72221

Partially Shaded Soil – 388 grams

72241 – 322 grams

72261 – 279 grams

Reference Soils

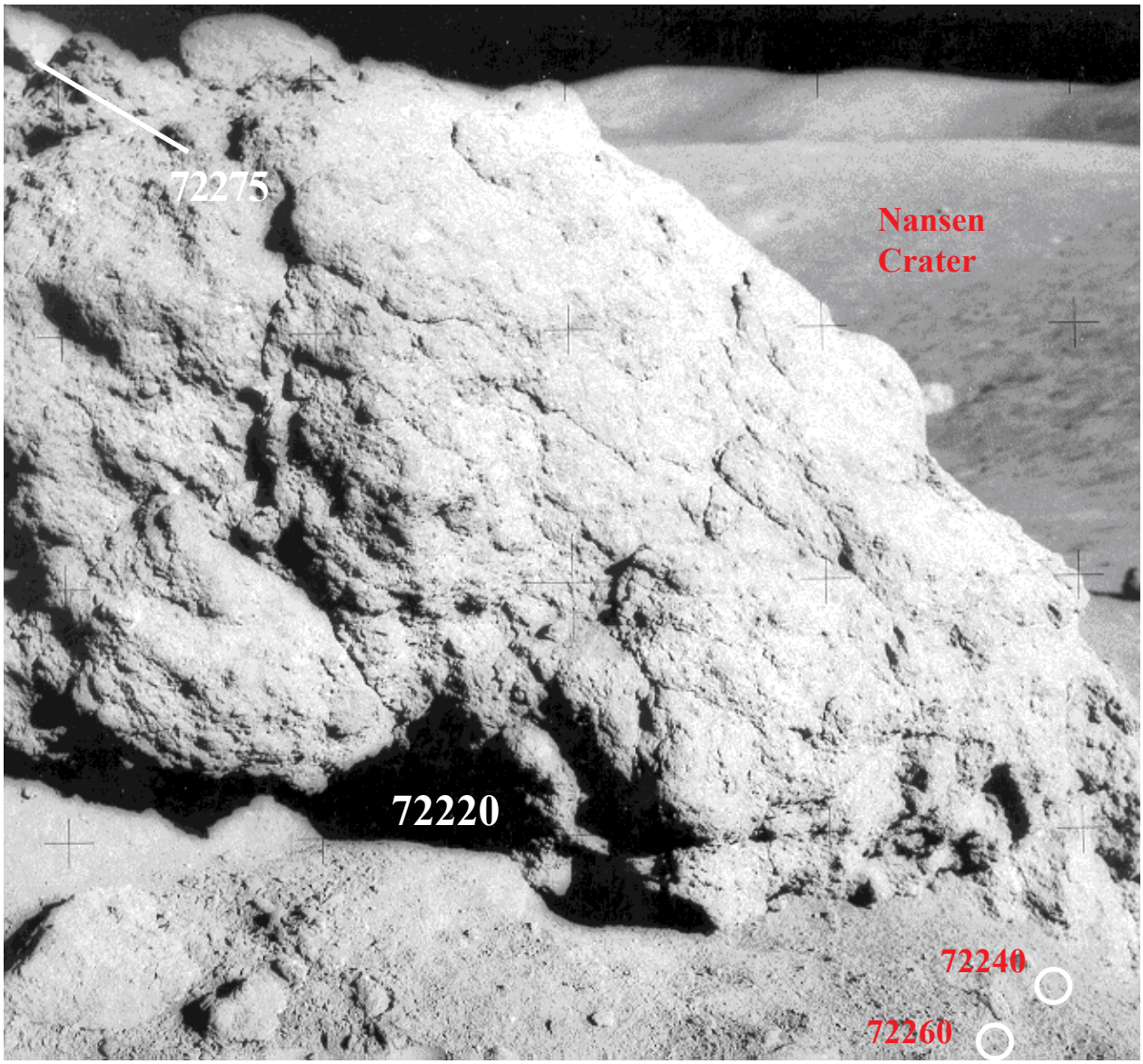

Figure 1: Boulder 1, station 2, Apollo 17. Lunar soil sample 72220 was collected from shadow on east side of boulder, while soils 72240 and 72260 were collected from sunlit "fillet" of boulder. AS17-138-21031.

