15558

Regolith Breccia

1333 grams

Figure 1: Photo of 15558. Sample is 3 inches across. S71-45184.

Introduction

15558 is a large regolith breccia made mostly of mare material. The exact collection site is unknown, but probably at Station 9 near the rille (Ryder 1985). It is similar to 15505 – from same location, but has more fine grained material.

Petrography

Simon et al. (1986) and McKay et al. (1989) reported that 15558 contained clasts of mare and feldspathic KREEP basalt. It also has agglutinates and a great deal of glass. McKay et al. reported that the maturity index $I_s/FeO = 21$. Thin sections show that it has more matrix than clasts (figure 3).

Chemistry

15558 is Fe-rich (figure 6) and has a REE pattern similar to local soil.

Moore et al. (1973) reported 110 ppm carbon in 15558, verifying that it is a soil breccia.

Cosmogenic isotopes and exposure ages

Keith et al. (1972) reported cosmic-ray-induced activity of ^{26}Al = 84 dpm/kg, ^{22}Na = 36 dpm/kg, ^{54}Mn = 23 dpm/kg, ^{56}Co = 9 dpm/kg and ^{46}Sc = 3 dpm/kg.

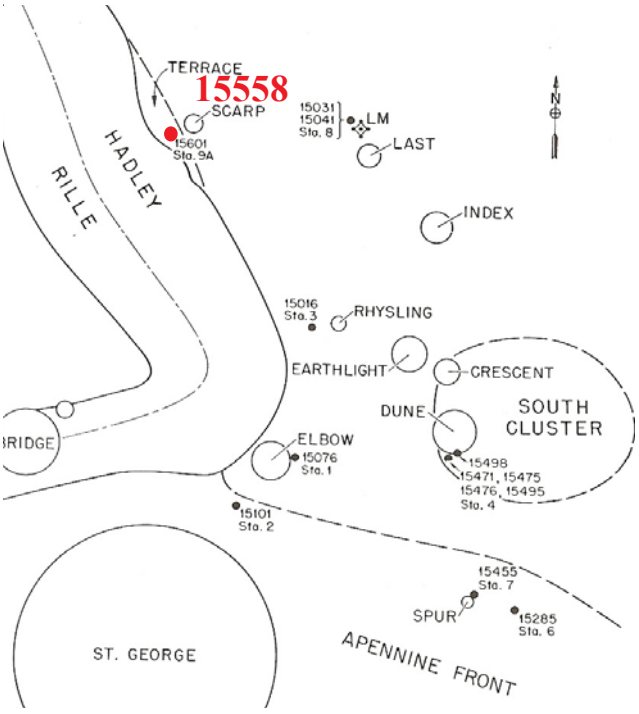

Figure 2: Location of 15558 on map of Apollo 15 site.

Other Studies

The abundance and isotopic ratios of rare gasses were reported in Bogard and Nyquist (1972) and McKay et al . (1989).

Mineralogical Mode for 15558

(Simon et al. 1986)

	Matrix 54 %	
	20-90 micron	90-100 micron
Mare Basalt	1.3 %	5.4 %
KREEP Basalt		0.5
Feld. Basalt	0.2	0.4
Plutonic	0.2	1
Granulitic	0.4	0.7
Breccia	1	0.5
Olivine	3.8	1.2
Pyroxene	10.8	3.4
Plagioclase	2.7	
Opaques	0.3	
Glass	6.5	3.4
Agglutinate	1.1	1.4

Mineralogical Mode for 15558

(McKay et al. 1989)

	20-500 mciron	500-1000 micron
Mare Basalt	1 %	10.5 %
KREEP basalt	7.9	8.8
Plutonic	0	10.5
Breccias	1	12.3
Olivine	1	0
Pyroxene	42.2	8.8
Plagioclase	14.2	5.3
Opaques	0.3	0
Glass	14.5	40.4
Agglutinates	7.3	1.8

Processing

15558 was split along a penetrating fracture (figures 4, 8 and 9) and has not been sawn. There are 7 thin sections.

