

75081
Mare Soil
1562 grams

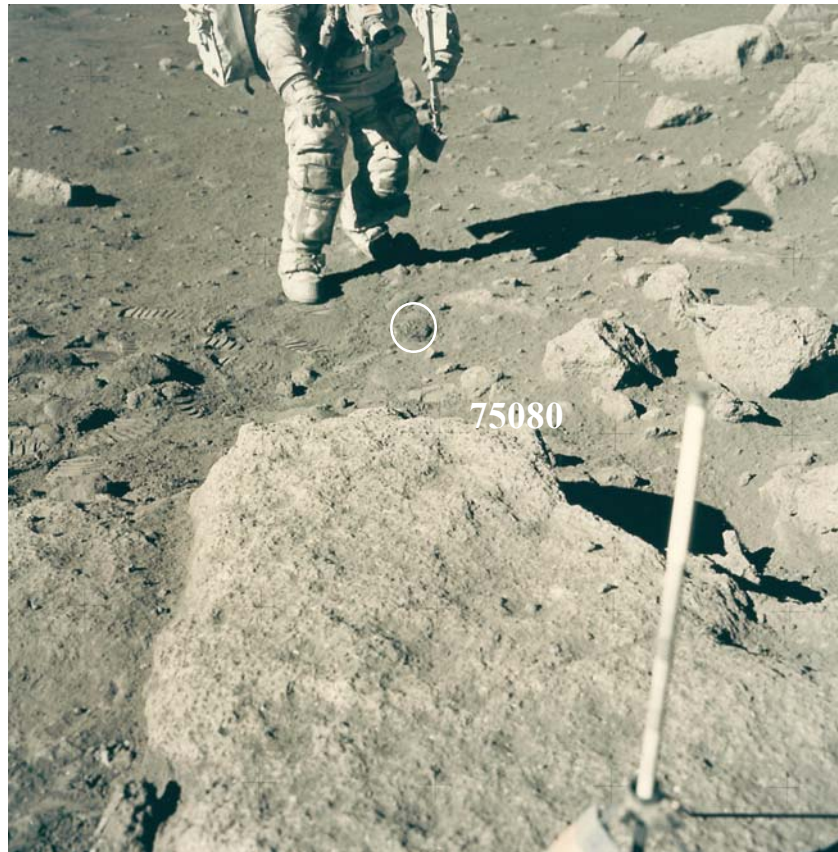


Figure 1: Picture of location where 75080 was collected. ASI7-145-22158

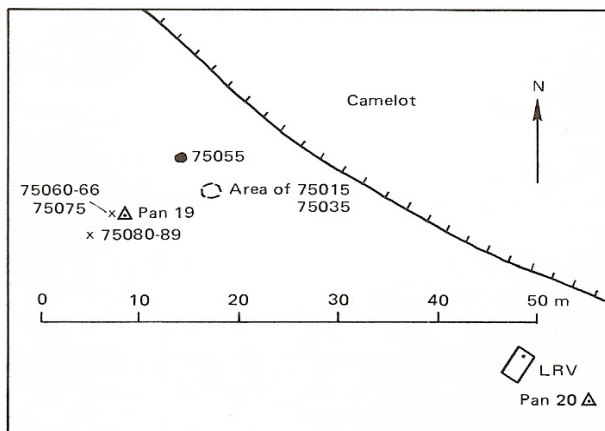


Figure 2: Map of station 5, Apollo 17.

Introduction

Station 5 was located on the rim of Camelot Crater where several basalt boulders were sampled (figure 2). Camelot Crater is about 650 meter diameter and the rim contained samples of the basalt flows in the Taurus-Littrow Valley. Soil sample 75080 was collected from between the basalt boulders and contained several fragments of basalt (75085-89)(figure 1). Basalt fragments from 75083 were dated from 3.67 – 3.75 b.y.

