

PETROLOGY AND PROVENANCE OF APOLLO 15 DRILL CORE 15010/011. Scott A. Griffiths<sup>1</sup>, Abhijit Basu<sup>1</sup>, David S. McKay<sup>2</sup>, Georgann Nace<sup>3</sup>, <sup>1</sup>Department of Geology, Indiana University, Bloomington, IN 47405; <sup>2</sup>NASA-JSC, Houston, TX 77058; <sup>3</sup>Lockheed Inc., Houston, TX 77058.

The Apollo 15 core 15010/011 (~60 cm deep) was collected at the edge of the Hadley Rille where the regolith is very thin apparently promoted by rapid transport of regolith into the rille (1). Grain size, petrology and their implication to regolith dynamics have been presented earlier (1). In this note we present the detailed modal analysis data (20-500  $\mu$ m size fraction) of the upper half of the core (Table 1); the data on the lower half are already published (1).

We have recalculated the modal data of crystalline lithic fragments and monomineralic fragments in the fashion of Basu et al. (2) to estimate the contributions of different source rocks to this core (15010/011). Needless to mention, we have combined the modal data of six size fractions (weighted according to grain size distributions) of the twelve samples from different levels of the core. In all, our data are based on the modal analysis of 20535 photographically documented particles. The results of the recalculation is given below together with those of the surface sample 15601 collected at the same site.

	Recalculated (%)		Source Rock Contribution (%)	
	15010/011	15601	15010/011	15601
ANT suite	0.3	0.5	1.7	2.7
KREEP basalt	0.8	0.9	4.9	4.8
Olivine basalt	10.7	12.5	65.0	66.8
Quartz-normative basalt	3.9	4.2	23.5	22.5
Crystalline breccias	0.8	0.6	4.9	3.2

The core also shows a depletion of monomineralic plagioclase (7.3% observed; 12.0% expected) in the size range of 20-500  $\mu$ m just as 15601 (5.9% observed; 14% expected) does (2).

The remarkable similarity in compositions of surface soil 15601 and the total core 15010/15011 from the edge of the Hadley Rille adds strong support to the conclusions reached by McKay et al. (1) that at this site regolith "is very dynamic and has a relatively high rate of both deposition and erosion". Surely, under such conditions slow accumulation leading to vertical compositional differentiation cannot occur.

REFERENCES: (1) McKay et al. (1980) PLPSC 11th, 1531-1550; (2) Basu et al. (1979) PLPSC 11th, 1727-1741.

Griffiths, S. A. et al.

Table 1.

