15201 and 15211

Soils

26.7 and 390.9 grams

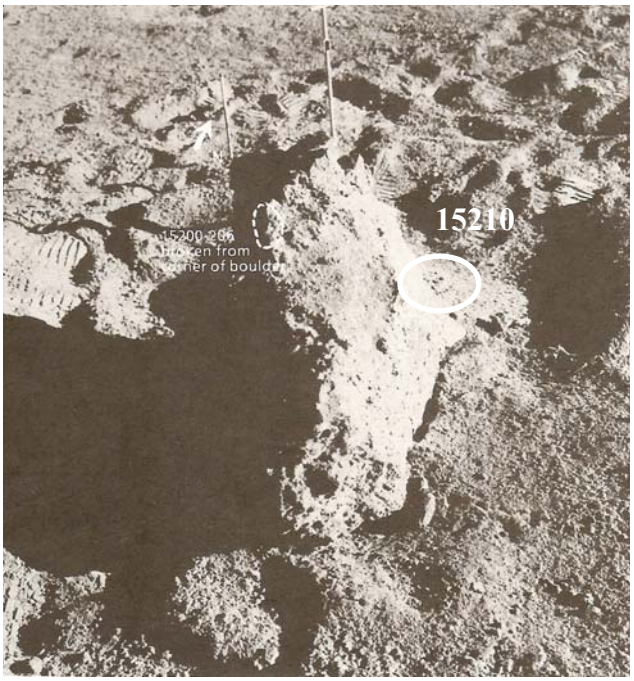


Figure 1: Photo of boulder with location of 15211. AS15-86-11558.

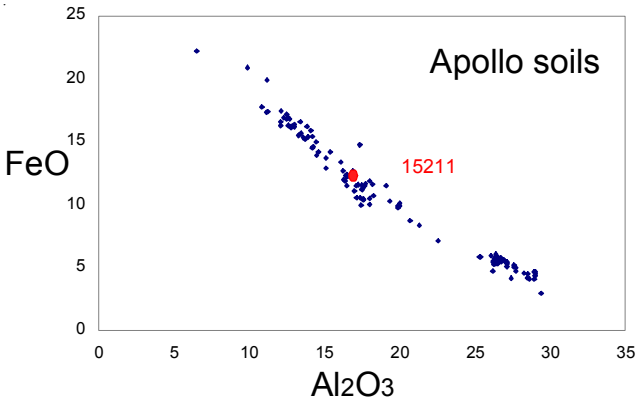


Figure 2: Chemical composition of 15211 compared with other Apollo soils.

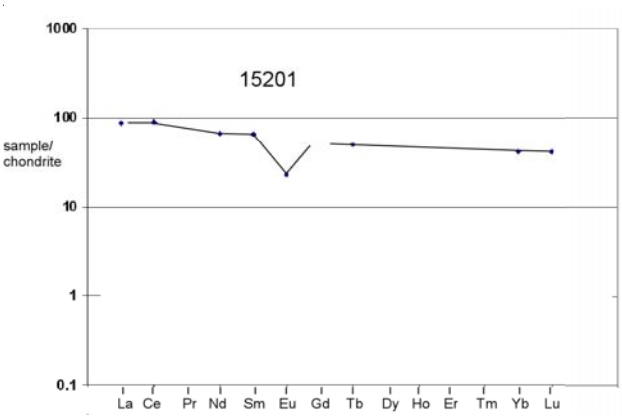


Figure 3: Normalized rare-earth-element diagram for 15211.

Introduction

These soil were collected adjacent to the small boulder at station 2, Apollo 15. 15205 and 15206 were chipped off of the boulder and when 15205 was picked up, some soil (19201) was placed in same bag. !5211 was collected as a "fillet" sample of the boulder (figure 1) (see section on 15220).

Petrography

The maturity (I_s/FeO) of 15201 is 68 and that of 15211 is 60 (Morris et al. 1978). The average grain size is 52 microns (figure 4).

Chemistry

The chemical composition of 15201 and 15211 is identical to that of the other soils at station 2, 15091, 15101, 15221 and 15231 (figures 2 and 3).

Cosmogenic isotopes and exposure ages

Rancitelli et al. (1972) determined the cosmic-ray-induced activity of 15211 as ^{22}Na = 64 dpm/kg, ^{26}Al = 152 dpm/kg, and ^{54}Mn = 12 dpm/kg. Keith et al. (1972) determined ^{22}Na = 59 dpm/kg, ^{26}Al = 139 dpm/kg, ^{54}Mn = 19 dpm/kg, ^{56}Co = 16 dpm/kg and ^{46}Sc = 3.4 dpm/kg.