Petrography

The maturity index I_s/FeO for 75081 is 40 (submature) (Morris 1978), however there is a substantial agglutinate component. The grain size distribution and modal lithology was determined by Butler and King (1974), Green et al. (1975) and Heiken and McKay (1974). Von Guten et al. (1979) also determined the

grain size and calculated that 75081 was made of about 84% mare basalt, 7.6 % anorthosite, 1.4 % KREEP, ~7% orange glass and 0.6 % meteoritic material. Meyer (1973) tabulated 56 basalt particles, 8 agglutinates, 15 dark matrix breccias and only 2 feldspathic particles in the 4 – 10 mm coarse-fines.

Goldstein et al. (1974) reported the composition of iron particles in 75081 (figure 8).

The maturity of 75081 is $I_s/FeO = 40$ and the average grain size is 80 microns (Morris 1978, Graf 1993).

Chemistry

Numerous authors reported analyses of 75081 (table 1). Evensen et al. (1973) and Duncan et al. (1974) analyzed numerous size fractions of 75081.

LSPET (1973) and Moore et al. (1974) reported 115 ppm carbon for 75081 (figure 4). Norris et al. (1983) reported carbon = 81 ppm and nitrogen = 39 ppm in 75080 and DesMarais et al. (1975) reported 105 ppm carbon. Pillinger et al. (1974) found the carbon and metallic iron contents could be correlated. Goel et al. (1975) found 65 ppm nitrogen.

75081 has been used to study the redistribution of volatile elements in the lunar regolith and by a nearby crater (Krahenbuhl et al. 1977, Wegmuller et al. 1980, Cirlin and Housley 1981 and Reed et al. 1977). Von Gunten et al. (1979) carefully studied the composition of 75081 as function of grain size.

Radiogenic age dating

Huneke et al. (1973) and Papike et al. (1974) have reported ages of particles from 75080 (table and figure 7).

Cosmogenic isotopes and exposure ages

The ^{38}Ar exposure age is 310 m.y. (Huneke et al. 1973). Bull and Durrani (1975) and Goswami and Lal (1974) studied the fossil tracks caused by cosmic rays and solar flares.

Other Studies

Bogard et al. (1974), Hintenberger et al. (1975) and Alexander et al. (1977) reported the isotopic ratios of rare gasses in 75081.

Cirlin and Housley (1981) showed that the Cd and Zn were located on the surfaces of grains in 75081 (figure

9). The optical spectra was obtained by Adams et al. (1974) (figure 10).

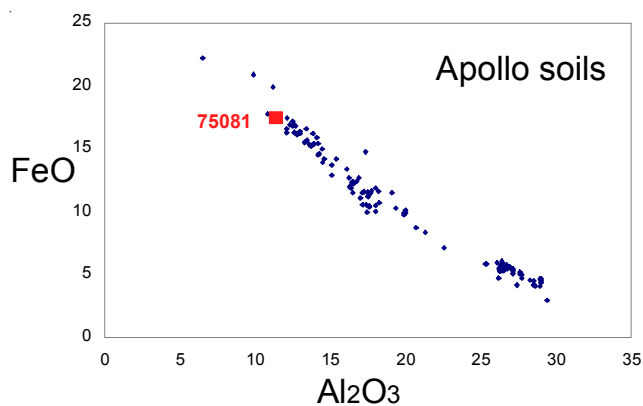


Figure 3: Chemical composition of lunar soils with 75081.