Introduction

72221 was collected in the shade under boulder #1, at station 2, Apollo 17 (figure 1). 72241 and 72261 were collected as nearby reference samples. 72241 is from the "fillet" of the boulder and 72261 is a "skim" sample from the top 1 cm (see also sections on 72215, 72235, 72255 and 72275, which are samples of the rather friable boulder). The boulder is probably part of the landslide off of the South Massif (Wolfe et al. 1981).

These soils are probably fillet material from the adjacent boulder, as is evident from the high rare earth element and Th concentration.

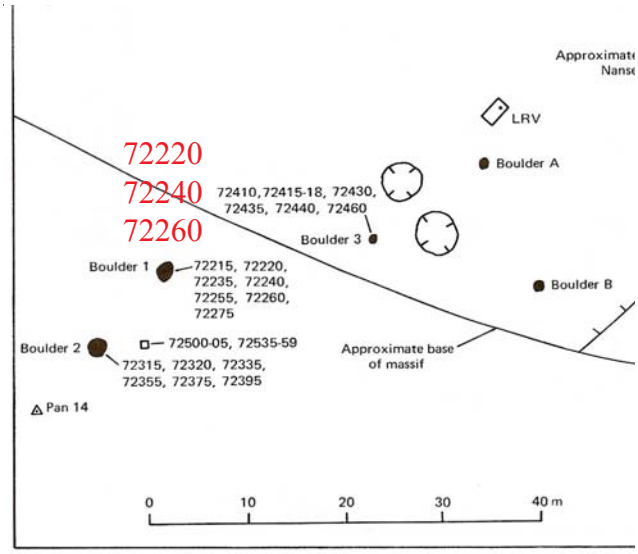

Figure 2: Map for station 2, Apollo 17.

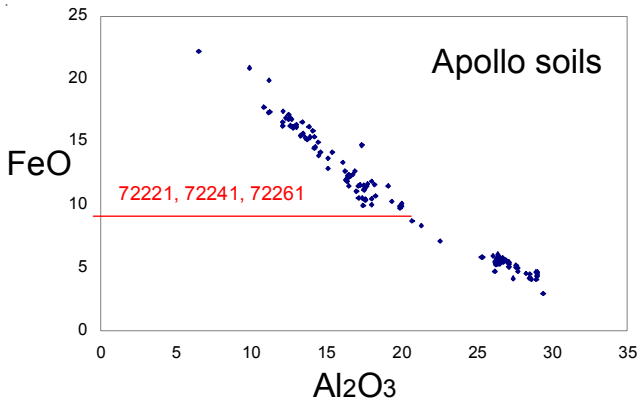

Figure 3: FeO content of 72221 compared with other lunar soils.

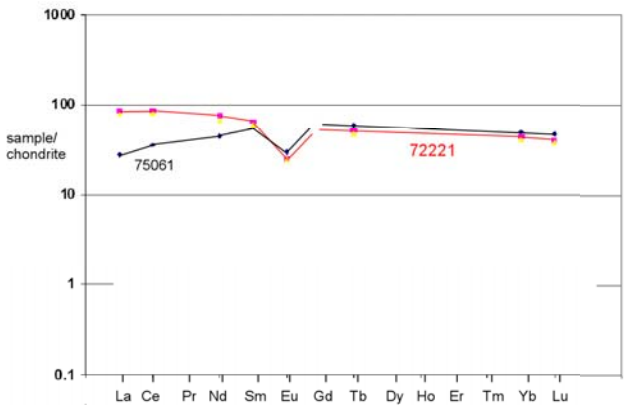

Figure 4: Normalized rare-earth-element diagram for 72221 - compared with mare soil 75061.

