71041 – 259 grams
71061 – 506.5 grams
Partially Shaded Soils

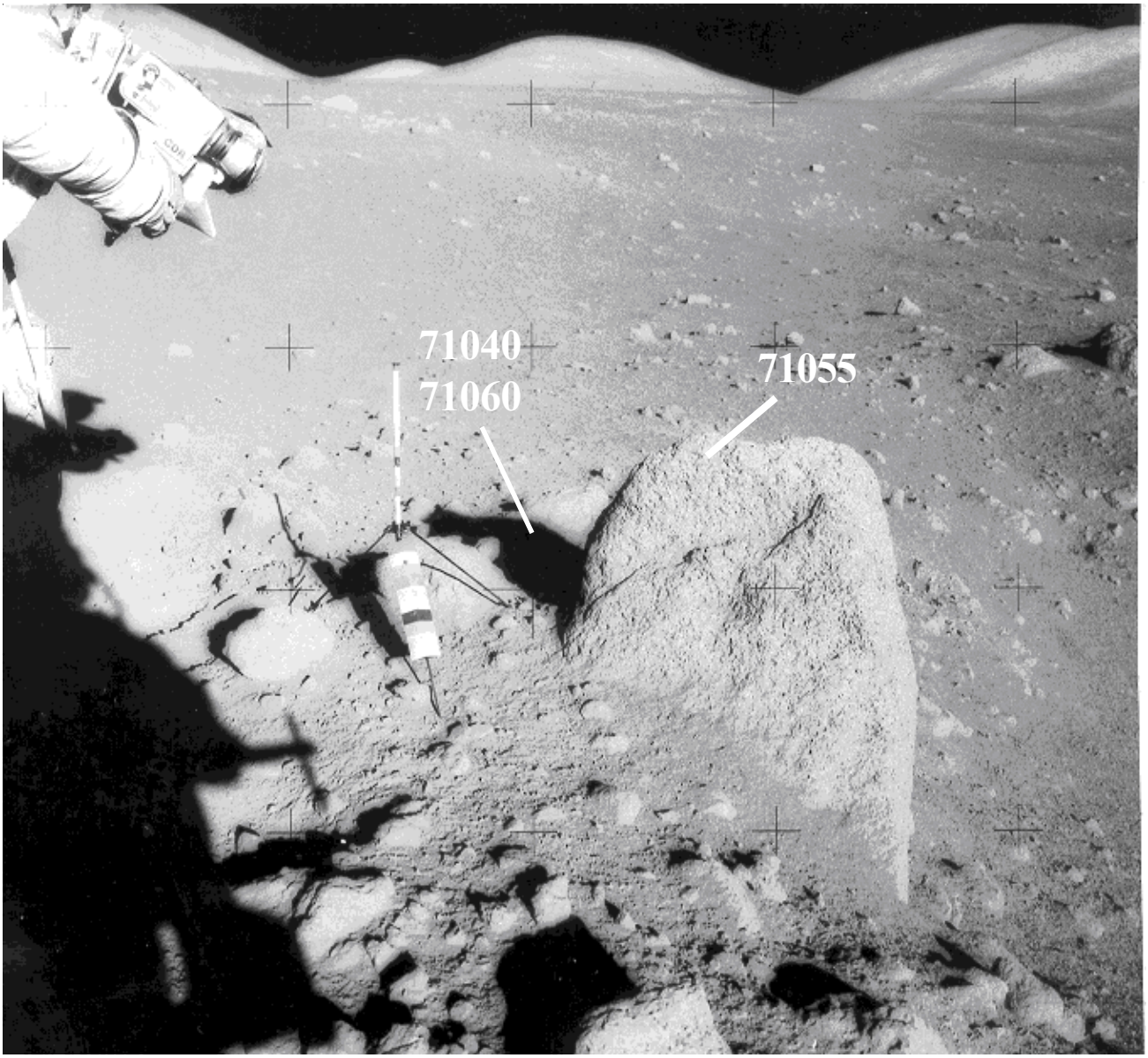


Figure 1: Soils collected from shade behind small boulder at station 1, Apollo 17. AS17-136-20739.

