PETROLOGY OF LUNAR CORE 15007/8. D.S. McKay, SN6-NASA JSC, Houston, TX 77058 and A. Basu, Indiana Univ., Bloomington, IN 47405

Introduction. Core 15007/8 is a 57 cm long section collected from the flanks of St. George Crater on the slopes of the Apennine Front. This core is the first non-mare core studied from the Apollo 15 site. We have previously discussed some of the features of the upper section (15008) of this core {1}. Rare gas and ferromagnetic data are also available for the upper section {2} and the FMR profile of the entire core is given in {3}.

We have now completed petrographic modal analysis of the 90-150 micrometer grain size fraction for 13 representative sieved samples spaced over the entire depth of the core.

General Description. Components in the core consist of (a) mineral fragments (mainly plagioclase and pyroxene), (b) lithic fragments including mare basalt, KREEP basalt, and a variety of highland rocks, mostly breccias, (c) glass fragments including particularly homogeneous green glass interpreted to be pyroclastic, and (d) agglutinates. In contrast to the upper section of the core (15008) which is relatively homogeneous {1}, the lower section shows considerable variation for a number of these components, some of which are shown in Figure 1.

KREEP Basalt. KREEP basalt shows a reasonably systematic increase toward the bottom where the abundance of these fragments is nearly four times that at the top of the core. A similar increase in KREEP was also noted toward the bottom of the deep drill core {4} and also in core 15010/11 {5}. The significance of this systematic increase of KREEP basalt with depth is not clear. It may support the argument that actual KREEP basalt flows exist below or interlayered with the mare basalt flows {6}. Such KREEP flows would be expected to contribute proportionally more to early regolith formation and less to later regolith formation as a regolith buffer layer is built up retarding crater penetration to the KREEP layers. Alternatively the core data are also in accordance with the hypothesis that the whole area was covered by ray ejecta from a distant crater {7}. What these core data do say is that KREEP at the Apollo 15 site is not confined to either the mare regolith or the Front regolith; the abundance levels are similar in both.

Mare Basalt. The abundance of mare basalt decreases with depth by about a factor of 3 (Fig. 1). This may simply reflect more complete mixing at the mare-highland boundary over time. This variation of mare basalt with depth adds an important third dimension which must be considered in any mixing models concerned with the mare-highland boundary transition.

Green Glass. Green glass content remains constant throughout most of the core but jumps dramatically between 50 and 55 cm (Fig. 1). Nagle {8} reported that this interval contains a number of friable clasts of green glass droplets. The abundance of green glass in this core from Station 2 shows that green glass is not just concentrated around Station 7 and Spur Crater but is present in high concentrations at other locations along the front.

Plagioclase/Pyroxene Ratio. This ratio is a fair indicator of over all chemical composition. It increases slightly toward the bottom of the core (Fig. 1) suggesting a more aluminous composition. A similar slight increase exists in the abundance of total highland lithic fragments (normalized to an agglutinate-free basis) toward the bottom of the core. The bottommost sample contains the highest ratio of highland lithics to mare basalt fragments, the lowest conntent of mare basalt, and nearly the highest plagioclase/pyroxene ratio. This sample is shown by {3} to be lowest in total iron content and may be the most "pure" sample of highland soil in the core and possibly the entire Apollo 15 collection {3}.

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Maturity and Stratigraphy. In general, the agglutinate profile for this core is similar to the FMR profile of {3}. Based on agglutinate content the core soils are generally submature down to about 49 cm, below which they are immature. The two samples at 18 and 22 cm are mature on the agglutinate scale but submature on the FMR scale {3}. The pronounced decrease in maturity near the bottom, the green glass-rich level, and the more felsic composition of the bottommost sample are the most distinctive stratigraphic features of this core. Detailed geologic interpretation must await rare gas data on exposure ages of these core soils and selected core clasts. These data are currently being collected by D. Bogard at JSC.

References.

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FIG. 1