



Figure 1a,b: Photo of dust-covered 15306. Sample is 7 cm across. S71-43064 and 067.

Introduction

15306 is a regolith breccia collected as part of a large soil (15300) and rake sample (15310) at Spur Crater. 15315, 15324, 15325 and 15330 are additional large soil breccias from the same rake sample, and there are many smaller fragments from the same sample (Butler 1972; Ryder and Sherman 1989). They all contain green glass spheres, distinctive of the soil and breccias samples at Spur Crater.

Petrography

15306 was selected by Fruland (1985) as one of the “regolith breccias” for the study by Simon et al. (1986) and McKay et al. (1989). The other samples in this group show the variability among regolith breccias.

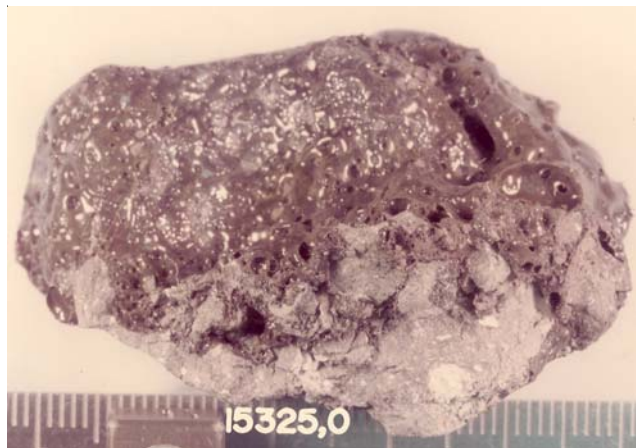


Figure 4: Photo of 15325. Sample is 4 cm. S76-26843.

15306 – 134.2 grams

15315 – 35.6 g

15324 – 32.3 g

15325 – 57.8 g

15330 – 57.8 g

Regolith Breccia



Figure 2: Photo of 15315. Cube is 1 cm. S72-53914.