Introduction

Soil samples 71041 and 71061 were collected from next to a boulder in a small blocky crater (figure 2). Although these soils were collected in the shade of the boulder (figure 1), this area should have been in the sunlight at other times of the lunar sol. 71041 is a surface sample (0 – 2 cm) while 71061 is subsurface (5 – 6 cm).

Petrography

The maturity of 71041 and 71061 is I_s/FeO = 29 and 14, respectively and the average grain size is 80 and 110 microns (Morris 1978, Graf 1993). Heiken and McKay (1974) found they contained 27 and 9 % agglutinate, with the rest basalt or basalt derived material. These are both very immature soils, and

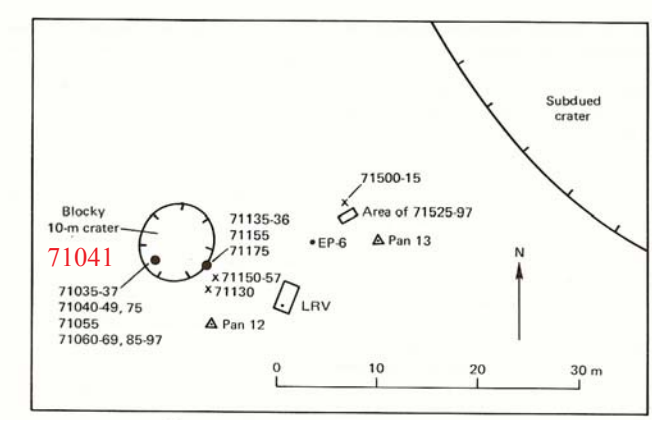


Figure 2: Map of station 1, Apollo 17.

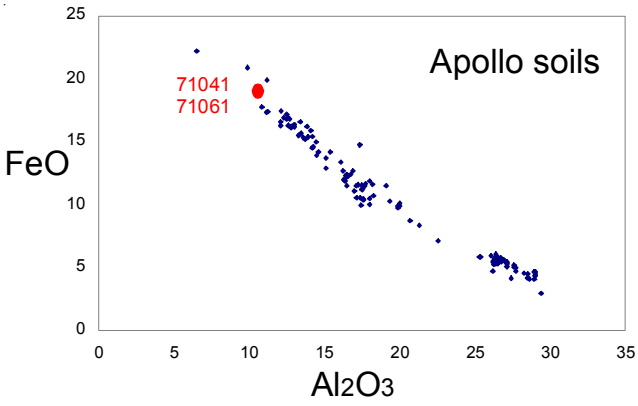


Figure 3: Composition of soil samples 71041 and 71061 compared with that of other soil samples.

should be considered samples of "fillet" of the boulder (basalt sample 71055).

Gibbons et al. (1976) studied the agglutinates from 71061.

Chemistry

The Ti content of these soil samples is high (9.5%) and they have a REE pattern similar to that of the A17 mare basalts (figure 5).

LSPET (1973) and Moore et al. (1974) reported 90 and 40 ppm carbon for 71041 and 71061, respectively (figure 4).

Cosmogenic isotopes and exposure ages

Rancitelli et al. (1974) determined the cosmic-ray-induced activity of ^{22}Na = 123 dpm/kg, ^{26}Al = 123 dpm/kg, ^{46}Sc = 75 dpm/kg, ^{48}V = 27 dpm/kg, ^{54}Mn = 198 dpm/kg and ^{56}Co = 379 dpm/kg.

Modal content of soil 71041 (90-150 micron).
From Heiken and McKay 1974.