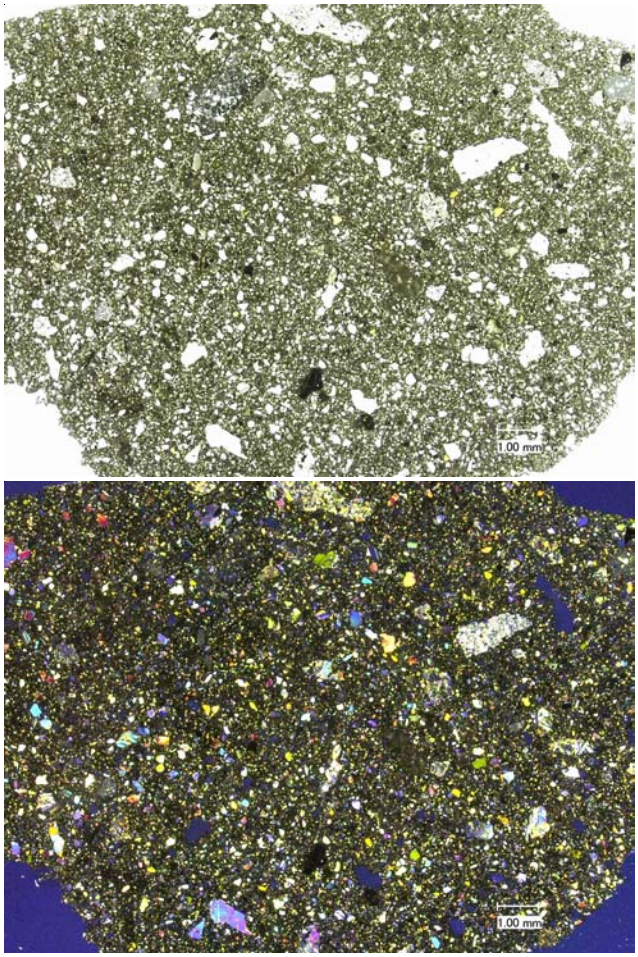

Figure 3: Plane polarized and cross polarized photomicrographs of thin section of 15558. Scale is included.

References for 15558

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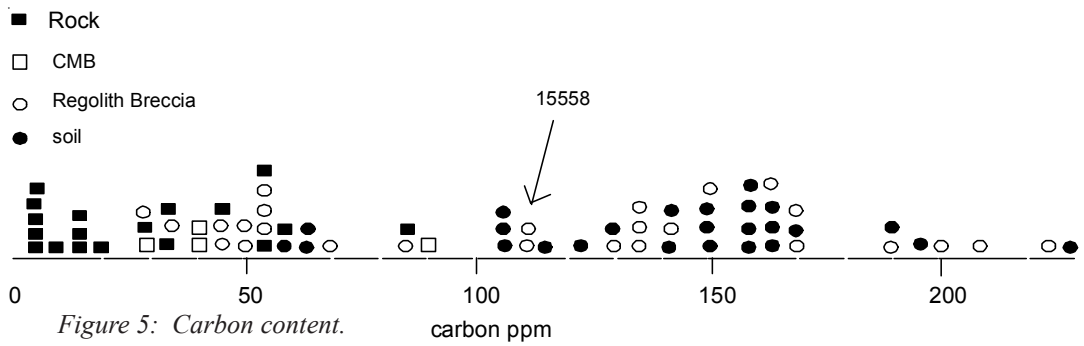

Figure 5: Carbon content.