Figure 3: Photo of 15324. Scale is cm. S71-49640

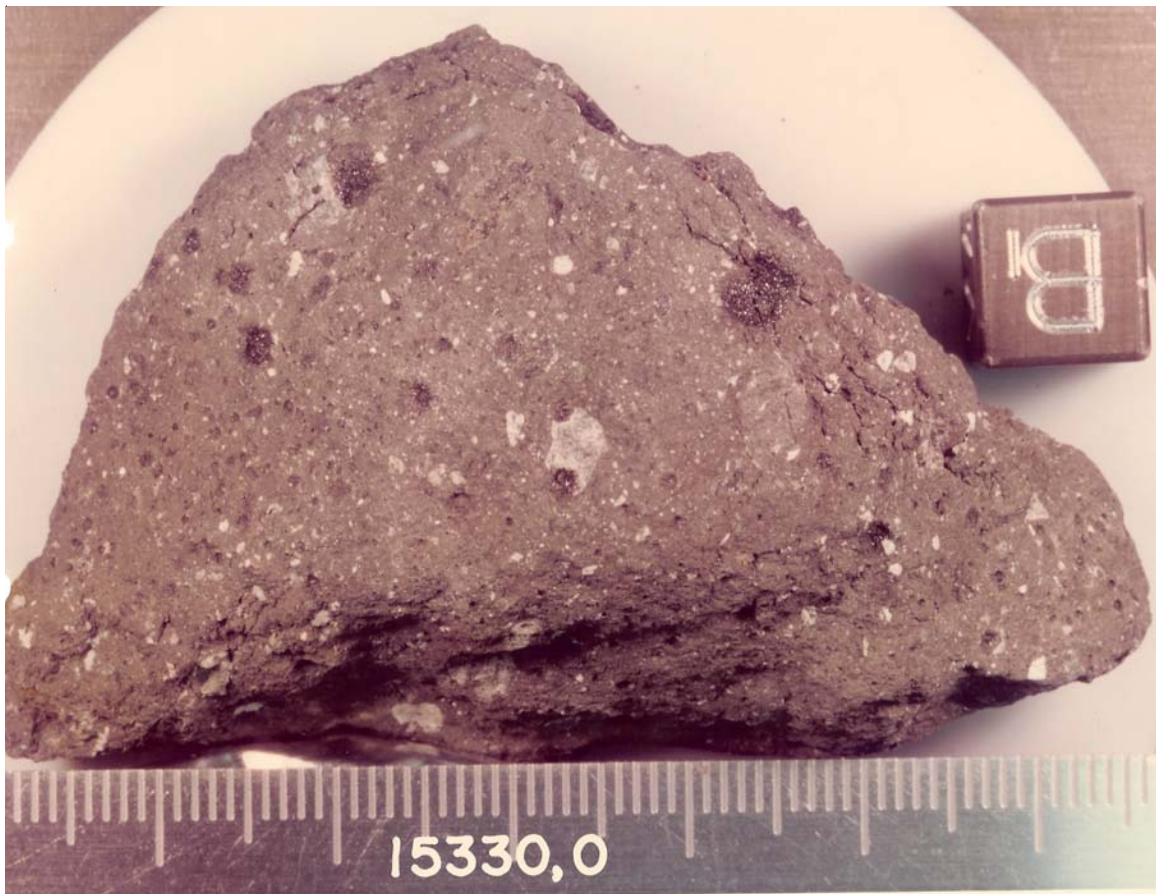


Figure 5: Photo of 15330. Cube is one cm. S76-26379

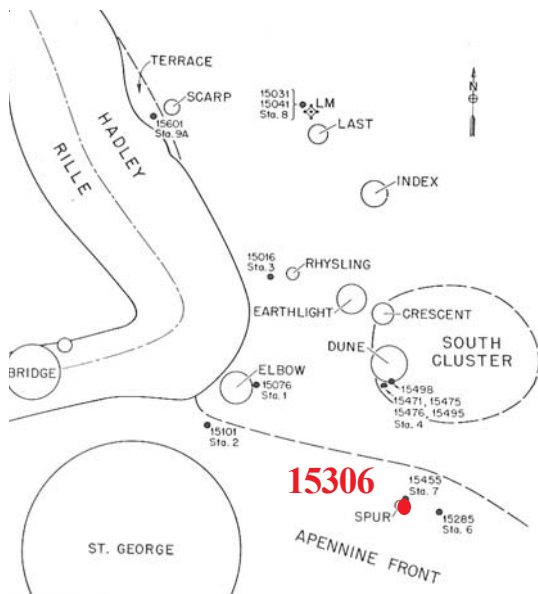


Figure 6: Location of rake sample at Spur Crater on lower slope of Apennine Front.

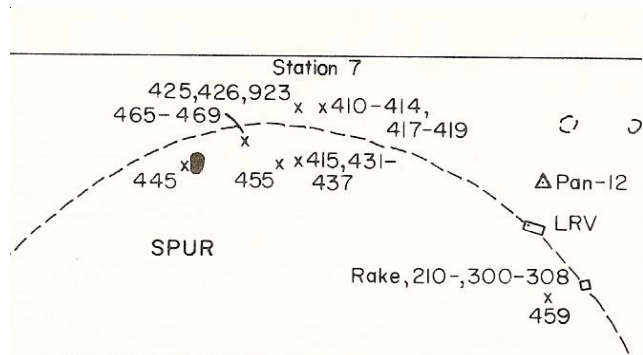


Figure 7: Map of station 7, Apollo 15

Thin section photomicrographs of these samples can be found in the catalog by Ryder (1985).

Best and Minkin (1972) reported on glass composition in 15306. McKay et al. (1989) found 15306 to be "subporous" with density = 2.34 gm/cm³. They also reported a high percentage of mare basalt.

Dowty et al. (1973) and Hlava et al. (1973) found that 15315 had a high proportion of mafic green glass.

15324 is friable and full of glass (figure 3).

15325 had a glass coating on one side (figure 4).

15330 (figure 5) had micrometeorite pits on all sides and was coherent.

Warren and Wasson (1980) studied two clasts from 15306. One was pristine and Ta-rich (Warren 1993). Mineral compositions are given in figure 11.

Chemistry

Simon et al. (1986), Taylor et al. (1973), and Wanke et al. (1976) reported analyses for these soil breccias. They are not as enriched in REE as other regolith breccias from this site (figure 9).

