76565

Dark Matrix Regolith Breccia
11.6 g, 2.5 x 2.5 x 2 cm

INTRODUCTION

Fruland (1983) included 76565 in the suite of soil breccias to be studied by the Regolith Initiative, and it has been studied in detail by Simon et al. ('1990). Warren et al. (1983) found the small white clast to be nonpristine.

PETROGRAPHY

Sample 76565 is a dark matrix regolith breccia (Fig. 1) with a high percentage of mineral fragments (Simon et al., 1990) (Table 1). It has a brown glass matrix (Fig. 2) and has been termed a "vitric matrix breccia" by Simonds et al. (1975). It contains orange glass beads and mare basalt fragments. It also contains fragments of feldspathic materials from the highlands (Figs. 1 and 2).

WHOLE-ROCK CHEMISTRY

The rare earth element composition of the dark matrix part of 76565 is identical to the Station 6 soil, 76501 (Fig. 3). The composition has been reported by Simonds and Warner (1981) and by Simon et al. (1990) (Table 2). It has a relatively high Ti content for talus from the North Massif, indicating lateral transport for the adjacent mare surface. Simonds et al. (1975) speculate that the vitric matrix breccias from the Station 6 soil may have come from small (less than 1 km across) craters that are within the Apollo 17 valley (e.g., SWP, Cochise, and Shorty).

SIGNIFICANT CLASTS

Warren et al. (1983) have studied the small white clast seen in Fig. 1 (estimated mass is ~150 mg). They

Figure 1: Sample 76565, showing a white clast studied by Warren. Scale bar is 1 mm. S73-19644.

conclude that it is a nonpristine "anorthositic, polymict, granulitic breccia." The relatively high Ir (20 ppb) and the Ni and Co content of the metal indicate meteoritic; contamination. It is about 70% plagioclase ($An_{2.6-97.3}$), with olivine ($Fo_{71.9-74.1}$), and with both high-Ca and low-Ca pyroxene (Fig. 4).

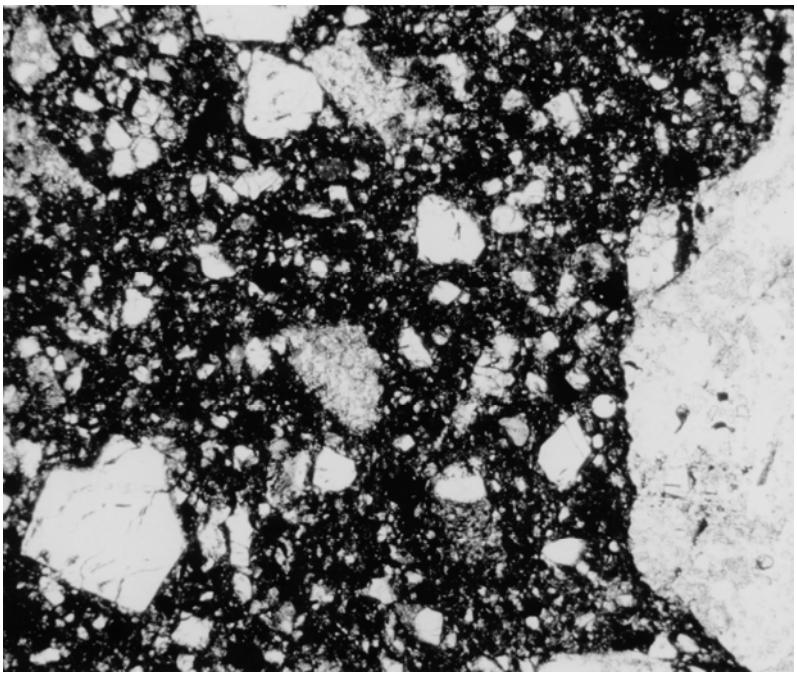

Figure 2: Photomicrograph of 76565,7, showing brown glass matrix and part of a clast of feldspathic highlands material. Field of view is 2 x 3 mm.

