

76321
Soil
814 grams



Figure 1: Photograph of top of block 1 of the big boulder at station 6, Apollo 17, where soil sample 76320 was collected. ASI7-140-21482

Introduction

76320 – 76324 is the soil from on top of a flat boulder (figure 1). It was probably placed there from a nearby impact into the regolith (Wolfe et al.1981).

One of the goals of the Apollo 17 mission was to identify the “dark mantle” that could be seen from orbital photography. It is interesting to note that it was not found on top of this boulder!

Petrography

The maturity of 76321 is $I_s/FeO = 93$ and the average grain size is 61 microns (Morris 1978, Graf 1993). The agglutinate content is 39%. This is a very mature soil.

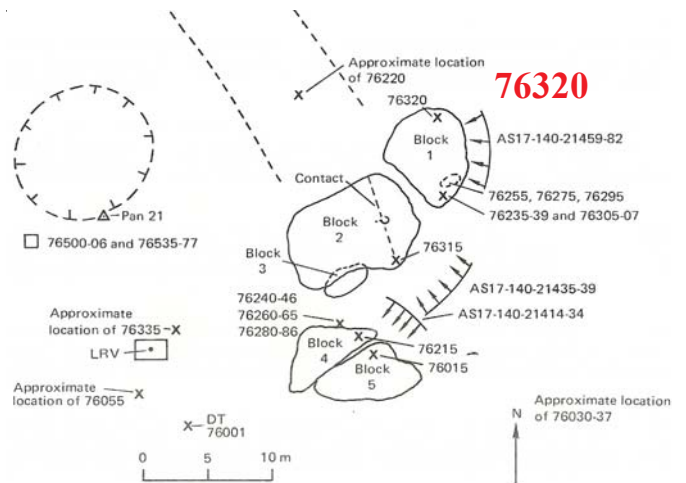


Figure 2: Map of station 6, with location of 76320 indicated.

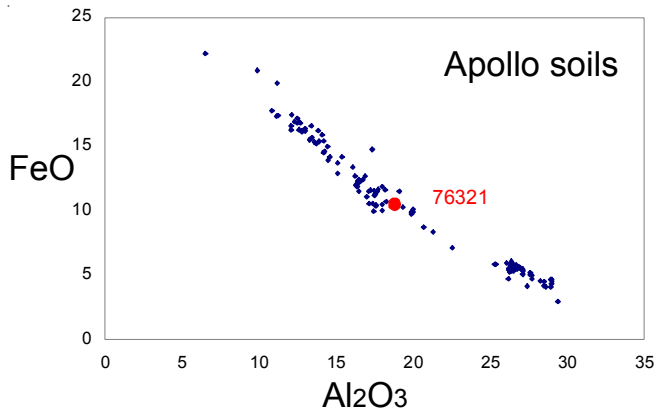


Figure 3: Composition of 76321 compared with that of Apollo soil samples.

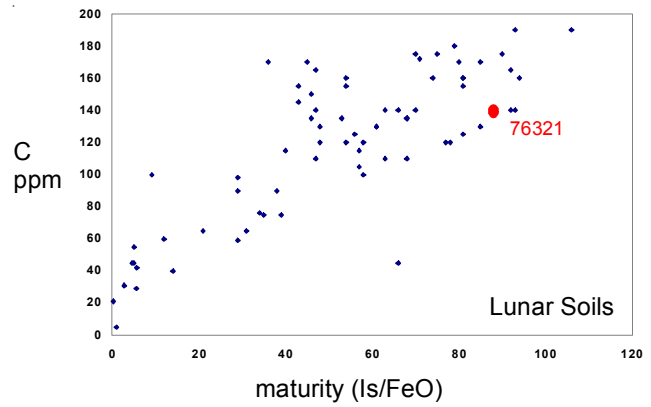


Figure 4: Carbon content and maturity index for 76321 and other Apollo 17 soils.

The grain size distribution was determined by Butler and King (1974) and Green et al. (1975).

Heiken and McKay (1974) reported the mineralogical mode and Meyer (1973) cataloged the 4 – 10 mm coarse-fines. There is not a lot of mare material.

Chemistry

The chemical composition was determined by Rhodes et al. (1974), Duncan et al. (1974), Brunfelt et al. (1974) and Korotev and Kremser (1992). It is relatively aluminous (figure 3).

Moore et al. (1974) determined 140 ppm carbon (figure 4).

Other Studies

Crozaz et al. (1974) studied the fossil nuclear tracks caused by solar-flare cosmic-ray irradiation.

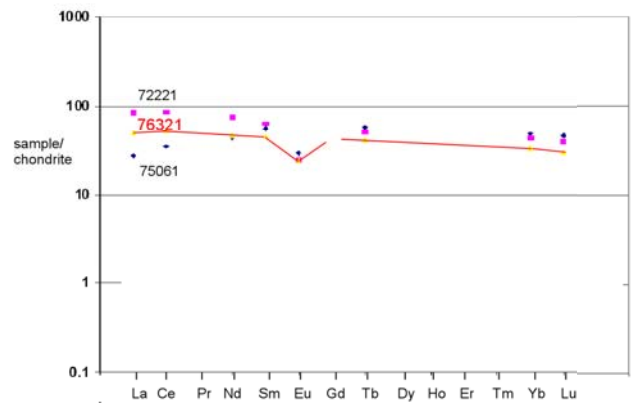


Figure 5: Normalized rare-earth-element diagram for 76321 compared with mare and highland soils.

Modal content of soil 76321 (90-150 micron).

From Heiken and McKay 1974.