Petrography

Morris (1978) determined the maturity index (I_s/FeO) of 72221 and 72261 as 58 and 59, respectively. The maturity of 72241 is I_s/FeO = 64 and the average grain size is 63 microns (Morris 1978, Graf 1993).

Meyer (1973) cataloged the 4 – 10 mm coarse fines, but nobody seems to have performed the obligatory modal minerlology.

Chemistry

These three soils are from the debris that falls off of the boulder (fillet), perhaps mixed with a bit of soil that was present before the boulder was placed. The FeO content is similar to the other landslide soils (72501 etc). Figure 4 compares the rare earth content with mare materials.

Cosmogenic isotopes and exposure ages

Keith et al. (1974) determined the cosmic-ray-induced activity of ^{22}Na = 63 and 143 dpm/kg, ^{26}Al = 132 and 187 dpm/kg, ^{46}Sc = 5 and 11 dpm/kg, ^{54}Mn = 48 and 78 dpm/kg and ^{56}Co = <200 and 130 dpm/kg.

Other Studies

Wieler et al. (1980, 1983) studied the rare gas content and isotopic ratio of mineral separates for 72261.

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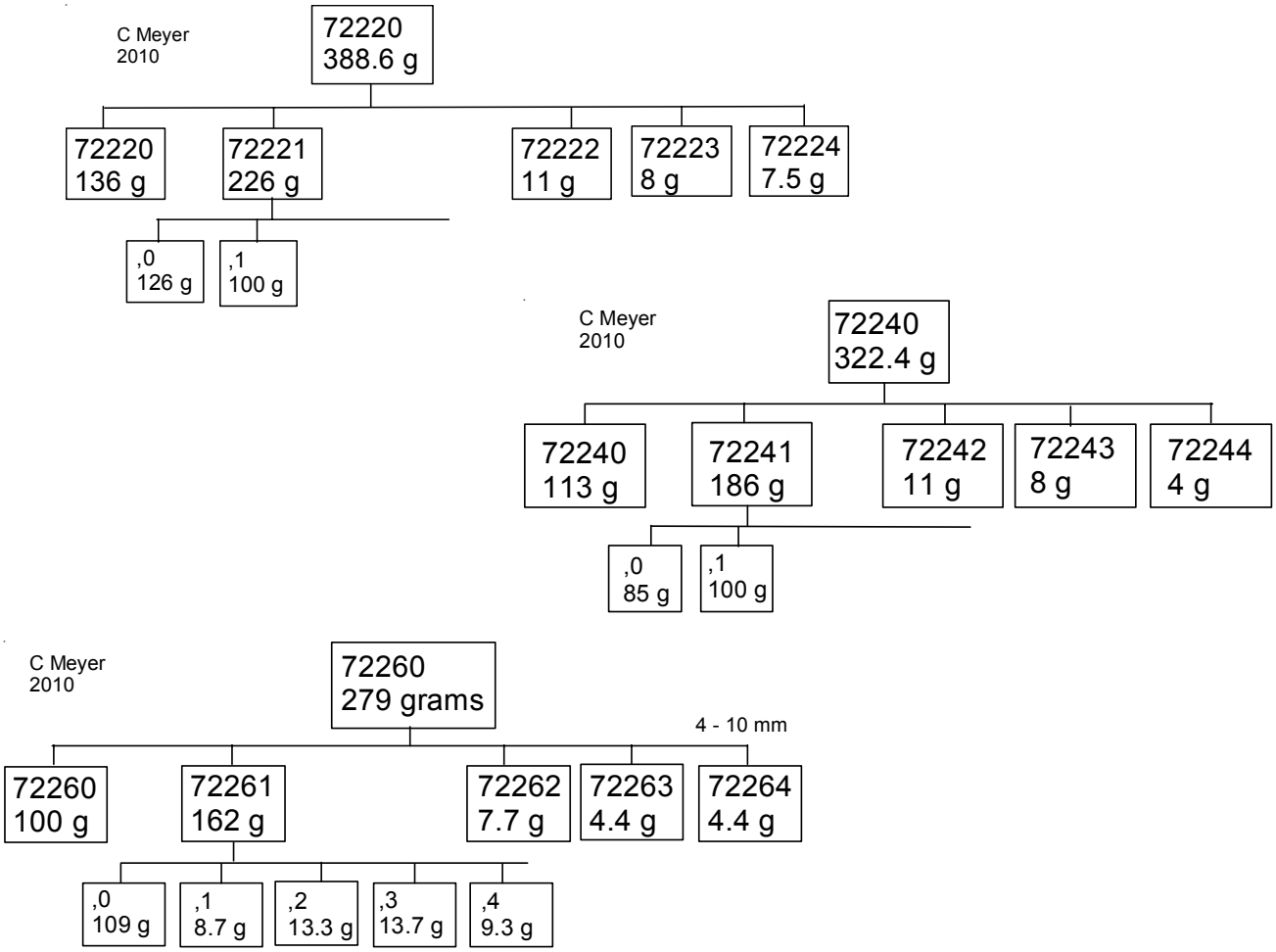
Table 1. Composition of 72221, 72241 and 72261.