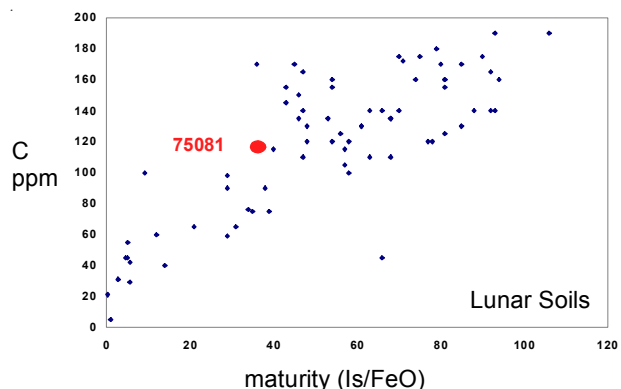
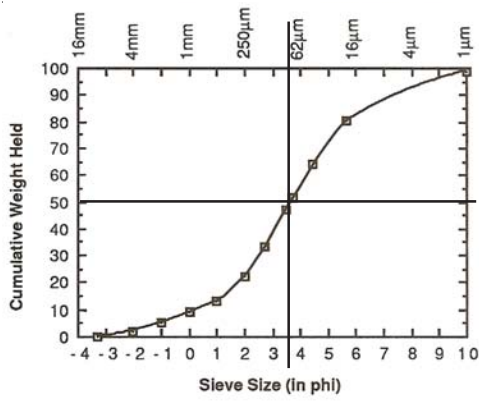


Figure 4: Maturity and carbon content of lunar soils, showing 75081.

Mineralogical Mode for 75081

*Heiken and McKay 1974
(90 to 150 micron*

Mare basalt	19.7
feldspathic basalt	
anorthosite, norite	0.3
breccias, light	0.7
poikilitic breccias	2
mafic mineral	21
plagioclase	9
opaque	5.7
glass	5.6
agglutinate	35.3
dark breccias	0.7



Average grain size = 80 microns

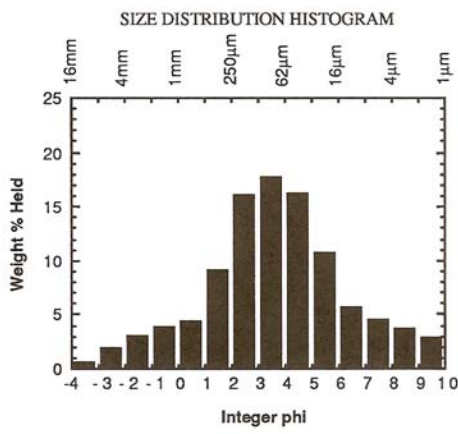


Figure 5: Grain size distribution for 75080 (Graf 1993, data from McKay).

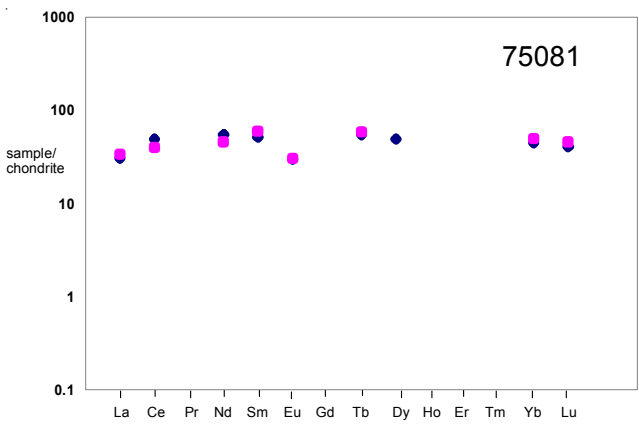


Figure 6: The trace element pattern for 75081 is like that of the mare basalt.

Summary of Age Data for 75083

- Ar/Ar
- Huneke et al. 1973 3.70 ± 0.09 b.y.
- Papike et al. 1974 3.77 ± 0.05
- 3.75 ± 0.04
- 3.67 ± 0.1
- 3.74 ± 0.04
- 3.68 ± 0.1
- 3.68 ± 0.07

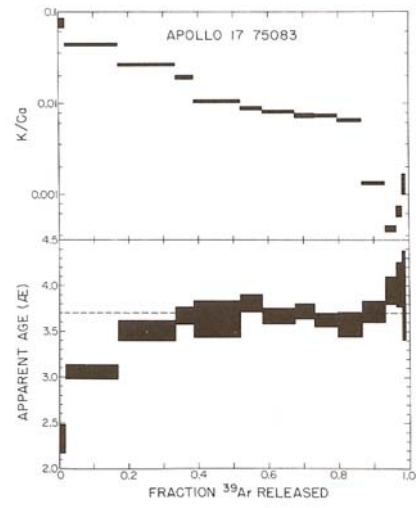


Figure 7: Ar release pattern for basalt fragments from 75083 (Huneke et al. 1973).