	71041	71061
Agglutinates	27.4	9.3 %
Basalt	13.7	19.6
Breccia	4.5	5.8
Anorthosite	1	0.3
Norite		
Gabbro		
Plagioclase	12.2	17.3
Pyroxene	17.3	21
Olivine	0.5	
Ilmenite	5.6	4.6
Orange glass	3.6	6.3
Glass other	14.2	21.8

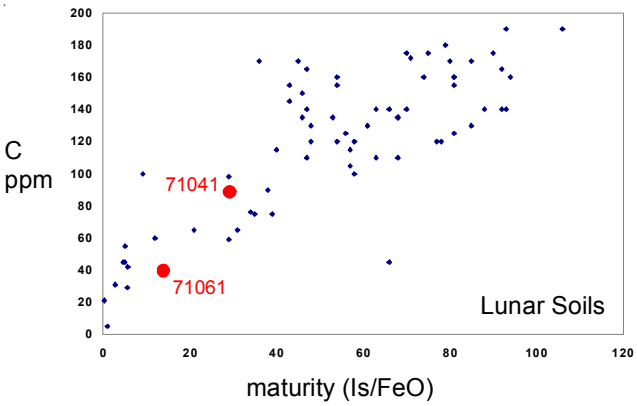


Figure 4: Carbon content and maturity index of 71041 and 71061 compared with that of other Apollo soil samples.

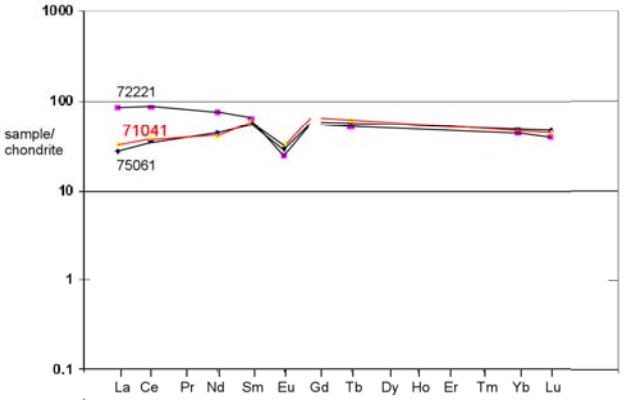
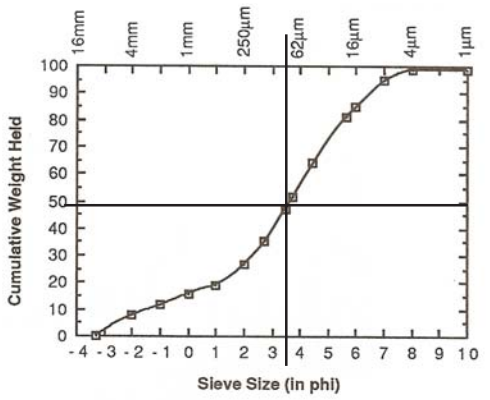


Figure 5: Normalized rare-earth-element diagram for 71041 compared with mare and highland samples at Apollo 17.



average grain size = 80 microns

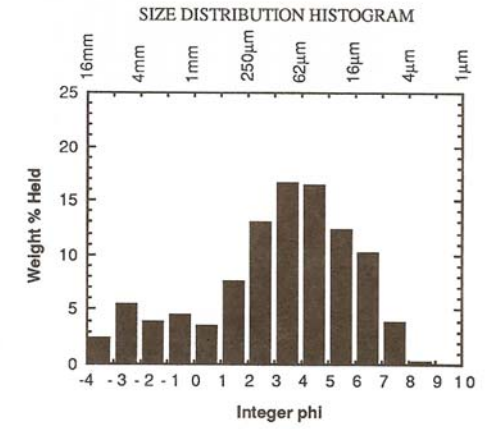
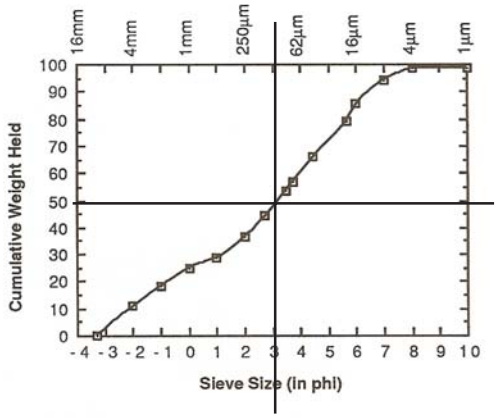