Processing

15200 and 15210 were returned in a sealed ALSRC (#1).

Table 1. Chemical composition of 15201

reference	Korotev87	
weight		
SiO2 %		
TiO2	1.3	(a)
Al2O3	17.1	(a)
FeO	11.5	(a)
MnO	0.16	(a)
MgO	10.7	(a)
CaO	10.7	(a)
Na2O	0.42	(a)
K2O		
P2O5		
S %		
sum		
Sc ppm	22.1	(a)
V		
Cr	2410	(a)
Co	37.7	(a)
Ni	225	(a)
Cu		
Zn		
Ga		
Ge ppb		
As		
Se		
Rb		
Sr	140	
Y		
Zr	320	(a)
Nb		
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb		
In ppb		
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm	0.24	(a)
Ba	218	(a)
La	20.4	(a)
Ce	53	(a)
Pr		
Nd	30	(a)
Sm	0.48	(a)
Eu	1.27	(a)
Gd		
Tb	1.78	(a)
Dy		
Ho		
Er		
Tm		
Yb	6.6	(a)
Lu	0.99	(a)
Hf	7.6	(a)
Ta	0.9	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb	7.6	(a)
Pt ppb		
Au ppb	2.2	(a)
Th ppm	4.3	(a)
U ppm	0.86	(a)
technique:	*(a) INAA*	

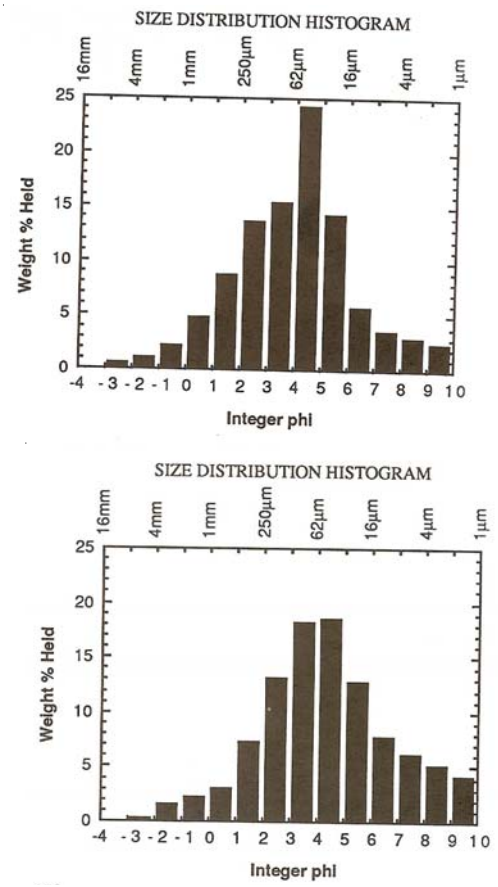
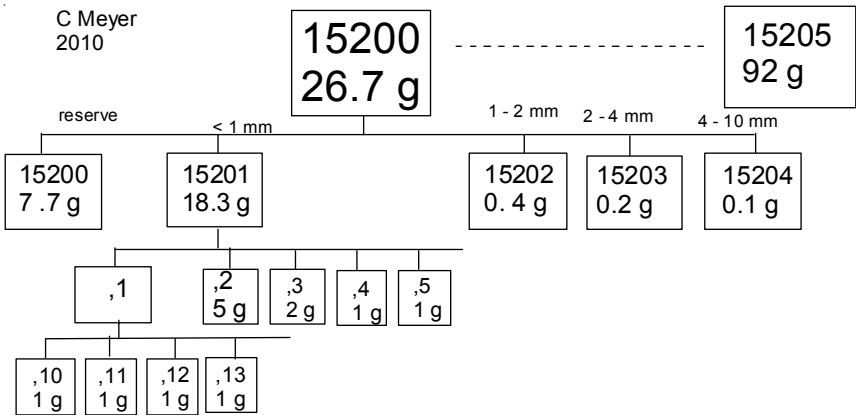