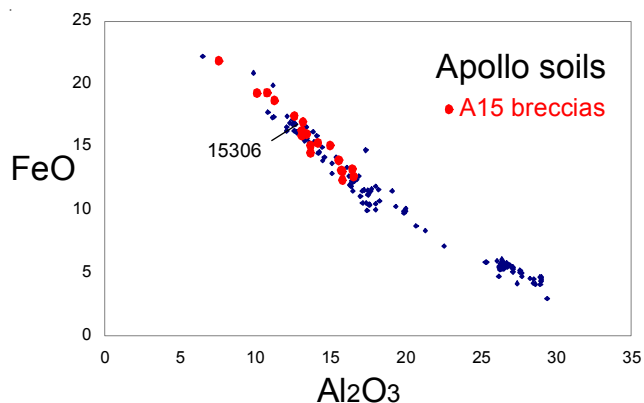


Figure 8: Composition of 15306 in comparison to that of Apollo 15 breccias and Apollo soils.

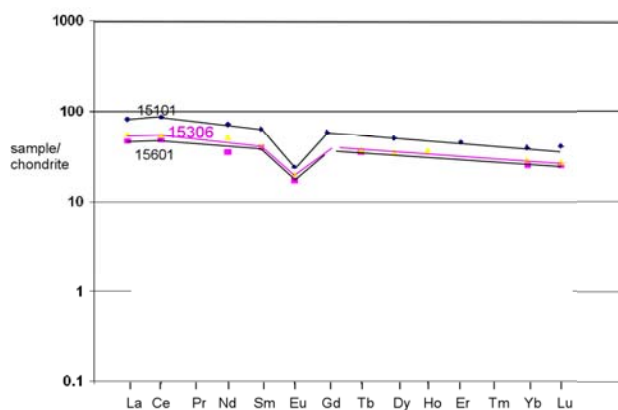


Figure 9: Normalized rare-earth-element diagram for 15306 and selected Apollo 15 soils, for comparison.

Mode for 15306 (Simon et al. 1986)

Matrix	<20 micron	56.9 %
	20-90 micron	90-1000 micron
Mare basalt	-	1.6 %
Plutonic Rx.	0.1	1.2
Feld. CMB	-	0.4
Feld. Basalt	-	-
KREEP basalt	-	-
Granulitic/Poik.	0.2	1.0
Reg Bx.	0.9	0.9
Agglutinate	1.6	2.9
Pyroxene	4.0	0.5
Olivine	1.2	0.2
Plagioclase	5.1	1.3
Opaque	0.1	-
Glass	10.9	8.6

Mineralogical Mode for 15306

	(McKay et al. 1989)	
	20-500 micron	500-1000 micron
Mare Basalt	0 %	44 %
KREEP basalt	0	0
Plutonic	2	0
Breccias	3.3	4.4
Olivine	10.3	0
Pyroxene	8.3	0
Plagioclase	17.6	0
Opacues	0	0
Glass	23.9	51.1
Agglutinates	4.7	0

Table 1. Chemical composition of 15306.