	72221			72221		72241			72241		72261		
reference	Korotev92			Keith74		Korotev92			Keith74		Korotev92		
weight													
SiO2 %													
TiO2													
Al2O3													
FeO	8.89	8.68	(a)			8.84	8.59	(a)			8.55	8.24	(a)
MnO													
MgO													
CaO													
Na2O	0.463	0.456	(a)			0.472	0.466	(a)			0.451	0.427	(a)
K2O				0.17	(b)				0.173	(b)			
P2O5													
S %													
sum													
Sc ppm	21	18.9	(a)			19.7	19	(a)			18.9	17.8	(a)
V													
Cr	1730	1540	(a)			1620	1610	(a)			1560	1490	(a)
Co	28.9	30.8	(a)			27.5	26.2	(a)			29.5	27.6	(a)
Ni	237	289	(a)			214	212	(a)			277	252	(a)
Cu													
Zn													
Ga													
Ge ppb													
As													
Se													
Rb													
Sr	152	142	(a)			161	200	(a)			167	165	(a)
Y													
Zr	250	260	(a)			310	250	(a)			290	270	(a)
Nb													
Mo													
Ru													
Rh													
Pd ppb													
Ag ppb													
Cd ppb													
In ppb													
Sn ppb													
Sb ppb													
Te ppb													
Cs ppm													
Ba	204	200	(a)			224	208	(a)			239	195	(a)
La	18	17.8	(a)			19.7	19	(a)			19	18.8	(a)
Ce	47.4	45.8	(a)			51.5	49.6	(a)			50.1	49.4	(a)
Pr													
Nd	31	27	(a)			34	30	(a)			31	30	(a)
Sm	8.73	8.51	(a)			9.36	9.04	(a)			9.19	8.76	(a)
Eu	1.34	1.32	(a)			1.38	1.35	(a)			1.33	1.29	(a)
Gd													
Tb	1.72	1.63	(a)			1.87	1.74	(a)			1.76	1.7	(a)
Dy													
Ho													
Er													
Tm													
Yb	6.56	6.21	(a)			7.05	6.61	(a)			6.67	6.4	(a)
Lu	0.912	0.855	(a)			0.963	0.931	(a)			0.9	0.871	(a)
Hf	6.76	6.75	(a)			7.66	7.1	(a)			6.65	6.9	(a)
Ta	0.86	0.89	(a)			0.89	0.83	(a)			0.84	0.83	(a)
W ppb													
Re ppb													
Os ppb													
Ir ppb	8	9	(a)			5.7	5.5	(a)			9.2	9	(a)
Pt ppb													
Au ppb	3.6	3.2	(a)			2.8	2.9	(a)			3.6	2.6	(a)
Th ppm	3.6	3.25	(a)	3.6	(b)	3.2	3.36	(a)	3.6	(b)	3.2	3.04	(a)
U ppm	0.79	0.84	(a)	0.89	(b)	0.84	1	(a)	0.94	(b)	0.81	0.59	(a)

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



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