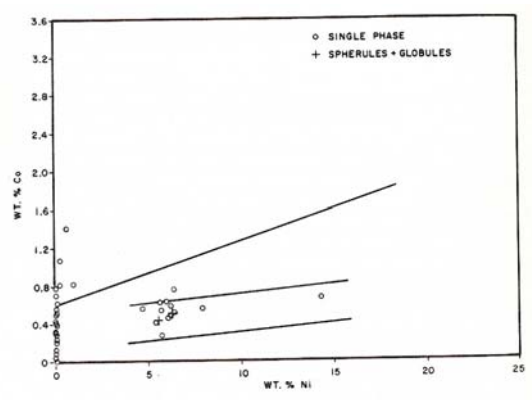


Figure 8: Chemical composition of iron grains in 75081 (Goldstein et al. 1974).

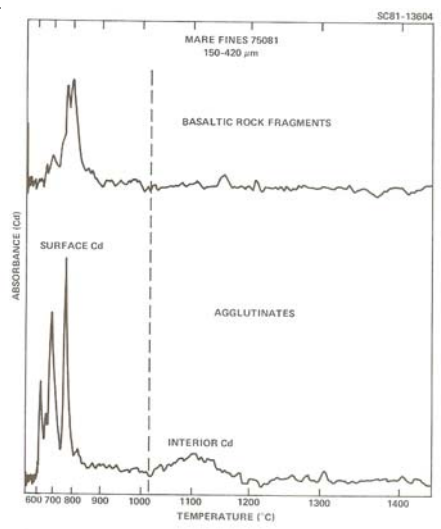


Figure 9: Cd on surface of soil particle from 75081 (Cirlin and Housley 1981).

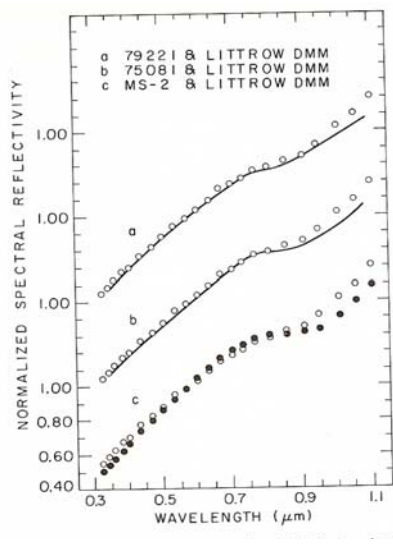


Figure 10: Spectra of 75081 (Adams et al. 1974).

Table 1a. Chemical composition of 75081.

