STUDY OF MINERAL, LITHIC AND GLASS CLASTS
<1mm SIZE IN APOLLO 16 CORE SECTION 60003

Henry O.A. Meyer, and Robert H. McCallister, Dept. of Geo-
siences, Purdue University, West Lafayette, IN 47907.

We have previously characterized the mineralogy and
petrology of the <1mm fines from several horizons in the
Apollo 16 drill string core sections 60002 and 60004 (1,2).
In general, it was observed that all samples showed a binodal
distribution in grain size that was in part due to the pre-
sence of agglutinates in the >86μm size fraction. The lithic
and mineral clasts were all of fairly restricted compositions
and could generally be assigned to a non-mare origin. In
contrast, glass fragments in these core samples exhibited a
wide range of compositions. Highland basalt glass (3) was
predominant but two new and distinct glass compositions were
observed (4).

We are continuing these detailed petrographic and mineral-
ologic studies on samples from the Apollo 16 drill core by inves-
tigating the variation in composition of mineral, lithic and
glass clasts as a function of grain size and depth for the
core section 60003. From this core section we have 30 samples
spaced at irregular intervals throughout the total 39cms
of core length. In order for these studies of the 60003 samples
to be comparable with our previous results on the 60002 and
60004 sections we have confined our examination to material
between 1mm and 125μm in size. The material in this range
contains the highest percentage of lithic clasts recognizable
as specific rock types in the <1mm fines. Below this range
(i.e. <125μm) the number of lithic fragments decreases and
mineral clasts become increasingly important.

As is the case with the 60002 and 60004 samples (2)
feldspar (An88-An86) is the major mineral clast with ortho-
pyroxene, clinopyroxene and olivine being subordinate. Unfor-
tunately, the predominance of plagioclase feldspar and the
restricted chemical range of the silicates in general, negate
the use of mineral clasts to characterize horizons in the cores.
The use of lithic clasts, glasses and possibly abundance of
agglutinates may prove more useful as indicators of specific
horizons, although the lateral extent of any given horizon in
the regolith is probably fairly limited.

In samples from the 60003 core metallic and opaque minerals
are fairly rare. Most of these phases when present occur as
constituent particles either in agglutinates or lithic clasts.
Ilmenite, ulvospinel, troilite, metallic iron and possibly
tranquillityite have all been observed. A detailed mineralogical and chemical study of these opaque phases throughout all 30 samples of the 60003 core section is underway in order to provide data with which to compare the results of investigations of natural remnant magnetism and other physical measurements.

In contrast to the samples studied in the 60002 and 60004 core sections the clasts of igneous origin are much less common in the 60003 material. Most abundant among the lithic clasts in 60003 are breccias showing various degrees of metamorphic recrystallization. As in the case of the mineral clasts feldspar is the most common constituent of the lithic clasts followed by orthopyroxene, clinopyroxene and olivine in order of decreasing abundance. Up to the present we have not found any rock fragments that can be directly attributed to a mare origin, although Delano (5) has reported a number of mare basalt fragments in the 60003 core.

Of particular significance in the samples so far studied is the paucity of glass particles in the 1mm-125μm size range. This contrasts markedly with their relative abundance in the 60002 and 60004 core sections. However, at this time the result may be an artifact of samples studied because even within the other two core sections considerable variation in number and type of glass fragments was found (4).

In summary, from the evidence currently available it is obvious that most of the material in the regolith between 80 and 190cms depth is composed of similar mineral (plagioclase >An40, pyroxene, olivine) and lithic clasts which are almost exclusively of Highlands origin. Glasses fluctuate in abundance and type and though of predominantly Highlands origin do show instances of a possible mare component.

References