64801 and 64810

Soil and rake residue

480 and 301 grams

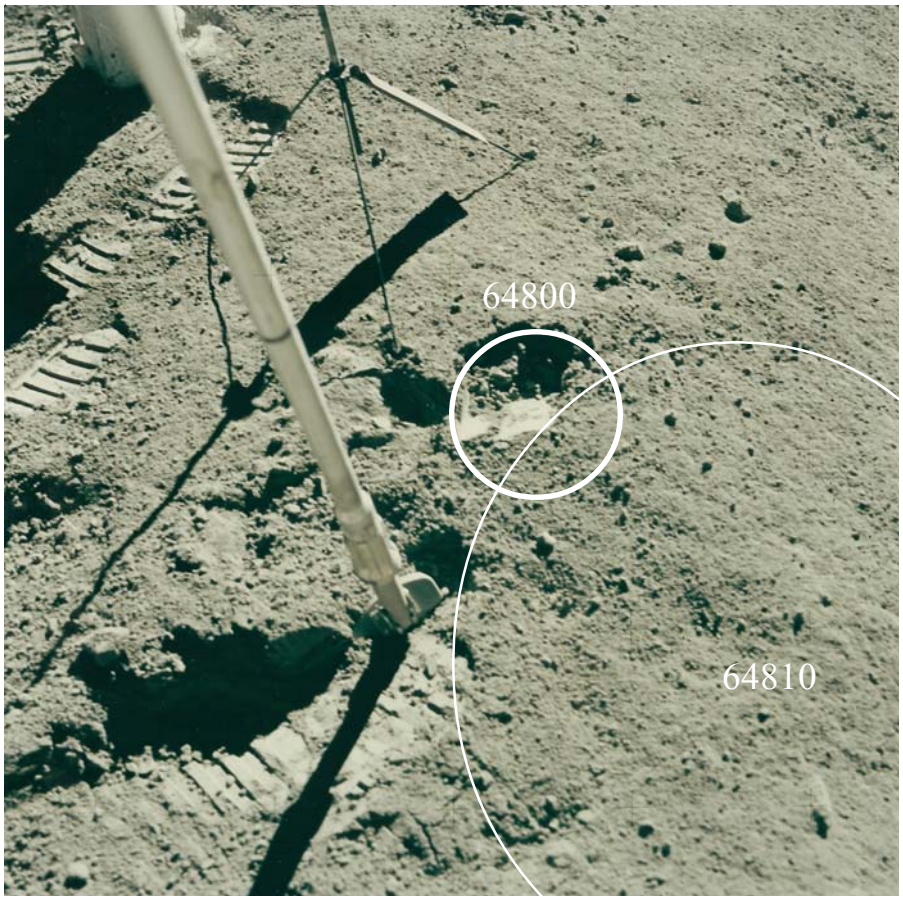
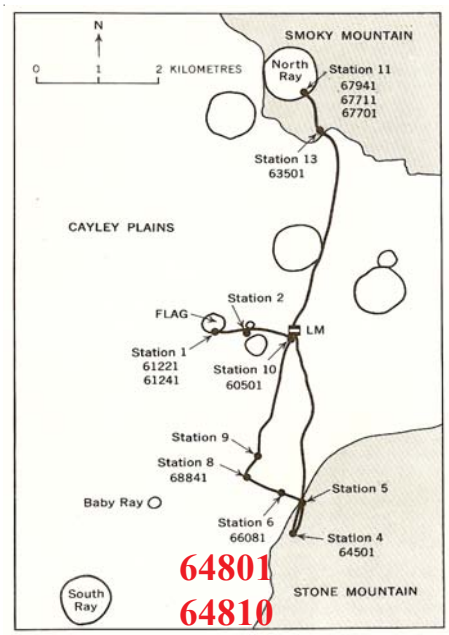
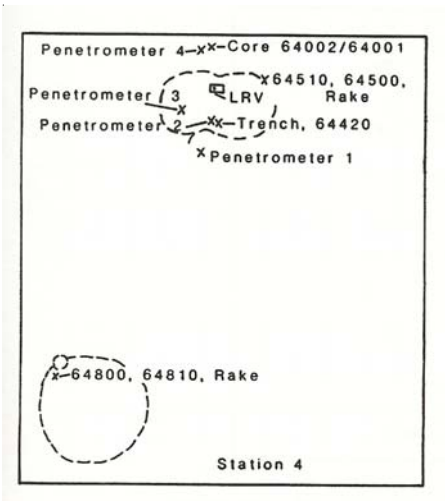