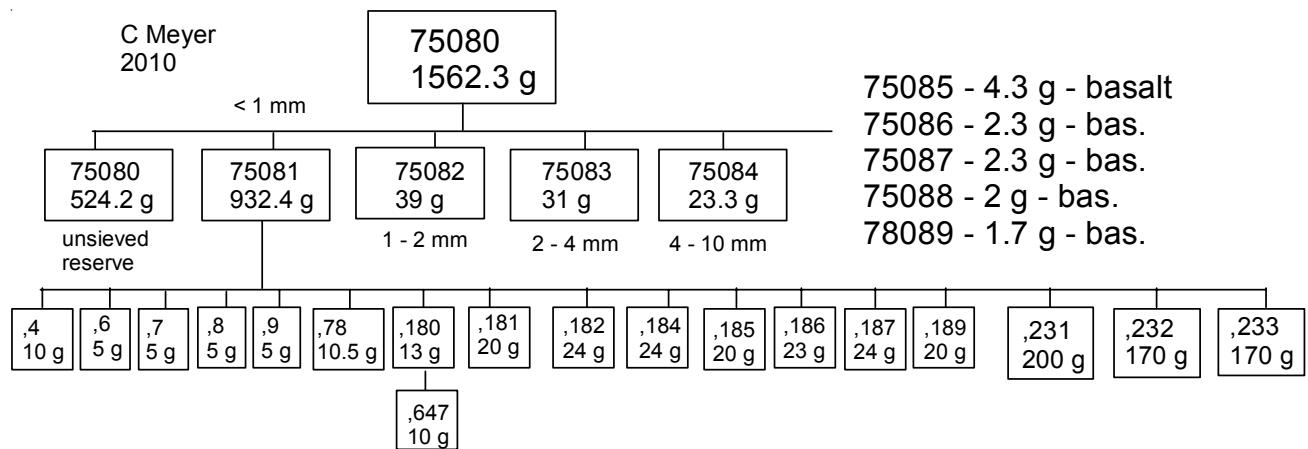
reference weight	Laul 74		Rhodes74 LSPET73		Korotev92		Duncan74				Evensen73		
							coarse		fine				
SiO2 %			40.27	40	(a)		39.73	40.06	40.03	40.65	(a)		
TiO2	9.4	(b)	9.41	9.4	(a)		10.45	9.89	9.73	8.33	(a)		
Al2O3	11.3	(b)	11.31	11.18	(a)		10.18	10.25	11.03	13.77	(a)		
FeO	17.3	(b)	17.2	17.3	(a)	17.8	17.5	(b)	17.66	17.74	17.75	16.01	(a)
MnO	0.227	(b)	0.25	0.25	(a)				0.235	0.237	0.237	0.2	(a)
MgO	9	(b)	9.59	9.42	(a)				9.36	9.71	9.61	9.08	(a)
CaO	10.6	(b)	10.97	10.87	(a)				11.04	10.79	10.75	10.97	(a)
Na2O	0.4	(b)	0.33	0.38	(a)	0.372	0.374	(b)	0.37	0.37	0.33	0.35	(a)
K2O	0.082	(b)	0.08	0.08	(a)				0.067	0.065	0.071	0.093	(a)
P2O5			0.07	0.07	(a)				0.071	0.069	0.08	0.109	(a)
S %			0.12	0.11	(a)				0.125	0.12	0.1	0.189	(a)
sum													
Sc ppm	61	(b)				66.9	65.9	(b)					
V	100	(b)							111	103	82	75	(a)
Cr	2942	(b)	3147	3079	(a)	3240	3190	(b)	3360	3264	3277	3654	(a)
Co	27	(b)				29.9	31.2	(b)	25	26	30	37	(a)
Ni	100	(b)	140	143	(a)	50	150	(b)	68.5	87.5	116	198	(a)
Cu									3.2	4.1	5	11.5	(a)
Zn			35	31	(a)				12	16.8	21.8	49.1	(a)
Ga													
Ge ppb													
As													
Se													
Rb									1.8	1.4	1.4	2.1	(a)
Sr			165	159	(a)	170	210	(b)	149	154	164	180	(a)
Y			77	73	(a)				73.7	71.2	67.3	65.5	(a)
Zr	230	(b)	229	211	(a)	230	180	(b)	241	235	224	238	(a)
Nb			20	19	(a)				20.2	19.8	20.2	20.6	(a)
Mo													
Ru													
Rh													
Pd ppb													
Ag ppb													
Cd ppb													
In ppb													
Sn ppb													
Sb ppb													
Te ppb													
Cs ppm													
Ba	100	(b)				100	108	(b)	95	89	91	112	(a)
La	7.2	(b)				8.01	7.91	(b)					
Ce	30	(b)				24.1	24.2	(b)					
Pr													
Nd	25	(b)				21	23	(b)					
Sm	7.6	(b)				8.8	8.7	(b)					
Eu	1.7	(b)				1.75	1.7	(b)					
Gd													
Tb	2	(b)				2.15	2.17	(b)					
Dy	12	(b)											
Ho													
Er													
Tm													
Yb	7.3	(b)				8.12	7.95	(b)					
Lu	1	(b)				1.12	1.1	(b)					
Hf	7	(b)				7.82	7.64	(b)					
Ta	1.3	(b)				1.38	1.34	(b)					
W ppb													
Re ppb													
Os ppb													
Ir ppb	5	(b)				5.4	6	(b)					
Pt ppb													
Au ppb	3	(b)				6	7	(b)					
Th ppm	0.6	(b)				0.75	0.81	(b)					
U ppm						1	0.8	(b)					