Figure 6a: Grain size distribution for 71040 (Graf 1993, data by McKay).



average grain size = 110 microns

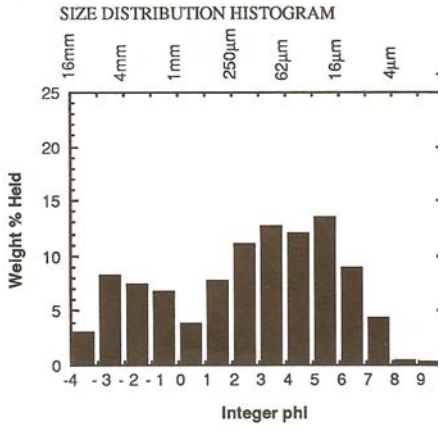


Figure 6b: Grain size distribution for 71060 (Graf 1993, data by McKay).

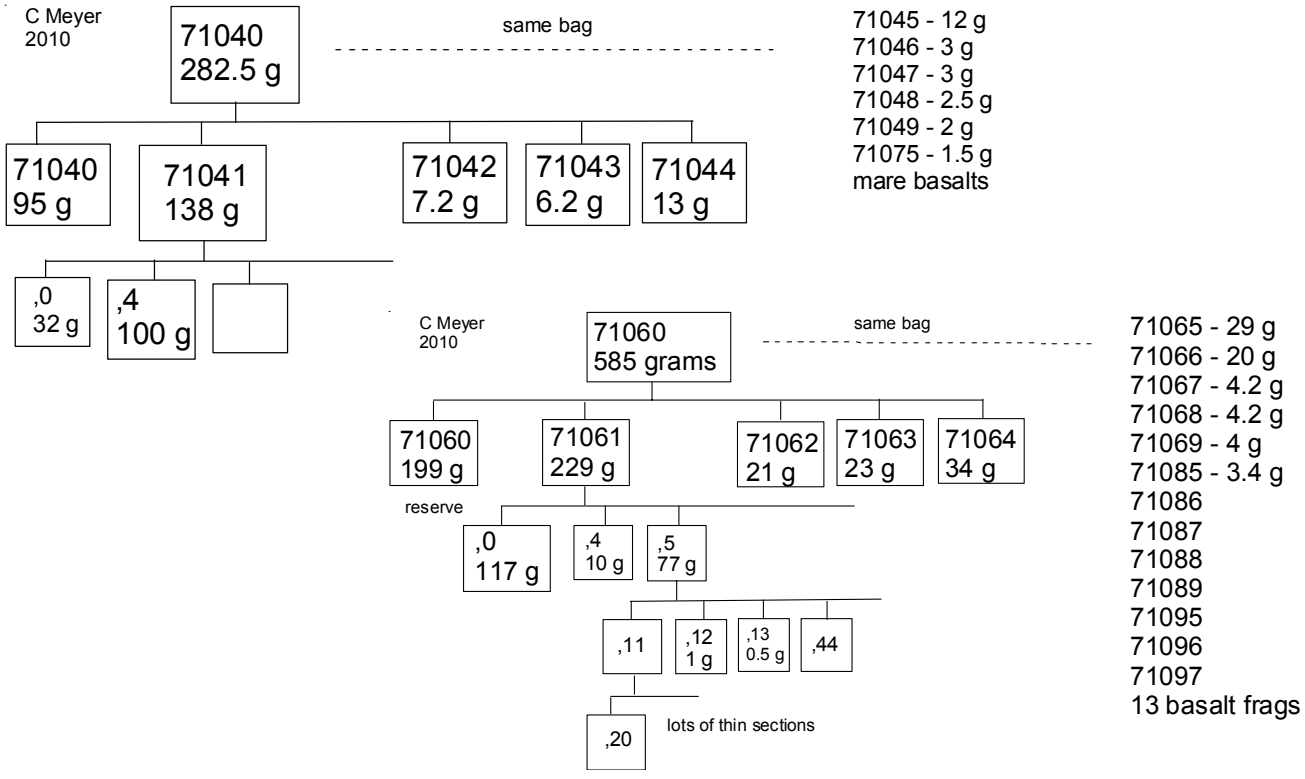


Table 1. Composition of 71041 and 71061.

