PETROGRAPHY OF CORE 15008 AND A COMPARISON TO CORE 15010/11.

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We have been investigating a recently opened and dissected core, 15008. This 23 cm core is the upper half of a double drive tube collected on the flanks of St. George Crater on the slopes of the Apennine Front.

A general description of the core is given in (1). This core is interesting for several reasons. It is the first opened Apollo 15 core from non-mare terrain and therefore can be closely compared to core 15010/11 from the mare regolith about 4 km distant. Core 15008 was taken near the rim of a fresh appearing 10 m crater and may include the contact between the ejecta blanket from the crater and the preexisting regolith surface (2). Finally, the core is in a geologically interesting location on the flanks of St. George Crater sloping off steeply from the Apennine Front directly into the rille. The core may consequently reflect some of the effects of the St. George event and also downslope movement from the Front into the rille.

In this abstract we report petrographic abundances of grains in the 90-150 μm grain size for six samples spaced down the core (Table 1). Mean grain size for these samples is also given. Companion abstract by (3) and (4) discuss the rare gas content of these samples, their major and trace element chemistry, and the FMR maturity profile of the core.

The data in Table 1 tell a rather surprising story of homogeneity over the length of 15008. With the exception of the uppermost sample the mean grain size is nearly identical among all six samples. The grain size of the uppermost sample is strongly influenced by an abundance of friable soil breccia fragments in the 1 mm - 10 mm size fractions (1). Variation of petrographic abundances for many of the components is no greater than statistical variation to be expected from counting a limited number of grains. Expected statistical variations for 320 grain samples range from ±0.6% (1 standard deviation) at the 1% abundance level to ±2.7% at the 40% abundance level. Comparison to the data in Table 1 shows that the only components significantly exceeding (2x) this variation are agglutinates and plagioclase grains. The other components are nearly homogeneous over the core length. Agglutinate variation is real but does not show any discernable systematic profile except that the two samples below 18 cm are highest. Bogard et al. (3) did not find a FMR reworking profile but did find slight systematic oscillations in the profile. Nagle (1) identifies a contact at 17.5 cm which he suggests may represent the contact underlying crater ejecta from the nearby 10 m crater. Our own data do not help decide whether this model is correct except that our agglutinates are more abundant below this depth, perhaps reflecting a buried surface of higher maturity. However, detailed stratigraphic interpretations must await the analysis of the lower core tube 15007 and of the continuous polished thin sections from the entire core.

A comparison with the mare-regolith core 15010/11 (Table 1) shows that mare-derived components are as expected considerably more abundant in 15010/11. Pyroxene is 65% higher in the mare core, the pyroxene/plagioclase ratio is 3 times higher, and the actual abundance of mare basalt is also 3 times higher. The St. George core has a significant mare component, however. The 4.1% mare basalt fragments make up nearly half of the total crystalline lithic fragments. Mixing model calculations by Laul and Papike (5) indicate that the Station 2 bulk soils have ∿25% mare basalt component.

KREEP basalt abundance is low in both terrains and is statistically identical between the two cores. This suggests that the source of KREEP basalts is somewhat distant and is not related to local geology. By contrast, green glass is 5 times more abundant at the St. George site. A similar enrichment is found at Station 6 on the Apennine Front compared to the mare stations (7). This abundance difference between the Front soils and mare soils is real and may be related to the location of the source area of the green glass. However, the difference could most easily be explained if the green glass (assumed to be volcanic ejecta) were older than the youngest mare basalts and were covered by them in the mare areas but left uncovered in the nearby highlands. Ropy glasses are equally abundant at both core locations, again suggesting distant sources unrelated to local geology. It has been previously proposed that ropy glasses are predominantly ejecta from large impacts (8).

References: (1) Nagle, J. S. (1980) Proc. Lunar Planet. Sci. Conf. 11th, p. 1479-1496. (2) Swann, G. A. et al. (1972) Apollo 15 Prelim. Sci. Report, NASA SP-289. (3) Bogard, D. D., Morris, R. V. and Lauer, H. V. (1980) This volume. (4) Blanchard, D. P. (1980) This volume. (5) Laul, J. C. and Papike, J. J. (1980) Proc. Lunar and Planet. Sci. Conf. 11th, p. 1307-1340. (6) Basu, A. and McKay, D. S. (1980) This volume. (7) Basu, A. and McKay, D. S. (1979) Proc. Lunar and Planet. Sci. Conf. 10th, p. 1413-1424. (8) Fruland, R. M., Morris, R. V., McKay, D. S. and Clanton, U. S.(1977) Proc. Lunar Sci. Conf. 8th, p. 3095-3111.

Table 1. PETROGRAPHIC ABUNDANCES OF PARTICLES IN THE 90-150 μm GRAIN SIZE FOR CORE 15008. CORE 15010/11 SHOWN FOR COMPARISON FROM REFERENCE (6).

SAMPLE	201	202	203	204	205	206	MEAN	15010/11
DEPTH (cm)	0.5-1	5-5.5	9-9.5	13.5-14	18-18.5	22-22.5	(6 SAMPLES)	(12 SAMPLES)
PLAGIOCLASE	16.9	16.2	12.5	21.1	12.1	10.3	14.9 ± 4.0	7.5 ± 2.3
PYROXENE	13.9	17.4	17.2	17.4	14.6	12.8	15.6 ± 2.0	25.7 ± 3.9
OLIVINE	2.4	0.6	1.3	1.6	1.2	2.2	1.6 ± 0.7	3.6 ± 1.8
MARE BASALT	5.0	4.0	4.6	2.8	2.5	5.9	4.1 ± 1.3	13.4 ± 3.6
KREEP BASALT	0.6	0.9	1.4	1.6	1.5	2.5	1.5 ± 0.7	0.9 ± 0.9
DARK MATRIX BRECCIA	11.8	9.0	4.7	5.6	8.4	7.8	7.9 ± 2.5	6.1 ± 3.5
LIGHT MATRIX BRECCIA	0.9	0.9	0.9	0.9	0.6	1.2	0.9 ± 0.2	0.2 ± 0.3
ANT+META+MELT BRECCIA	5.1	4.3	6.9	5.2	5.6	1.2	4.7 ± 1.9	0.9 ± 0.6
AGGLUTINATES	30.5	32.4	36.9	30.4	42.1	43.9	36.0 ± 5.9	30.1 ± 6.0
GREEN GLASS	3.6	5.0	3.1	5.3	3.4	3.7	4.0 ± 0.9	0.8 ± 0.6
ROPY GLASS	2.7	4.0	3.8	1.6	2.8	3.1	3.0 ± 0.9	3.0 ± 1.1
TOTAL GLASS	12.0	13.8	12.5	10.9	9.9	9.5	11.4 ± 1.6	8.9 ± 2.5
TOTAL GRAINS	331	321	320	322	323	321	1938	3798
MEAN GRAIN SIZE (μm)	128	62	61	62	61	58	72	94