Figure 1: Close-up photo of areas where 64800 and 64810 were collected. AS16-107-17465





Figures 2 and 3: Maps of location of station 4 on Stone Mt. and samples 64801 and 64810.

Introduction

Soil sample 64801 and rake sample 64810 were collected adjacent to each other at Station 4, on the slope of Stone Mountain (figures 1, 2 and 3). The area was free of the blocky material found at the Doublet Crater nearby (64501 etc) and, indeed, the rake sample yielded only a few small rocks.

Petrography

The maturity index I_s/FeO = 71 for 64801 and 54 for 64810 (Morris 1978). This is a relatively mature soil with average grain size 80 microns (figure 8).

Phinney and Lofgren (1973) and Marvin (1972) cataloged the particles picked out of these samples.

Butler et al. (1973) reported a mineral mode for different size fractions of 64801 and Simkin et al. (1973) reported the mode for the large residue from rake sample 64811. There are a lot of agglutinates in each size range.

Chemistry

64801 is a typical high-Al highland soil (figures 4 and 6). It should be considered as a reference to the soils from the nearby Doublet Crater which is thought to have been created by ejecta from South Ray Crater. Together, these soils should include material from the elusive Descartes Formation, but in fact they haven't been distinguished from the material from the Cayley Plains.

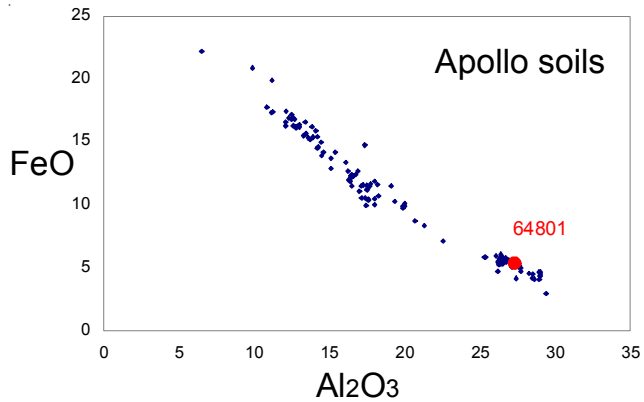


Figure 4: Composition of 64801 and other Apollo soil samples.

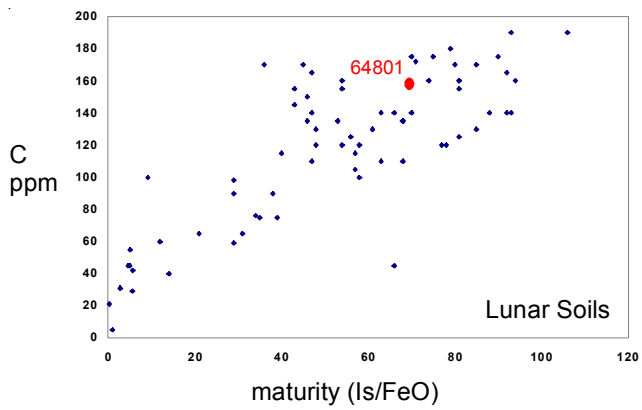


Figure 5: Carbon content and maturity index for 64801 (Moore et al. 1973; Graf 1993).

Moore et al. (1973) determined 160 ppm carbon for 64801 (figure 5). Kerridge et al. (1975) and Moore and Lewis (1975) reported 86 ppm and 113 ppm nitrogen, respectively for 64801. Jovanovic and Reed (1973) determined the halogens, Li, U and Te. The meteoritic siderophiles (Ni, Ir and Au) are very high.

