph of thin section of 77539 (from Warner et al. 1977).

the white clast in 77539 finding that it was a very good anorthosite. I say "very good", because we had expected to find more anorthosite!

Processing

There are only 4 thin sections of 77539. Subdivision is illustrated in figure 1.

Mineral Mode (Warner et al. 1977)

	Vol. %
Matrix	29.1
Mineral clasts	3.8
Lithic clasts	67.1
Mineral clasts	
Plagioclase	2.1
Olivine/Pyroxene	1.7
Opaque	
Metal/troilite	
Other	
Lithic Clasts	
ANT	66.9
Devit. Anorthosite	0.1
Breccia	
Other	0.1
Percent of matrix	
Plagioclase	50.8
Olivine/pyroxene	45.2
Opaque	2.2
Metal/troilite	0.2
Other	1.5

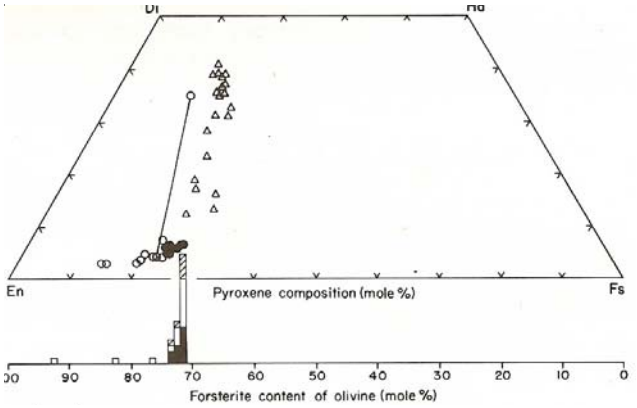

Figure 4: Pyroxene and olivine in matrix of 77539 (Warner et al. 1977).

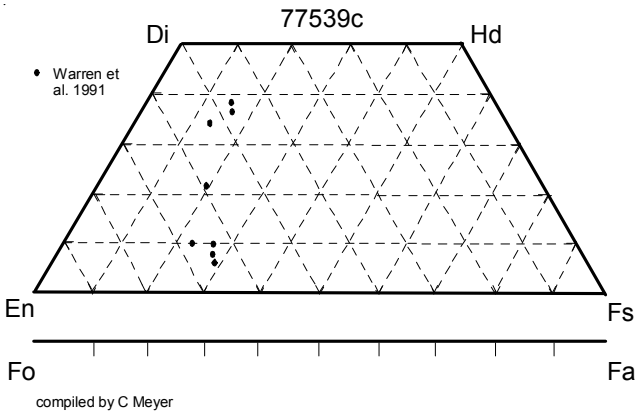

Figure 5: Pyroxene in white clast in 77539 (Warren et al. 1991).

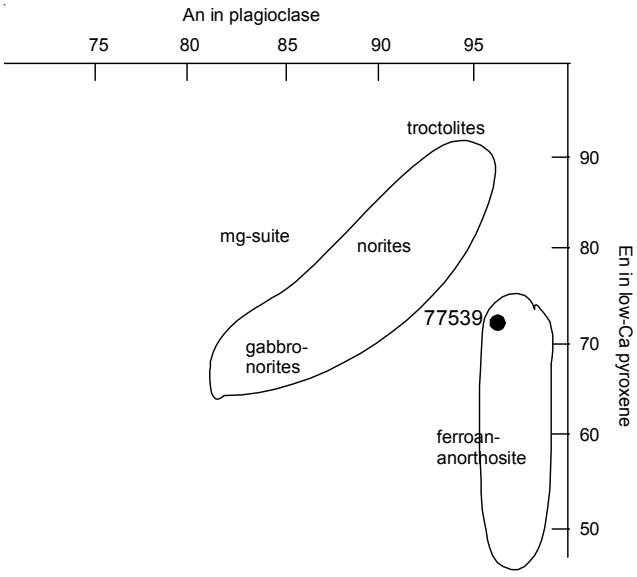

Figure 6: Plagioclase-pyroxene diagram for 77539 whilte clast (Warren et al. 1991).