technique: (a) XRF, (b) INAA, (c) IDMS

Table 1b. Chemical composition of 75081.

<i>reference weight</i>	Baedecker74	Korotev92 ave ?	Laul78	Morgan74	Laul74b ,21	Miller74
SiO2 %		40.1	(b) 40.4	(b)		38.7
TiO2		9.41	(b) 9.1	(b)		9.3
Al2O3		11.25	(b) 11.1	(b)		11
FeO	18.1	(b) 17.4	(b) 17.3	(b)		17
MnO	0.26	(b) 0.25	(b) 0.23	(b)		0.16
MgO		9.51	(b) 9.6	(b)		10.6
CaO		10.9	(b) 10.9	(b)		10.5
Na2O		0.373	(b) 0.44	(b)		0.42
K2O		0.08	(b) 0.08	(b)		
P2O5		0.07	(b)			
S %		0.12	(b)			
<i>sum</i>						
Sc ppm	67	(b) 66.4	(b) 67	(b)		
V			100	(b)		
Cr	3000	(b) 3220	(b) 2942	(b)		
Co	33	(b) 30.6	(b) 30	(b)	31	(d)
Ni	125	(d) 100	(b) 110	(b) 113	(d) 120	(d)
Cu						
Zn	26	(d) 33	(b) 35	(b) 27	(d) 31	(d)
Ga	5.1	(d)	6.4	(b)		
Ge ppb	207	(d)		190	(d)	
As						
Se				250	(d) 280	(d)
Rb		1.1	(b)	1.2	(d) 1.1	(d)
Sr		164	(b) 160	(b)	160	(d)
Y		75	(b)			
Zr	251	(b) 220	(b)			
Nb		20	(b)			
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb				9.9	(d) 9.6	(d)
Cd ppb	32	(d)		32	(d) 33	(d)
In ppb	2	(d)			2.7	(d)
Sn ppb						
Sb ppb				0.67	(d) 1.3	(d)
Te ppb				10	(d)	
Cs ppm				0.047	(d) 0.047	(d)
Ba		104	(b) 100	(b)	95	(d)
La		7.96	(b) 7.7	(b)		
Ce	23	(b) 24.2	(b) 28	(b)		
Pr						
Nd		22	(b) 25	(b)		
Sm		8.78	(b) 8.4	(b)		
Eu	1.8	(b) 1.72	(b) 1.8	(b)		
Gd						
Tb	2.2	(b) 2.16	(b) 2.1	(b)		
Dy			13	(b)		
Ho			3	(b)		
Er						
Tm						
Yb	6.4	(b) 8.04	(b) 7.4	(b)		
Lu		1.11	(b) 0.98	(b)		
Hf	8.3	(b) 7.73	(b) 7.4	(b)		
Ta	1.4	(b) 1.36	(b) 1.4	(b)		
W ppb						
Re ppb				0.47	(d)	
Os ppb						
Ir ppb	5	(d) 5.7	(b) 10	(b) 5.36	(d) 5.4	(d)
Pt ppb						
Au ppb	1.4	(d) 2.1	(b)	1.7	(d) 1.7	(d)
Th ppm	0.6	(b) 0.78	(b) 0.9	(b)		
U ppm		0.2	(b) 0.25	(b) 0.24	(d) 0.26	(d)

technique: (a) XRF, (b) INAA, (c) IDMS, (d) RNAA



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