reference	15306	15306	15306	15306	15324	15325	15330	
weight	Simon86	Ganapathy	Warren80	15306	Taylor73	Wanke77		
	matrix	"rhyolite"	clast23	clast27				
SiO2 %			47.3	45.8	(e)			
TiO2	1.2	(a)	1.8	0.43	(e)			
Al2O3	15.9	(a)	18	27.8	(e)			
FeO	12.7	(a)	8.9	4.6	(e)			
MnO	0.165	(a)			(e)			
MgO	12.2	(a)	12.9	4.6	(e)			
CaO	11.3	(a)	10	16	(e)			
Na2O	0.43	(a)	0.43	0.5	(e)			
K2O	0.14	(a)	0.05	0.2	(e)			
P2O5								
S %								
sum								
Sc ppm	24.1	(a)	16.3	8.8	(a) 36	(c) 23.3	25.4	(d)
V	90	(a)			(a) 130	(c) 77	87	(d)
Cr	2326	(a)	2790	642	(a) 2500	(c)		
Co	47.1	(a)	29	17	(a) 48	(c) 36	47	(d)
Ni	260	(a)	26	29	(a) 248	(c) 180	300	(d)
Cu					(a) 11	(c)	11	(d)
Zn		2.7	(b) 0.45	1.52	(a)		42	(d)
Ga			2.7	3.3	(a) 5	(c)	5	(d)
Ge ppb		39	(b) 89	27	(a)		790	(d)
As							24	(d)
Se		50	(b)				0.48	(d)
Rb		114	(b)		2.6	(c)	2.8	(d)
Sr	110	(a)				140	110	(d)
Y						138	118	(d)
Zr	150	(a)	480	290	(a) 200	(c) 96	57	(d)
Nb					15	(c) 405	196	(d)
Mo						29	12	(d)
Ru								
Rh								
Pd ppb								
Ag ppb		0.92	(b)					
Cd ppb		10	(b)					
In ppb		17	(b) 4	2.6	(a)			
Sn ppb					0.19	(c)		
Sb ppb		11.8	(b)					
Te ppb		23	(b)					
Cs ppm		4.53	(b)		0.1	(c)	0.13	(d)
Ba	130	(a)	420	1640	(a) 160	(c) 290	136	(d)
La	13	(a)	21.4	16	(a) 13.6	(c) 29.5	13.5	(d)
Ce	32	(a)	53	39	(a) 31	(c) 81.1	35.7	(d)
Pr					4.4	(c)	4.9	(d)
Nd	23	(a)	34	23	(a) 18.3	(c)	24	(d)
Sm	6.05	(a)	9.18	6.93	(a) 5.7	(c) 12.6	6.36	(d)
Eu	1.1	(a)	1.05	1.24	(a) 1.07	(c) 1.45	1.06	(d)
Gd					7.2	(c)	7.63	(d)
Tb	1.35	(a)	2	1.5	(a) 1.09	(c) 2.71	1.35	(d)
Dy	8.5	(a)			6.8	(c) 18	8.02	(d)
Ho	2	(a)			1.64	(c)	1.8	(d)
Er					4.7	(c)	5.45	(d)
Tm	0.73	(a)			0.73	(c)		
Yb	4.6	(a)	7.7	5.7	(a) 4.4	(c) 9.76	5.01	(d)
Lu	0.66	(a)	1.13	0.81	(a) 0.68	(c) 1.32	0.68	(d)
Hf	4.17	(a)	10.7	5.5	(a) 3.5	(c) 10	4.72	(d)
Ta	0.54	(a)	2.5	0.66	(a)	1.27	0.65	(d)
W ppb					0.13	(c)	250	(d)
Re ppb		0.28	(b)	0.063	(a)		1.2	(d)
Os ppb								
Ir ppb		3.6	(b) 0.61	1.54	(a)			
Pt ppb								
Au ppb		2.2	(b) 0.36	0.21	(a)		2.9	(d)
Th ppm	2.15	(a) 7.22	(b) 4.4	3.3	(a) 1.79	(c) 4.68	2.2	(d)
U ppm	0.6	(a)	1.6	0.81	(a) 0.43	(c)	0.58	(d)

technique: (a) INAA, (b) RNAA, (c) SSMS, (d) various, (e) fused bead



Figure 10: Photo of interior of 15306. Scale unknown. S71-52426.