Table 1. Chemical composition of 77539.

reference	Warren91		Norman2002		Laul75		Warner77	
weight	clast		matrix					
SiO2 %	44.1	(a)	46	(c)				
TiO2	0.11	(a)	1.51	(c)	1.1	(a)	1.1	(d)
Al2O3	34.2	(a)	17.4	(c)	22	(a)	22	(d)
FeO	0.67	(a)	8.78	(c)	6.9	(a)	6.9	(d)
MnO	0.01	(a)	0.11	(c)	0.08	(a)	0.08	(d)
MgO	0.89	(a)	13.6	(c)	8	(a)	8	(d)
CaO	18.9	(a)	10.8	(c)	12.5	(a)	12.5	(d)
Na2O	0.45	(a)	0.65		0.56	(a)	0.56	(d)
K2O	0.05	(a)	0.16		0.2	(a)	0.2	(d)
P2O5								
S %								
sum								
Sc ppm	2.58	(a)	16.5	(b)	11	(a)		
V	<25	(a)	42	(b)	40	(a)		
Cr	137	(a)	1292	(b)			958	(d)
Co	1.18	(a)	23.2	(b)	28	(a)		
Ni	3	(a)	182	(b)	300	(a)		
Cu			11.4	(b)				
Zn	0.52	(a)	12.7	(b)				
Ga	3.3	(a)	4.8	(b)				
Ge ppb	16	(a)						
As								
Se								
Rb	<3	(a)	6.5	(b)				
Sr	180	(a)	184	(b)				
Y			111	(b)				
Zr	46	(a)	484	(b)	300	(a)		
Nb			32.8	(b)				
Mo								
Ru			7.98	(b)				
Rh								
Pd ppb			8.41	(b)				
Ag ppb								
Cd ppb								
In ppb								
Sn ppb								
Sb ppb								
Te ppb								
Cs ppm	<0.14	(a)	0.24	(b)				
Ba	57	(a)	311	(b)	240	(a)		
La	4.2	(a)	27.3	(b)	23.5	(a)		
Ce	10.4	(a)	71.2	(b)	58	(a)		
Pr			9.59	(b)				
Nd	6.1	(a)	44.4	(b)	38	(a)		
Sm	1.65	(a)	12.6	(b)	10.5	(a)		
Eu	0.99	(a)	1.83	(b)	1.65	(a)		
Gd			14.1	(b)		(a)		
Tb	0.35	(a)	2.5	(b)	2.1	(a)		
Dy	2.12	(a)	15.8	(b)	13			
Ho			3.42	(b)				
Er			9.76	(b)				
Tm								
Yb	0.99	(a)	8.74	(b)	7.1	(a)		
Lu	0.132	(a)	1.27	(b)	1	(a)		
Hf	0.94	(a)	9.79	(b)	8.4	(a)		
Ta	0.106	(a)	1.41	(b)	1.1	(a)		
W ppb			0.44	(b)				
Re ppb	12	(a)	0.5	(b)				
Os ppb	<6	(a)						
Ir ppb	0.012	(a)	4.08	(b)	7	(a)		
Pt ppb			9.03	(b)				
Au ppb	0.028	(a)			2	(a)		
Th ppm	0.62	(a)	5.02	(b)	3.2	(a)		
U ppm	0.161	(a)	1.31	(b)	1.2	(a)		

technique: (a) INAA, (b) ICP-MS, (c) fused-bead e-probe, (d) e. probe

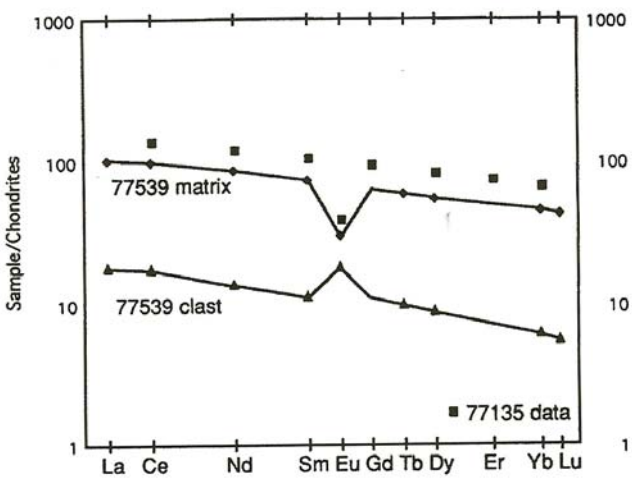

Figure 7: Composition of 77539 and white clast - compared with that of 77135.

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