COMPOSITIONS OF GLASS FRAGMENTS IN APOLLO 16 REGOLITH BRECCIAS;
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A chronologic order has been established for ancient regolith breccias from the Apollo 16 site based on 40Ar/36Ar ratios corrected for in situ decay of potassium (1). Analyses of rock and glass clasts in the breccias can take advantage of this chronology to help determine the sequence of rock-forming events on the moon. For example, records of three distinct melt sheets present at the Apollo 16 site with ages greater than 3.85 Gy may be recorded in these breccias (2). Clasts in breccias of these ages and older would be expected to show compositions reflecting the lithologies of these melt sheets, whereas those in younger breccias might show compositional trends indicative of the extensive mare basalt flooding that took place after 3.9 Gy. To determine whether such compositional differences can be noted, we have begun by analyzing compositions of glass fragments in the regolithic matrices of these breccias. The glass composition may be representative of a parent lithology. Because the target area may always be a mix of two or more lithologies, an impact glass fragment with the maximum content of a characteristic element will come closest to representing a single parent lithology. For example, the glass fragment with the highest Ti content will most closely represent a Ti-rich mare basalt lithology.

The ten samples thus far analyzed with an electron microprobe are breccias 63595,3; 60019,81; 61195,37; 61195,55; 66036,5; 66035,2; 66075,58; 66075,61; 60016,92; and 61135,35. A total of 993 analyses have been done for Na, Mg, Al, Si, K, Ca, Ti, Cr, Mn, and Fe. Table 1 shows the maximum content of four of these elements in glass fragments in each breccia, along with their 40Ar/36Ar ratios (1).

Both FeO and TiO2 content show a sharp increase for breccias with a 40Ar/36Ar ratio of less than 10 (age less than approximately 3.7 Gy; fig. 1, 2). This increase reflects the presence of impact melts of mare basalt fragments in these younger breccias because mare basalts are enriched in Fe and Ti with respect to highland rocks. Maximum K20 content also increases with decreasing 40Ar/36Ar ratios (fig. 3), indicating the possible presence of a KREEP component in the breccias. Maximum Cr2O3 content, on the other hand, shows a decrease with decreasing 40Ar/36Ar ratios (fig. 4). Because the mare basalts as well as KREEP basalts are generally somewhat enriched in Cr with respect to highland rocks, this trend poses some problems. Maximum contents of FeO, TiO2 and K20 in glass clasts are higher in younger breccias, as would be expected for regolith to which mare basalt and KREEP components had been added. Cr2O3 would normally be expected to follow the same trend. The reasons for its decrease are not yet clear.

As additional electronprobe analyses are done on glass and lithic fragments in breccias of lower 40Ar/36Ar ratio, it may be possible to infer a sequence of lunar events in this region. Analyses for rare-earth elements and phosphorus in these clasts may have to be performed to find the carrier of the KREEP component.

REFERENCES : (1) McKay, D.S. et al. (1986) PLPSC 16, D277-D303. (2) McKinley, J.P. et al. (1982) LPSci. XIII, 497-498.

GLASS FRAGMENTS IN A-16 REGOLITH BRECCIAS

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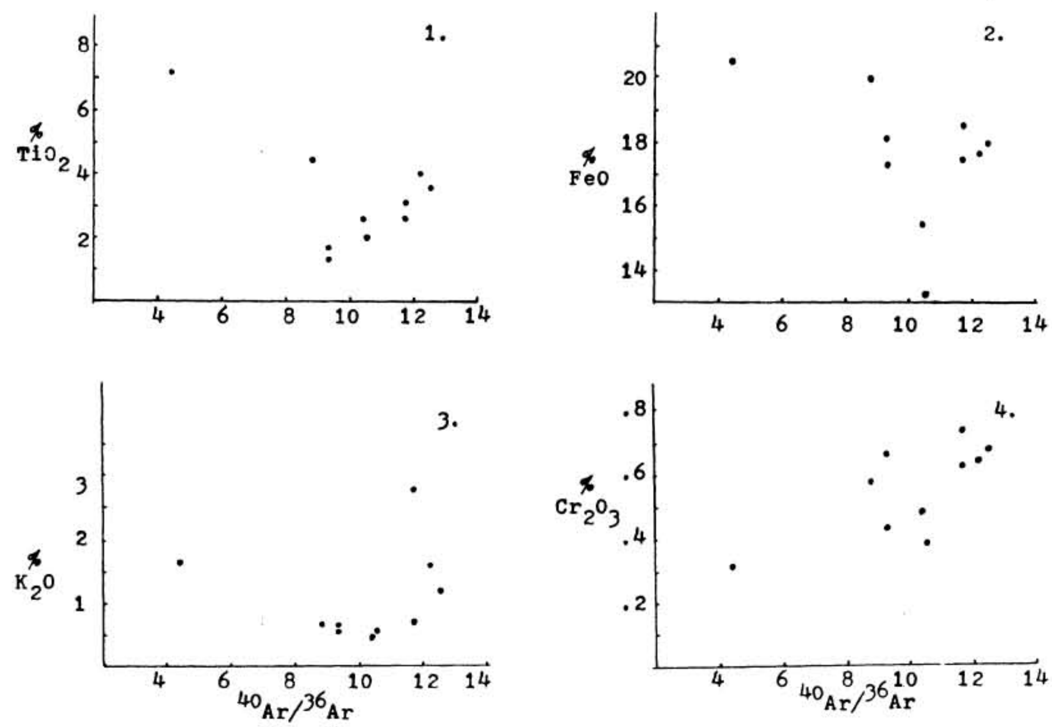
Breccia	$^{40}Ar/^{36}Ar$	TiO_2	FeO	K_2O	Cr_2O_3
63595,3	4.4	7.23	20.53	1.65	.32
60019,81	8.8	4.49	20.00	.65	.57
61195,37	9.3	1.36	18.14	.61	.66
61195,55	9.3	1.73	17.34	.57	.43
66036,5	10.4	2.58	15.48	.48	.59
66035,2	10.5	2.02	13.21	.57	.38
66075,58	11.7	3.11	17.49	2.77	.62
66075,61	11.7	2.64	18.54	.69	.73
60016,92	12.2	4.00	17.70	1.59	.64
61135,35	12.5	3.59	18.00	1.18	.67

Table 1. Maximum Elemental Contents Expressed As Percent Oxides



Figures 1-4. Maximum Element Content vs. $^{40}Ar/^{36}Ar$ Ratio