Cosmogenic isotopes and exposure ages

Eldridge et al. (1973) determined the cosmic-ray-induced activity of ^{26}Al = 105 dpm/kg and ^{22}Na = 50 dpm/kg. Wrigley (1973) determined the cosmic-ray-induced activity of ^{26}Al = 116 dpm/kg and ^{22}Na = 55 dpm/kg .

Other Studies

Bhandari et al. (1973) determined the fossil nuclear track density and found a 'suntan' age of only 6 m.y.

Pearce et al. (1973) reported magnetic properties for 64801 and other samples.

Walton et al. (1973) determined the rare gas content and isotopic rations. The ^{21}Ne exposure age is 310 m.y.

Processing

Since there was a lot of residue in the rake sample 64810, it was treated as a soil and sieved.

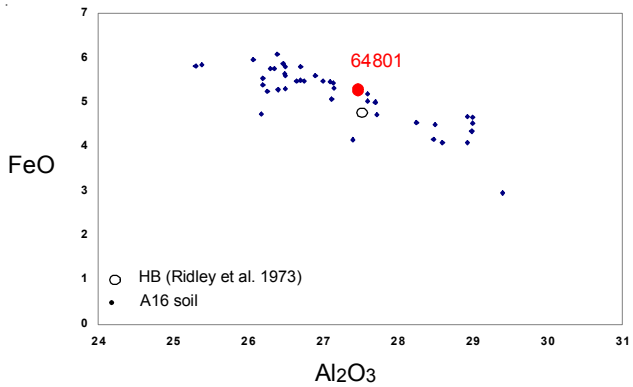


Figure 6: Composition of 64801

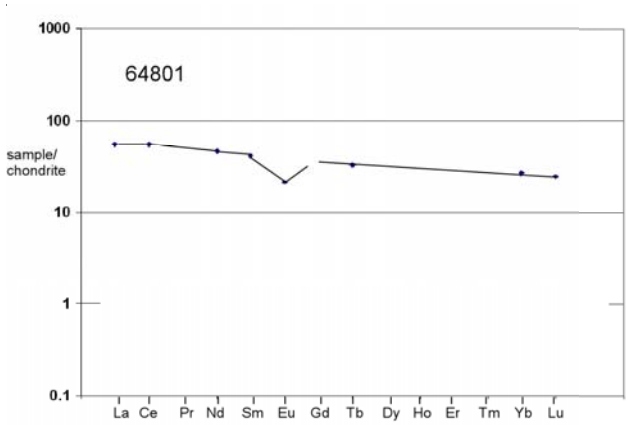
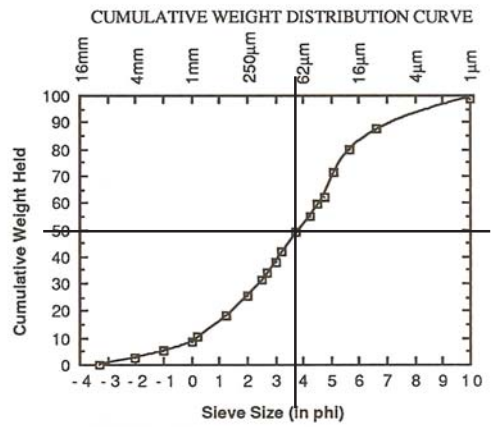


Figure 7: Normalized rare-earth-element diagram for 64801.



average grain size = 80 microns

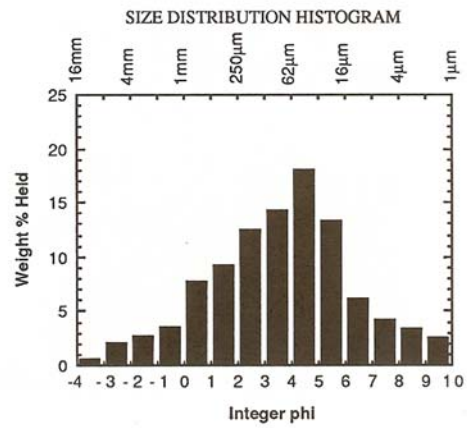


Figure 8: Grain size distribution for 64800 (Graf 1991, from data by Butler et al.)