	76321
Agglutinates	39.1 %
Basalt	2.7
Breccia	18.7
Anorthosite	1
Norite	
Gabbro	
Plagioclase	15.7
Pyroxene	12.4
Olivine	
Ilmenite	0.3
Orange glass	1.3
Glass other	8.6

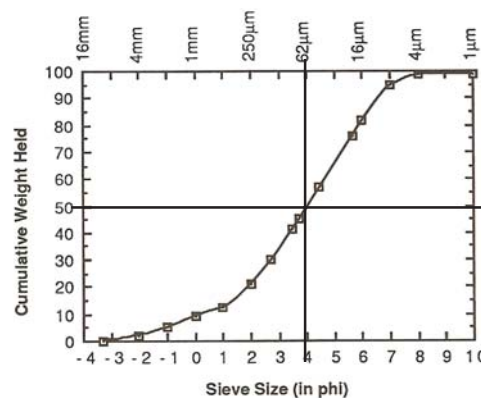
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Table 1. Chemical composition of 76321.

reference weight	Rhodes74	Korotev92		Duncan74	Brunfelt74 unpublished	
SiO2 %	44.08	(a)		44.19	(a)	
TiO2	3	(a)		2.95	(a)	2.82 (b)
Al2O3	18.41	(a)		18.68	(a)	18.86 (b)
FeO	10.53	(a)	10.1	10.3	(b)	10.36 (a) 9.85 (b)
MnO	0.15	(a)		0.135	(a)	0.137 (b)
MgO	10.82	(a)		10.82	(a)	9.6 (b)
CaO	12.23	(a)		12.24	(a)	11.9 (b)
Na2O	0.46	(a)	0.425	0.416	(b)	0.4 (a) 0.46 (b)
K2O	0.13	(a)		0.124	(a)	0.122 (b)
P2O5	0.09	(a)		0.113	(a)	
S %	0.07	(a)		0.08	(a)	
sum						
Sc ppm			26.6	27	(b)	25.4 (b)
V				54	(a)	55 (b)
Cr	1779	(a)	1810	1820	(b)	1861 (a) 1640 (b)
Co			28.2	32.1	(b)	30 (a) 26.6 (b)
Ni	210	(a)	180	230	(b)	190 (a)
Cu						5.2 (a) 6.7 (b)
Zn	26	(a)				20.4 (a) 20 (b)
Ga						3.9 (b)
Ge ppb						
As						
Se						
Rb	3.2	(a)				3.2 (a) 2.3 (b)
Sr	151	(a)	150	180	(b)	150 (a) 125 (b)
Y	54	(a)				48.6 (a)
Zr	204	(a)	240	210	(b)	210 (a)
Nb	15	(a)				15.8 (a)
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb						
Cd ppb						
In ppb						
Sn ppb						
Sb ppb						
Te ppb						
Cs ppm						0.13 (b)
Ba			149	141	(b)	139 (a) 120 (b)
La			11.6	11.6	(b)	8.7 (b)
Ce			31.3	31.6	(b)	
Pr						
Nd			21	24	(b)	
Sm			6.73	6.74	(b)	6.41 (b)
Eu			1.35	1.37	(b)	1.17 (b)
Gd						
Tb			1.47	1.5	(b)	1.56 (b)
Dy						9 (b)
Ho						
Er						
Tm						
Yb			5.39	5.42	(b)	5.2 (b)
Lu			0.73	0.74	(b)	0.75 (b)
Hf			5.57	5.31	(b)	4.2 (b)
Ta			0.78	0.81	(b)	0.79 (b)
W ppb						180 (b)
Re ppb						
Os ppb						
Ir ppb			7.4	8	(b)	
Pt ppb						
Au ppb			4	3.9	(b)	
Th ppm			2.08	1.84	(b)	1.46 (b)
U ppm			0.58	0.57	(b)	0.43 (b)

technique: (a) XRF, (b) INAA



average grain size = 61 microns

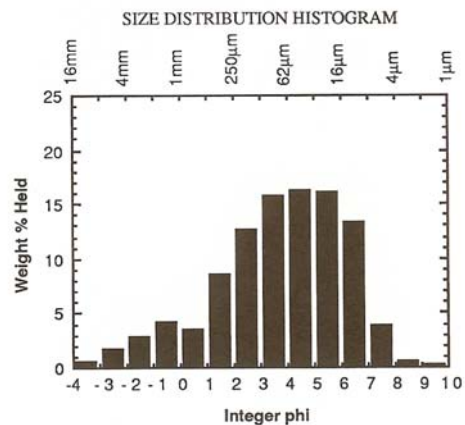
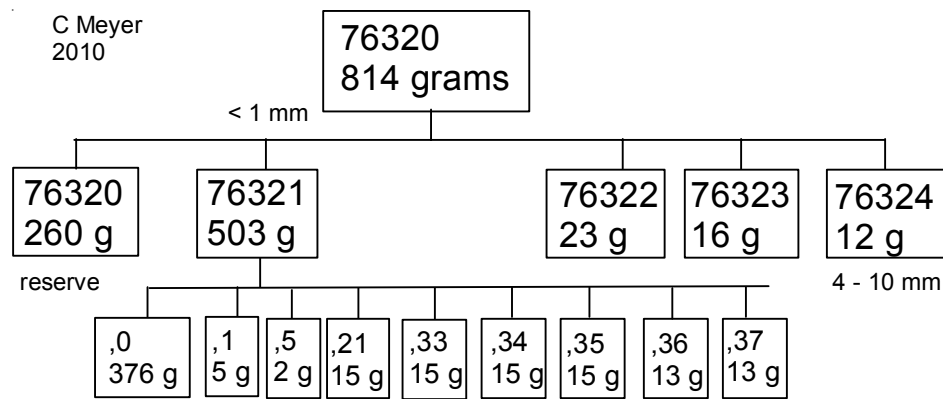


Figure 6: Grain size distribution for 76230 (Graf 1993, data from King).



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