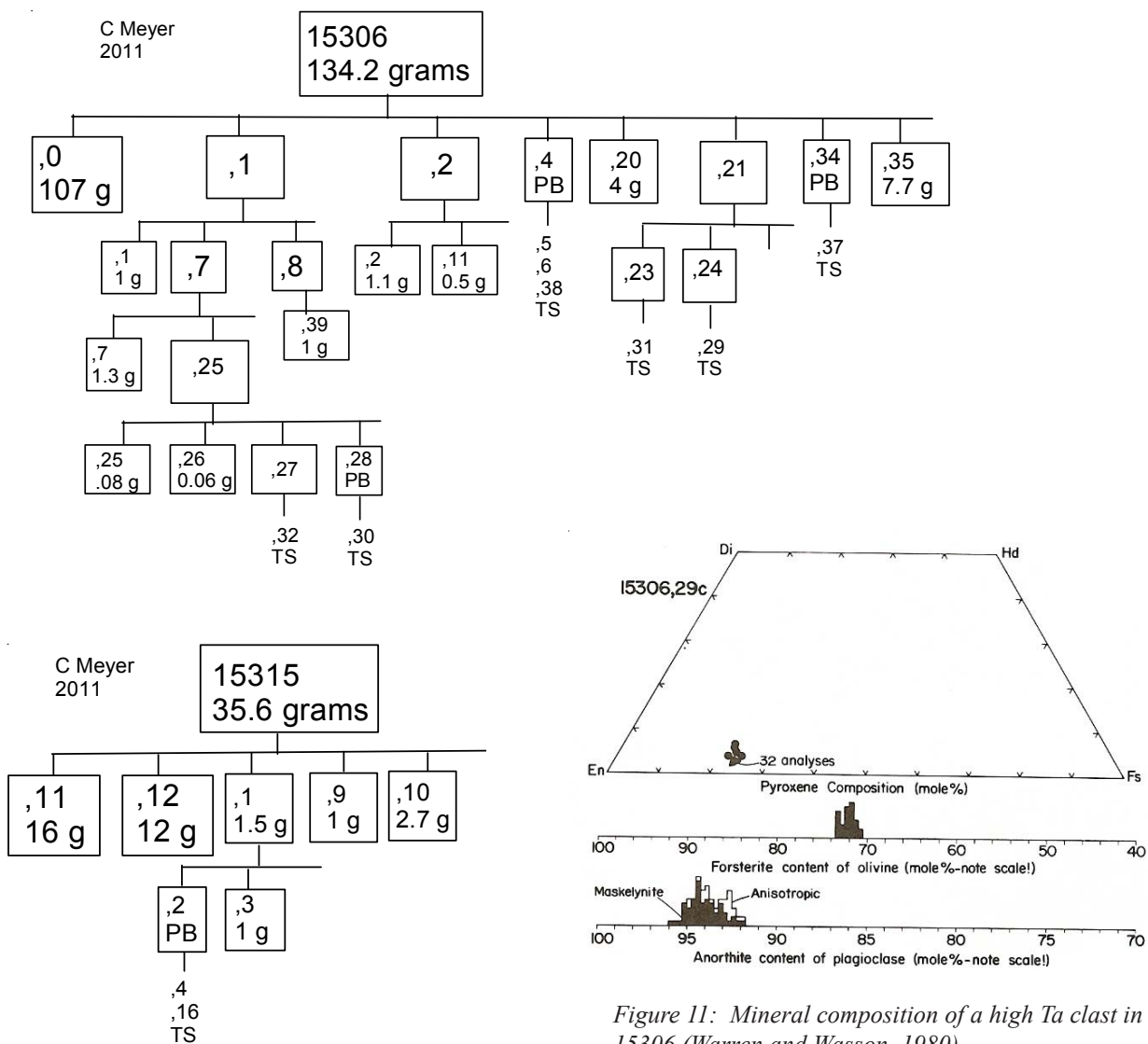
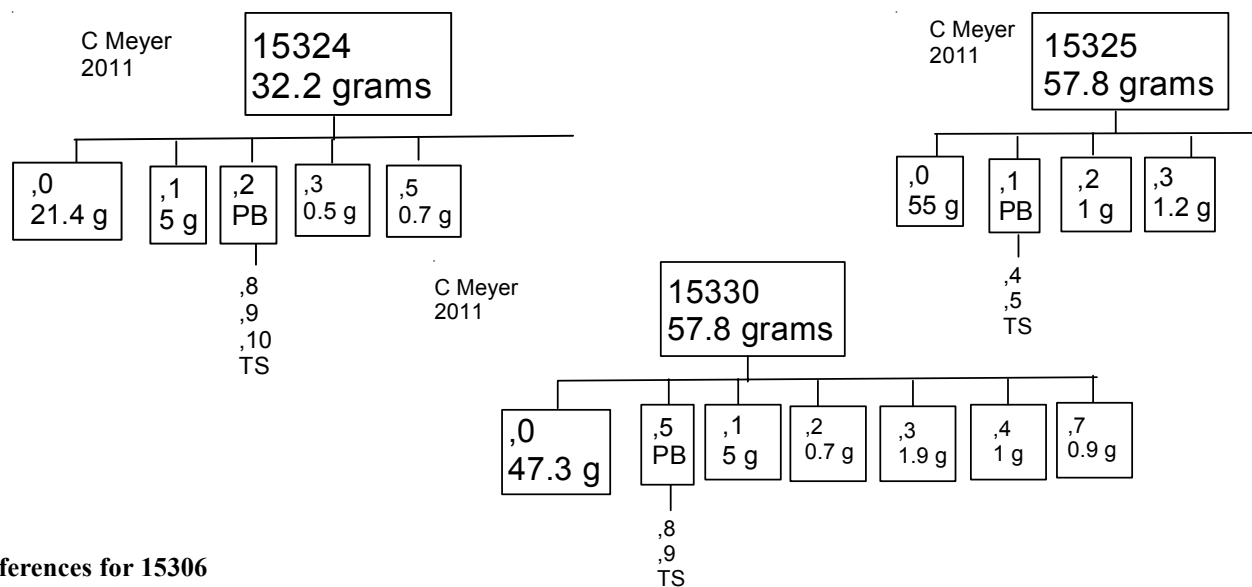


Figure 11: Mineral composition of a high Ta clast in 15306 (Warren and Wasson 1980).



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