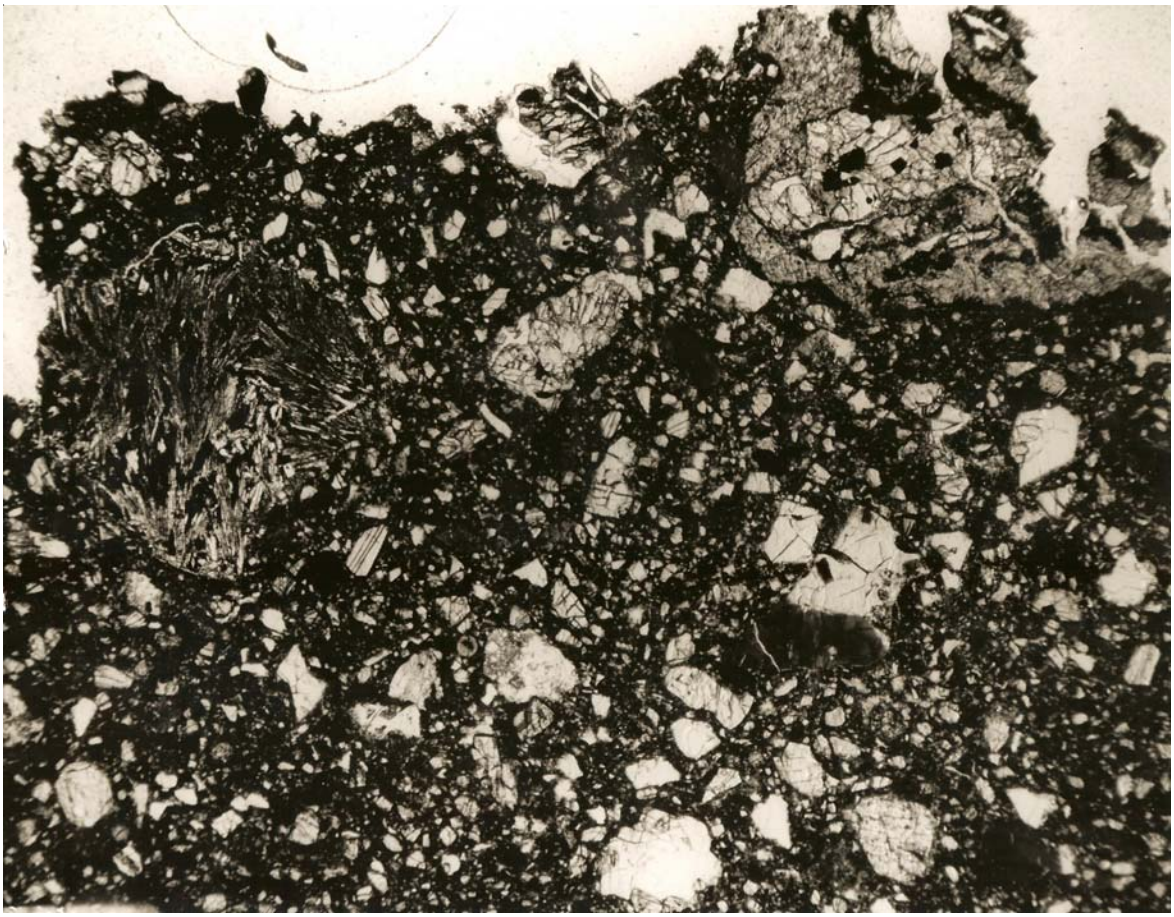

Figure 4: Photomicrograph of thin section of 15558. Note the large devitrified chondule in top left. S71-52210. Scale unknown

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Table 1. Chemical composition of 15558.

reference	Keith73		LSPET72		Simon86		McKay89	
weight								
SiO2 %			46.31	(c)				
TiO2			1.89	(c)	2	(b)	1.89	(b)
Al2O3			12.4	(c)	12.3	(b)	12.4	(b)
FeO			16.54	(c)	15.9	(b)	17.7	(b)
MnO			0.22	(c)	0.21	(b)	0.22	(b)
MgO			10.51	(c)	11.5	(b)	10.5	(b)
CaO			10.81	(c)	10	(b)	10.4	(b)
Na2O			0.42	(c)	0.45	(b)	0.41	(b)
K2O	0.205	(a)	0.19	(c)	0.21	(b)		
P2O5			0.21	(c)				
S %			0.09	(c)				
sum								
Sc ppm					30.7	(b)	34.1	(b)
V					120	(b)		
Cr					3127	(b)	3300	(b)
Co					42	(b)	51.1	(b)
Ni					160	(b)	201	(b)
Cu								
Zn								
Ga								
Ge ppb								
As								
Se								
Rb			5.3	(c)				
Sr			123	(c)	105	(b)	120	(b)
Y			78	(c)				
Zr			356	(c)	310	(b)	320	(b)
Nb			22	(c)				
Mo								
Ru								
Rh								
Pd ppb								
Ag ppb								
Cd ppb								
In ppb								
Sn ppb								
Sb ppb								
Te ppb								
Cs ppm							0.22	(b)
Ba					250	(b)	207	(b)
La					24.5	(b)	21.4	(b)
Ce					60	(b)	57	(b)
Pr								
Nd					41	(b)	33	(b)
Sm					11.5	(b)	10.6	(b)
Eu					1.3	(b)	1.25	(b)
Gd								
Tb					2.35	(b)	2.1	(b)
Dy					15.1	(b)		
Ho					3.5	(b)		
Er						(b)		
Tm					1.3	(b)		
Yb					8.27	(b)	7.1	(b)
Lu					1.17	(b)	0.98	(b)
Hf					7.8	(b)	8.3	(b)
Ta					1	(b)	1.06	(b)
W ppb								
Re ppb								
Os ppb								
Ir ppb							6	(b)
Pt ppb								
Au ppb							2.7	(b)
Th ppm	3.42	(a)	3.6	(c)	3.8	(b)	3.5	(b)
U ppm	1.01	(a)			1	(b)	0.95	(b)

technique: (a) radiation counting, (b) INAA, (c) XRF

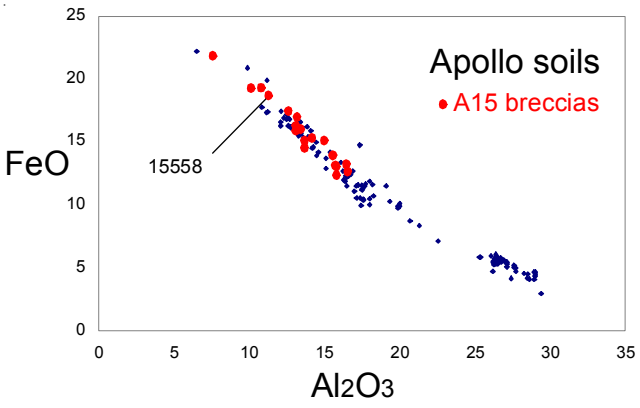

Figure 6: Composition of 15558 compared with Apollo soils and Apollo 15 soil breccias.