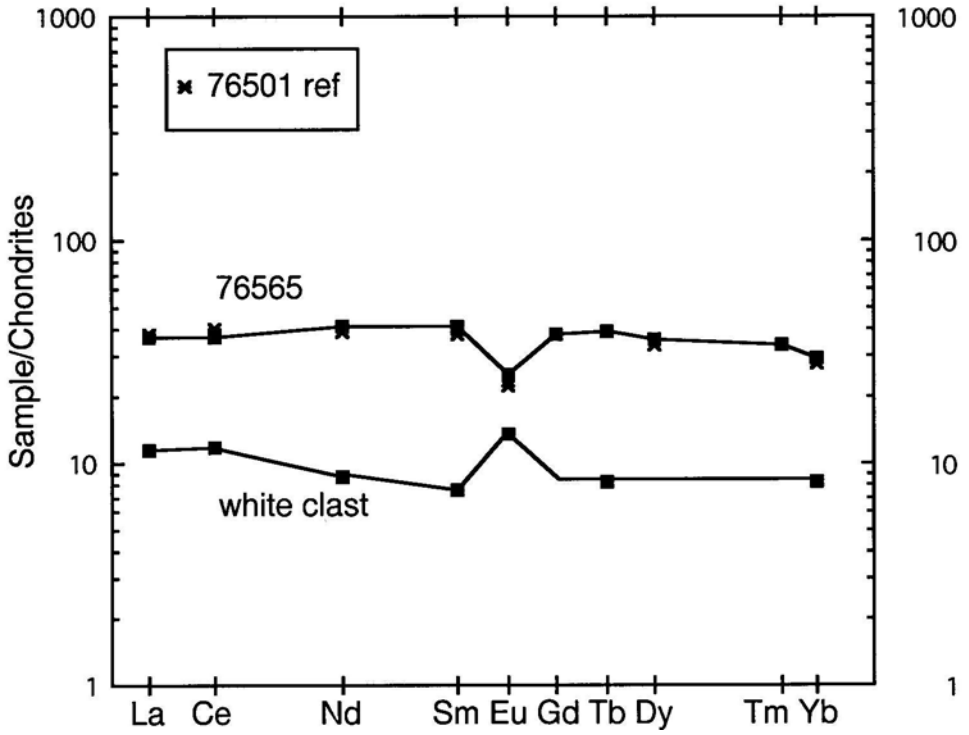

Figure 3: Normalized rare earth element diagram for 76565 and white clast in Fig. 1. The brown glass matrix has the same composition as 76501 soil.

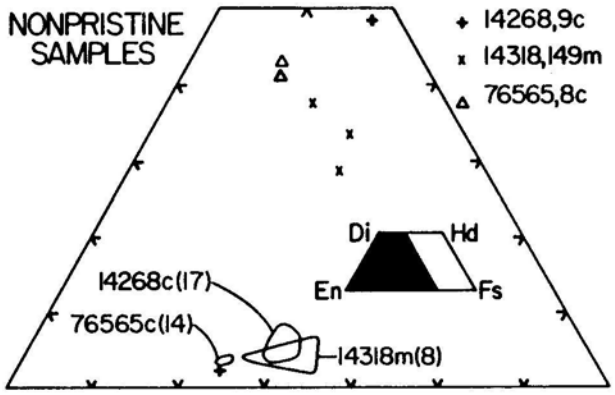

Figure 4: Pyroxene composition of 76565 white clast. From Warren et al. (1983).

Table 1: Mineralogical mode of brown glass matrix of 76565. From Simon et al. (1990).