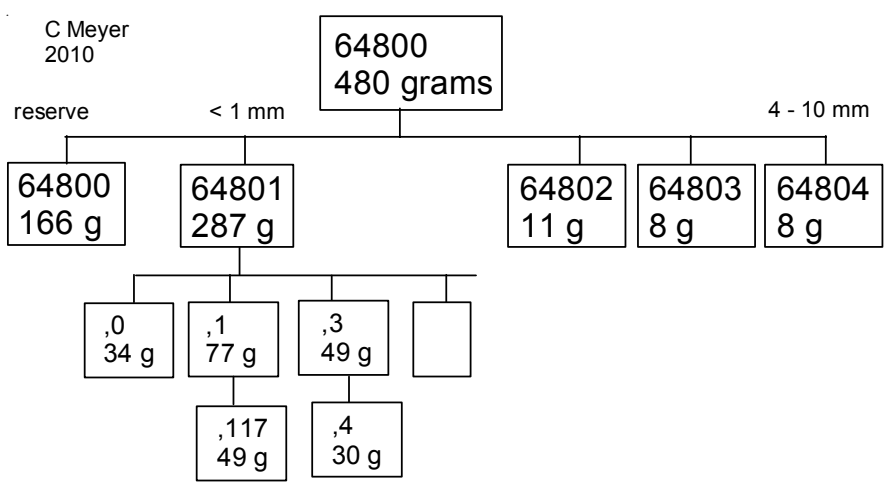


Table 1. Chemical composition of 64801.

reference	Hubbard73		Compston73		Simkin73	Taylor73		Wrigley73		Eldridge73		Korotev91		Krahenbuhl73		ave. st. 4 Korotev81
weight																
SiO2 %	45.03	(e)	45.05	(e)	44.6	44.9	(b)									45.1
TiO2	0.61	(e)	0.61	(e)	0.49	0.47	(b)									0.52
Al2O3	27.37	(e)	27.12	(e)	26.9	27.7	(b)									27.6
FeO	5.36	(e)	5.16	(e)	5.59	5.01	(b)					5.17	(a)			4.6
MnO	0.08	(e)	0.07	(e)	0.04											0.06
MgO	5.66	(e)	5.7	(e)	5.5	5.69	(b)									5.1
CaO	15.64	(e)	15.87	(e)	15.5	15.7	(b)					15.7	(a)			16.2
Na2O	0.36	(e)	0.44	(e)	0.5	0.51	(b)					0.45	(a)			0.47
K2O	0.13	(e)	0.12	(e)	0.19	0.22	(b)	0.1	(d)	0.13	(d)					0.112
P2O5	0.13	(e)	0.1	(e)		0.16	(b)									
S %	0.08	(e)	0.05	(e)												
sum																
Sc ppm						11	(b)					9.6	(a)			8.2
V					8	28	(b)									15
Cr					770	750	(b)					756	(a)			625
Co					24	27	(b)					25.4	(a)			24
Ni					290	300	(b)					336	(a)	640	(c)	320
Cu					10	7.6	(b)									
Zn														20	(c)	
Ga																
Ge ppb														1250	(c)	
As																
Se																
Rb			3.02	(f)		2.3	(b)							3	(c)	2.55
Sr			168	(f)	150							165	(a)			166
Y					44	36	(b)									41
Zr					220	210	(b)					193	(a)			192
Nb						15	(b)									
Mo																
Ru																
Rh																
Pd ppb																
Ag ppb														8.6	(c)	
Cd ppb														68.5	(c)	
In ppb																
Sn ppb						70	(b)									
Sb ppb														4.23	(c)	
Te ppb														27	(c)	
Cs ppm						0.07	(b)					0.16	(a)	0.129	(c)	
Ba					180	175	(b)					136	(a)			144
La						12.8	(b)					12.9	(a)			11.6
Ce						37.1	(b)					33.1	(a)			
Pr						4.2	(b)									
Nd						16.7	(b)					21	(a)			
Sm						4.95	(b)					6	(a)			5.4
Eu						0.99	(b)					1.17	(a)			1.16
Gd						6.5	(b)									
Tb						1.01	(b)					1.18	(a)			1.16
Dy						6.25	(b)									
Ho						1.44	(b)									
Er						4.15	(b)									
Tm						0.66	(b)									
Yb						4	(b)					4.32	(a)			3.75
Lu						0.62	(b)					0.591	(a)			0.55
Hf						3.5	(b)					4.59	(a)			4.2
Ta												0.558	(a)			0.52
W ppb																
Re ppb														2.34	(c)	
Os ppb																
Ir ppb												10.3	(a)	26	(c)	
Pt ppb																
Au ppb												15.6	(a)	16.6	(c)	
Th ppm						2.17	(b)	2.21	(d)	2.23	(d)	2.09	(a)			2
U ppm						0.61	(b)	0.58	(d)	0.6	(d)	0.56	(a)	0.66	(c)	0.58