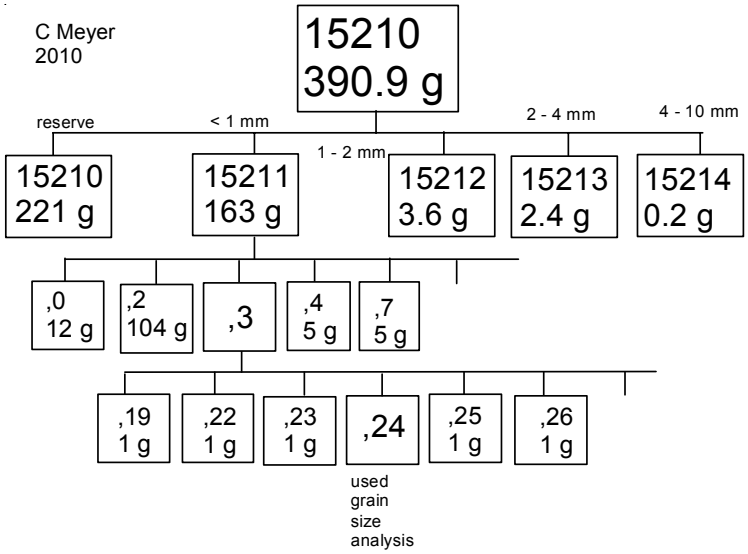
Figure 4: Grain size distribution of 15201 and 15211 (Graf 1993).

Table 2. Chemical composition of 15211.

reference	Cuttitta73		Fruchter73		Baedecker72		Wanke73		Baedecker73		Keith72		Rancitelli72	
weight														
SiO2 %	46.35	(a)					46.6	(b)						
TiO2	1.34	(a)	1.42	(b)			1.17	(b)						
Al2O3	17.73	(a)	17	(b)			17.24	(b)						
FeO	11.66	(a)	11.96	(b)			11.55	(b)						
MnO	0.16	(a)					0.15	(b)						
MgO	10.48	(a)					10.76	(b)						
CaO	11.68	(a)					11.2	(b)						
Na2O	0.44	(a)	0.425				0.43	(b)						
K2O	0.19	(a)					0.17	(b)			0.18	(d)	0.17	(d)
P2O5	0.19	(a)												
S %														
sum														
Sc ppm	22	(a)	23	(b)			21.1	(b)						
V	80	(a)												
Cr	1574	(a)	2170	(b)			2070	(b)						
Co	50	(a)	37	(b)			37	(b)						
Ni	325	(a)			240	(c)	290	(b)	262	(c)				
Cu	7.5	(a)												
Zn	16	(a)			16	(c)			15.1	(c)				
Ga	3	(a)			4.4	(c)			4.4	(c)				
Ge ppb					420	(c)			420	(c)				
As														
Se														
Rb	5	(a)												
Sr	150	(a)												
Y	83	(a)												
Zr	270	(a)	240	(b)										
Nb	14	(a)												
Mo														
Ru														
Rh														
Pd ppb														
Ag ppb														
Cd ppb					46	(c)			46	(c)				
In ppb					3.2	(c)			3.1	(c)				
Sn ppb														
Sb ppb														
Te ppb														
Cs ppm														
Ba	315	(a)												
La	32	(a)	25	(b)			22	(b)						
Ce			55	(b)			52	(b)						
Pr														
Nd							36	(b)						
Sm			10.4	(b)			10.1	(b)						
Eu			1.43	(b)			1.33	(b)						
Gd														
Tb			1.9	(b)			2	(b)						
Dy							14.6	(b)						
Ho							3.2	(b)						
Er														
Tm														
Yb	7.7	(a)	7.1	(b)			7.2	(b)						
Lu			1.12	(b)			0.93	(b)						
Hf			7.2	(b)			7.2	(b)						
Ta			1.3	(b)			0.97	(b)						
W ppb														
Re ppb														
Os ppb														
Ir ppb					8.2	(c)			8.2	(c)				
Pt ppb														
Au ppb									3.3	(c)				
Th ppm											3.75	(d)	3.95	(d)
U ppm											0.98	(d)	1.02	(d)

technique: (a) "microchemical" and OES, (b) INAA, (c) RNAA, (d) radiation count.


C Meyer
2010
15200
26.7 g
15205
92 g
reserve
< 1 mm
1 - 2 mm
2 - 4 mm
4 - 10 mm
15200
7 .7 g
15201
18.3 g
15202
0. 4 g
15203
0.2 g
15204
0.1 g
,1
,2
5 g
,3
2 g
,4
1 g
,5
1 g
,10
1 g
,11
1 g
,12
1 g
,13
1 g


C Meyer
2010
15210
390.9 g
reserve
< 1 mm
1 - 2 mm
2 - 4 mm
4 - 10 mm
15210
221 g
15211
163 g
15212
3.6 g
15213
2.4 g
15214
0.2 g
,0
12 g
,2
104 g
,3
,4
5 g
,7
5 g
,19
1 g
,22
1 g
,23
1 g
,24
,25
1 g
,26
1 g
used
grain
size
analysis

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