	76565		78546		79035		79135		79175	
	S	L	S	L	S	L	S	L	S	L
Lithic Fragments										
Mare Component										
Mare Basalt	0.4	2.2	0.1	3.7	1.1	5.0	0.4	1.9	0.5	3.3
Highland Component										
Plutonic	0.5	2.5	0.1	1.8	0.1	0.1	0.1	0.6	0.3	3.0
Feld. Frag. Breccia	0.1	–	–	0.1	–	0.1	–	0.5	–	0.2
Feld. Basalt	–	–	–	0.1	–	–	0.1	–	–	–
Granulite/Poik.	0.5	1.9	0.2	0.5	–	–	0.2	0.6	0.1	0.2
Impact Melt	0.5	0.4	0.5	1.5	0.7	1.2	0.5	1.5	0.4	1.2
Fused Soil Component										
Regolith Brecc.	0.1	1.5	0.1	2.7	0.3	0.3	0.2	0.8	0.1	2.0
Agglutinate	1.6	1.5	0.7	3.5	5.0	8.6	0.9	5.0	0.6	4.0
Mineral Fragments										
Pyroxene	3.8	1.6	3.8	1.2	3.8	1.7	3.2	1.7	2.9	1.7
Olivine	2.4	1.0	1.4	0.4	0.8	0.4	0.9	0.5	0.6	0.3
Plagioclase	7.8	5.6	4.2	3.4	2.2	0.8	3.4	1.6	1.7	1.4
Opaque	1.5	0.3	0.8	–	1.7	0.2	1.9	0.3	1.5	0.6
Glass Fragments										
Orange/Black	1.1	–	2.5	0.5	1.1	–	2.7	0.7	0.7	0.3
Yellow/Green	0.6	0.6	1.5	0.4	0.8	0.4	1.2	1.1	0.2	0.1
Colorless	1.0	0.1	0.8	–	0.6	1.0	1.3	1.1	0.2	0.3
Brown	0.2	–	0.2	–	0.2	–	0.1	–	0.2	0.1
Miscellaneous										
Devit. Glass	1.7	1.2	3.7	6.8	2.2	1.4	3.0	2.7	2.0	3.1
Other	0.2	0.2	–	0.2	0.1	–	–	0.4	0.1	0.2
Total	24.0	20.6	20.6	26.8	20.7	21.2	20.1	21.0	12.1	22.0
Matrix	55.4		52.6		58.1		58.9		65.9	

Matrix = <20μm; S = small clasts (90 – 20μm); L = large clasts (1000 – 90μm); tr = trace.

Table 2: Whole-rock chemistry of 76565.

a) Simonds and Warner (1981); b) Simon et al. (1990); c) Warren et al. (1983)

**(Cautionary note: Some of these preliminary analyses were made by fused bead electron microprobe analyses, R. Brown, analyst.)*

Split Technique	,2 (a) EMP matrix	,13 (b) INAA matrix	,10 (c) INAA clast
SiO_2 (wt%)	43.94*	–	45.37
TiO_2	3.24*	4.57	0.25
Al_2O_3	18.59*	16.1	26.08
Cr_2O_3	0.27*	0.32	0.16
FeO	9.57*	12.4	5.66
MnO		0.16	0.08
MgO	10.22*	10.3	8.13
CaO	12.15*	12.0	14.56
Na_2O	0.49*	0.41	0.35
K_2O	0.12*	0.09	0.10
Nb (ppm)			
Zr		120	–
Hf		5.00	1.08
Ta		0.86	0.16
U		0.32	0.21
Th		1.12	0.72
Sr		160	
Rb		4.7	
Ba		105	62
Cs		0.14	0.22
Zn		35	9.4
Ni		130	420
Co		30	33.1
Sc		38.7	10.9
La		8.55	2.71
Ce		22.5	7.1
Nd		18.7	3.9
Sm		6.04	1.13
Eu		1.38	0.75
Gd		7.4	
Tb		1.4	0.3
Dy		8.7	1.91

Table 2: (Concluded).

Split Technique	,2 (a) EMP matrix	,13 (b) INAA matrix	,10 (c) INAA clast
Tm		0.81	
Yb		4.78	1.32
Lu		0.72	0.21
Ga			3.9
Ge (ppb)			0.15
Ir		4.5	20
Au		2.0	7.2