DR# size (um) wt.1	246 500-250	245 250-150	209 150-90	210 90-45	211 75-45	212 45-20	15011,2109 1	248 500-250	247 250-150	233 150-90	215 90-75	215 45-20	15011,2110 1	250 500-250	24 250-150	217 150-90	218 90-75	219 45-20	220 15-45	15011,2111 1
Amorphous	18.3	30.9	37.6	42.0	38.2	30.2	37.4	14.1	32.2	37.5	48.7	42.2	41.2	9.7	38.6	41.5	33.2	41.7	46.4	77.4
Plagioclase	2.1	4.0	5.7	11.1	6.2	9.6	6.4	2.0	4.6	5.1	8.9	6.4	6.8	8.7	34.6	41.5	33.2	41.7	46.4	77.4
Pyroxene	13.5	23.8	29.5	28.4	28.5	35.7	27.4	8.7	23.1	28.7	34.1	44.3	30.8	6.5	26.2	28.3	26.9	28.5	22.1	67.9
Orthopyroxene	0.7	1.1	1.5	4.3	2.5	2.8	2.2	3.4	4.6	2.5	4.1	2.9	2.8	2.4	6.1	6.6	4.0	4.0	4.0	4.7
Other	0.3	0.3	0.3	1.3	0.5	0.5	0.5	1.3	1.3	1.3	1.0	0.6	0.8	0.6	0.3	0.3	0.3	0.3	0.6	0.1
Mineral, sulphide																				
Crystalline lithic	24.6	16.2	15.6	12.4	10.8	6.1	13.4	24.9	22.7	14.1	15.7	14.6	6.1	26.7	21.1	20.8	17.7	16.9	11.1	18.0
MP suite																				
Amorphous																				
Non basalt	(23.9)	(14.7)	(13.1)	(11.4)	(7.5)	(1.5)	(11.2)	(23.5)	(20.9)	(14.6)	(10.2)	(11.5)	(6.1)	(28.3)	(20.8)	(19.3)	(15.9)	(17.0)	(9.6)	(17.6)
Olivine bearing	(10.5)	(5.3)	(9.6)	(8.3)	(4.2)	(1.2)	(7.5)	(10.1)	(5.2)	(2.2)	(1.3)	(1.6)	(0.3)	(11.8)	(5.8)	(5.1)	(4.6)	(4.0)	(1.2)	(5.0)
Olivine-free																				
Perthitic, etc.	4.9	3.1	3.1	3.3	0.3	0.3	2.0	4.9	3.9	1.6	1.3	1.6	0.3	3.2	1.5	0.6	1.5	0.9	1.0	1.0
Ophtic, etc.	4.2	0.6	0.9				0.8	2.0	1.2					4.8	4.0	3.4	2.5	2.2	0.9	2.7
Other	2.8	5.2	5.3	7.3	4.9	2.9	6.5	0.7	6.5	4.5	5.1	6.4	4.3	0.9	0.3	0.3	0.6	0.5	0.3	0.9
Incomertal/granular	(0.7)	(0.3)	(0.6)		(1.0)		(0.5)	(0.7)		(0.3)	(1.0)	(0.6)		4.8	4.6	5.0	5.3	6.2	4.0	4.9
Polysiphic																				
Energy	0.7	0.3	0.6		1.0		0.5	0.7		0.3	1.0	0.6								
Plagioclase-phyric																				
Intermetallic																				
Breccia	10.6	9.2	4.4	4.8	4.0	4.5	6.4	9.4	4.6	7.9	6.1	5.4	4.8	14.9	4.9	3.1	6.4	1.5	4.6	5.4
Vitric	(10.6)	(8.6)	(4.1)	(4.5)	(7.4)	(4.5)	(6.4)	(7.4)	(4.0)	(7.6)	(5.3)	(5.1)	(6.3)							
Dark matrix	10.6	0.3	4.1	4.5	7.1	4.5	0.1	7.4	3.4	7.0	4.5	4.2	6.2	12.1	4.3	3.9	4.3	0.6	3.4	3.8
Crystalline																				
Polysiphic																				
Melt matrix																				
Melt matrix																				
Agglutinate	40.1	16.4	10.5	13.4	14.1	10.9	13.7	41.6	36.3	30.9	23.6	20.1	26.0	2.8	0.3	0.3	0.3	0.3	0.3	0.5
Glass	4.3	7.0	10.9	6.7	8.0	7.9	8.1	4.0	3.9	6.6	7.9	5.8	11.7	2.4	31.6	24.1	22.7	30.7	27.1	30.7
Basaltic glass (Vetrophyre)	1.4	2.8	2.5	1.9	1.3	0.6	1.9	1.3	0.6	2.2	0.9	1.6	0.3	0.8	2.7	2.3	3.1	2.5	5.6	3.1
Other glass	2.1	0.3	0.6	0.6	0.6	0.4	0.4	(1.3)	(0.3)	0.6	0.6	(1.0)	(1.2)	0.2	(0.3)	(0.6)	(0.3)			(0.3)
Other	0.7	0.3	0.6	0.3	0.3	1.9	0.2	1.3	0.3	1.5	0.3	1.0	1.2	0.8	0.3	0.6	0.3	0.3	0.3	0.1
Dextrified (cryptocrystalline)	(2.1)	1.2	2.8	1.3	2.9	1.9	1.9	(2.7)	(2.1)	1.5	(3.8)	1.3	2.8	0.8	1.2	2.2	2.8	2.2	0.9	1.6
Cracks or clast free																				
Yellow	1.4	0.9	1.3	1.0	1.1	3.5	1.4	2.7	1.2	0.3	2.2	0.3	0.6	0.8	1.5	0.6	0.6	0.6	1.2	0.9
Grey, calcareous																				
Mineral, black, etc.	0.7	0.3	0.4	0.4	0.4	0.1	0.1	1.9	0.9	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.6	1.2	0.3
No. of particles	142	324	318	314	308	311	1737	149	325	314	314	323	1739	324	328	320	323	323	321	1729