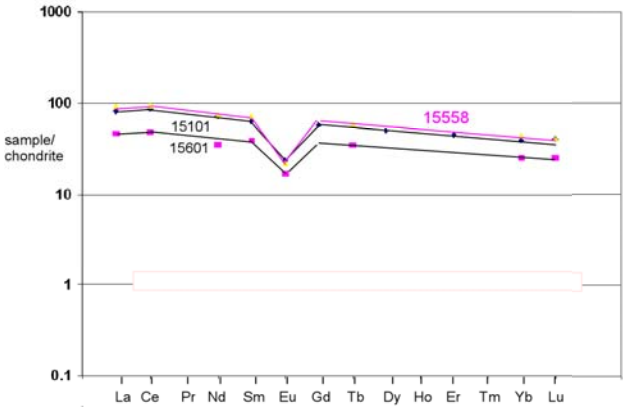

Figure 7: Normalized rare-earth-element diagram, comparing breeccia 15558 with soils 15101 and 15601.

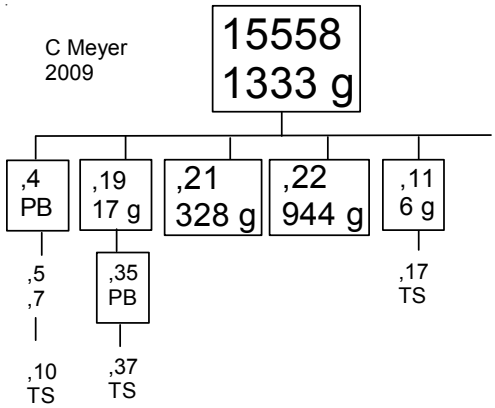

Figure 8: Photo of broken samples 15558. S72-50649

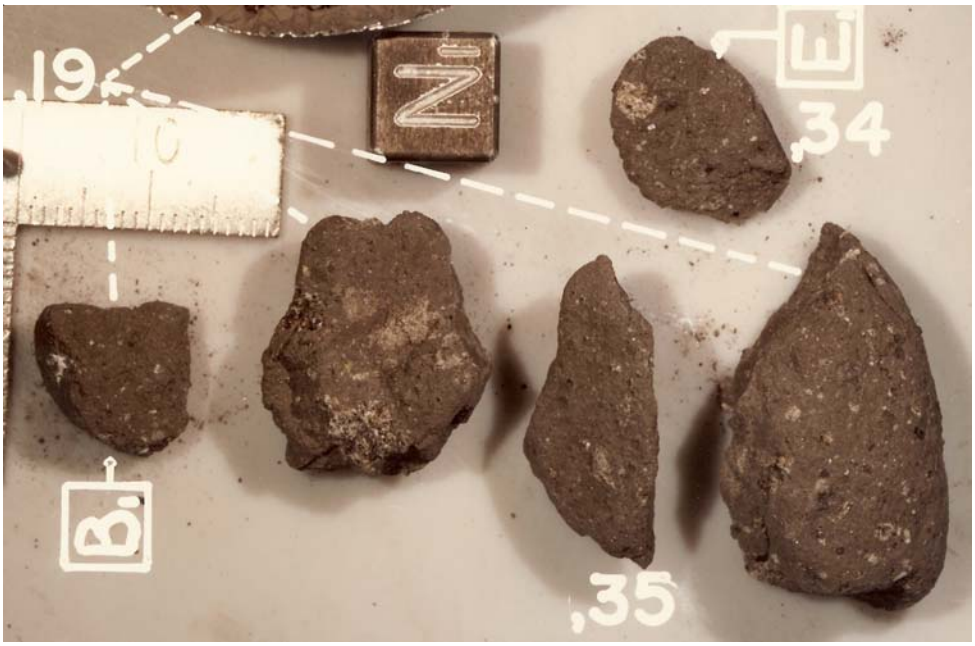

Figure 9: Pieces of 15558. Cube is 1 cm. S84-40800.