technique: (a) INAA, (b) SSMS, (c) RNAA, (d) radiation count. (e) XRF, (f) IDMS

Table 2. Chemical composition of 64811.

reference	Korotev82		Simkin73	
weight				
SiO2 %			44.6	(b)
TiO2			0.49	(b)
Al2O3	27	(a)	26.9	(b)
FeO	5.56	(a)	5.59	(b)
MnO	0.073	(a)	0.04	(b)
MgO	6.1	(a)	5.5	(b)
CaO	14.6	(a)	15.5	(b)
Na2O	0.462	(a)	0.5	(b)
K2O			0.19	(b)
P2O5				
S %				
sum				
Sc ppm	9.27	(a)		
V	21	(a)	8	(c)
Cr	733	(a)	770	(c)
Co	35.5	(a)	24	(c)
Ni	465	(a)	290	(c)
Cu			10	(c)
Zn				
Ga			4	(c)
Ge ppb				
As				
Se				
Rb				
Sr	165	(a)	150	(c)
Y			44	(c)
Zr	225	(a)	220	(c)
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm	0.17	(a)		
Ba	159	(a)	180	(c)
La	14.21	(a)		
Ce	38.3	(a)		
Pr				
Nd				
Sm	6.82	(a)		
Eu	1.185	(a)		
Gd				
Tb	1.44	(a)		
Dy				
Ho				
Er				
Tm				
Yb	4.83	(a)		
Lu	0.684	(a)		
Hf	5.67	(a)		
Ta	0.76	(a)		
W ppb				
Re ppb				
Os ppb				
Ir ppb	14.8	(a)		
Pt ppb				
Au ppb				
Th ppm	2.68	(a)		
U ppm	0.7	(a)		

technique: (a) INAA, (b) fused bead e-probe, (c) ES

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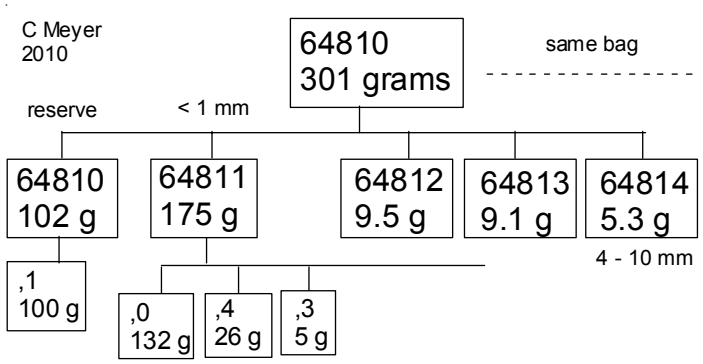

64815 - 21 g
64816 - 3.8 g
64817 - 9 g
64818 - 16 g
64819 - 12 g
64825 - 21 g
64826 - 11 g
64827 - 8 g
64828 - 1 g
64829 - 2.2 g
64835 - 2.3 g
64836 - 2 g
64837 - 2 g

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