	71041		71041		71041		71061			71061		71061		
reference	Korotev92		LSPET73		Rancitelli74		Korotev92			LSPET73		Korotev76		
weight			Rhodes74					dup.		Rhodes74		90-150	<20 micron	
SiO2 %			39.74	(b)						40.09	(b)			
TiO2			9.57	(b)						9.32	(b)			
Al2O3			10.8	(b)						10.7	(b)			
FeO	18	(a)	17.73	(b)			18	18.3	(a)	17.85	(b)	18.9	16.8	(a)
MnO			0.24	(b)						0.24	(b)			
MgO			9.72	(b)						9.92	(b)			
CaO			10.72	(b)						10.59	(b)			
Na2O	0.408	(a)	0.35	(b)			0.423	0.411	(a)	0.36	(b)	0.385	0.498	(a)
K2O			0.08	(b)	0.076	(c)				0.08	(b)			
P2O5			0.07	(b)						0.07	(b)			
S %			0.13	(b)						0.13	(b)			
sum														
Sc ppm	66.7	(a)					64.7	63.1	(a)					
V														
Cr	3190	(a)	3216	(b)			3110	3390	(a)	3352	(b)	3646	3394	(a)
Co	30.1	(a)					32.7	34.4	(a)			26.3	35.9	(a)
Ni	80	(a)	117	(b)			70	90	(a)	100	(b)	<50	150	(a)
Cu														
Zn			51	(b)						88	(b)			
Ga														
Ge ppb														
As														
Se														
Rb			1.1	(b)						1.1	(b)			
Sr	150	(a)	165	(b)			210	100	(a)	174	(b)			
Y			73	(b)						75	(b)			
Zr	290	(a)	217	(b)			230	270	(a)	215	(b)			
Nb			19	(b)						19	(b)			
Mo														
Ru														
Rh														
Pd ppb														
Ag ppb														
Cd ppb														
In ppb														
Sn ppb														
Sb ppb														
Te ppb														
Cs ppm														
Ba	110	(a)					150	74	(a)					
La	7.65	(a)					8.04	7.13	(a)			6.08	9.56	(a)
Ce	23.3	(a)					23.6	21.6	(a)			23.8	29.2	(a)
Pr														
Nd	18	(a)					19	17	(a)					
Sm	8.64	(a)					8.59	8.09	(a)			8.45	8.43	(a)
Eu	1.84	(a)					1.77	1.71	(a)			1.68	1.83	(a)
Gd														
Tb	2.19	(a)					2.08	1.98	(a)			2.39	2.17	(a)
Dy														
Ho														
Er														
Tm														
Yb	7.77	(a)					7.71	7.11	(a)			8.52	6.67	(a)
Lu	1.08	(a)					1.06	0.995	(a)			1.12	0.89	(a)
Hf	7.48	(a)					7.58	7.17	(a)			7.4	7.2	(a)
Ta	1.33	(a)					1.43	1.22	(a)			1.6	1.5	(a)
W ppb														
Re ppb														
Os ppb														
Ir ppb	9	(a)					< 5	< 12	(a)					
Pt ppb														
Au ppb	<6	(a)					< 10	< 7	(a)					
Th ppm	0.64	(a)			0.863	(c)	0.87	0.63	(a)			0.6	0.4	(a)
U ppm	0.22	(a)			0.25	(c)	0.3	< 0.4	(a)					

technique: (a) INAA, (b) XRF, (c) radiation count.

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