

PARTICLE TRACKS IN LUNAR CORE 15010. George E. Blanford, Julianne Blanford and James A. Hawkins. University of Houston at Clear Lake City, Houston, TX 77573.

As part of a coordinated effort to study lunar core soils we have been measuring particle tracks in samples from the Apollo 15 double drive tube 15010. Measurements of grain size distributions, modal petrography, agglutinate contents, ferromagnetic resonance intensities, noble gas contents and neutron activation chemistry appear elsewhere in this volume (1, 2, 3, 4, 5).

We have followed our usual procedure of etching polished grain mounts in 1N NaOH at $\sim 118^\circ\text{C}$ for 6 h and observing the samples with a scanning electron microscope. We intend to report track densities on plagioclase, pyroxene and olivine minerals for many of these samples. As of completion of this etching sequence, however, tracks are large enough to count only in plagioclase and olivine. Track density distributions and the percentage of high density grains ($\geq 10^9\text{ cm}^{-2}$) are shown in Fig. 1. Our conclusion about these samples based on previous work is that all of the samples appear to be very mature. It is difficult to reconcile this conclusion with measurements of the ferromagnetic resonance index ($I_S\text{FeO}$) and agglutinate contents which indicate that these soils are immature to submature. It is very important to measure the results in pyroxenes to determine whether or not there are sufficient low density pyroxenes to conclude that the soils have lower maturity according to track density standards. Approximately 30% of the plagioclases we have measured in one sample are in rock fragments containing pyroxene. Consequently a large fraction of monomineralic pyroxenes ($\sim 50\%$) will have to have low track densities to significantly change track density distributions. Track densities in olivine indicate that there may be low density pyroxene grains, but not enough to alter the conclusion that the soils appear to be mature.

Comparison of the fraction of high track density grains to the ferromagnetic resonance index $I_S\text{FeO}$ is very similar to results of Blanford and Wood (6) in Luna 24 samples. Figure 2 shows a correlation plot between $I_S\text{FeO}$ for Apollo 16 soils, Luna 24 soils and the Apollo 15 soils reported here. Unless pyroxene results alter the fraction of high density grains then clearly the correlation line for Apollo 16 data does not apply to data taken at mare sites. There must be a physical reason for the difference. Low values for $I_S\text{FeO}$ and agglutinate contents clearly indicate that the regolith at both the Luna 24 site and for this Apollo 15 core was not subject to extensive meteoritic reworking. But high track densities and high spallation gas contents indicate high levels of exposure to ionizing particles. This is not hard to reconcile for noble gas contents because these are acquired at depths on the order of meters. Without track data, one would conclude that the soils are immature-submature and old. The high track densities, on the other hand, are acquired at depths on the order of centimeters or less. Blanford and Wood (6) suggested that an increase in solar flare particle fluxes in the past could account for the different correlation. However, an increased production of low energy particles makes it difficult to produce a large volume of highly irradiated material. On the other hand a past increase in the production of high energy particles, the galactic cosmic rays, could account for these differences and would appear to be compatible with high cosmogenic gas contents. Further examination of other lunar samples are required to understand the nature of these two correlation lines.

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REFERENCES.

1. Basu A., *et al.* (1980). This volume.
2. McKay D.S., *et al.* (1980). This volume.
3. Morris R.V., *et al.* (1980). This volume.
4. Bogard D.D. and Hirsch W.C. (1980). This volume.
5. Blanchard D.P., *et al.* (1980). This volume.
6. Blanford G.E. and Wood G.C. (1978) Mare Crisium: The View from Luna 24, p. 157-163.

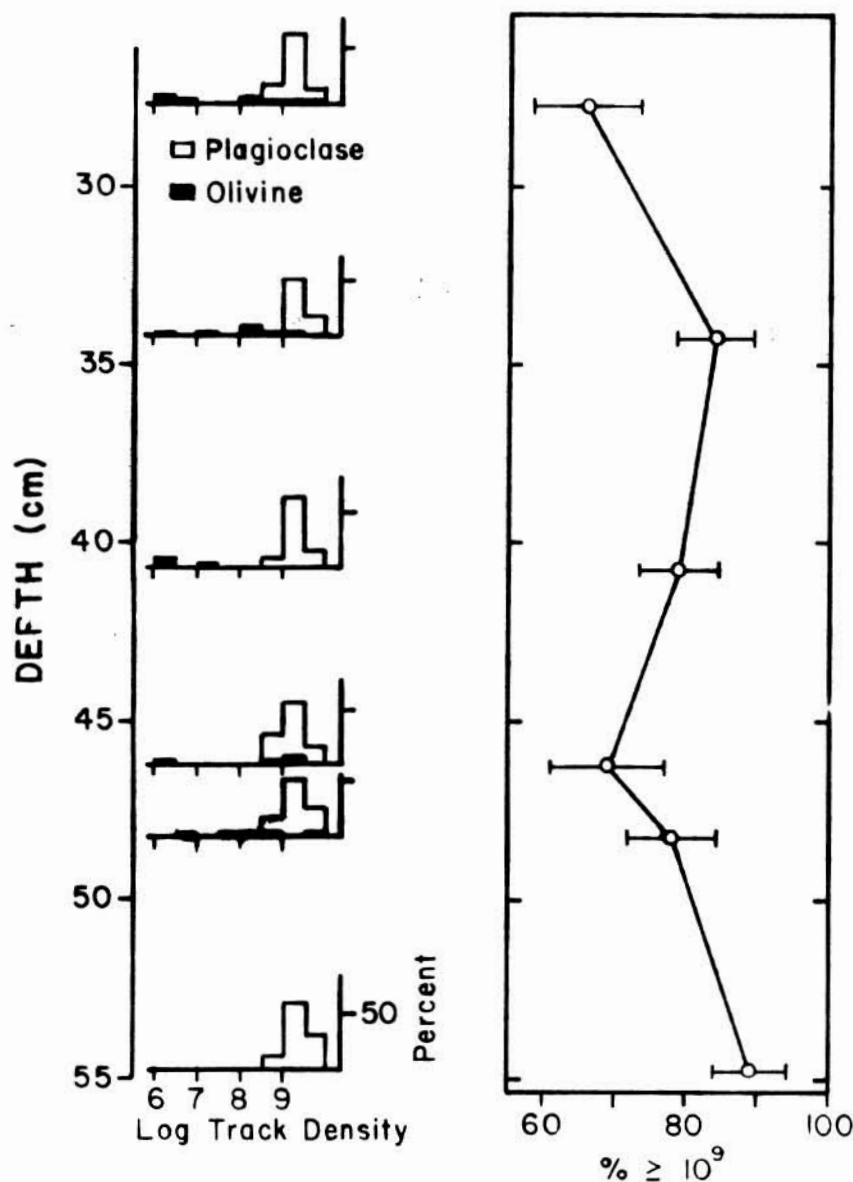


Fig. 1 Track density distributions and the fraction of grains with track densities $\geq 10^9$ cm⁻² (% $\geq 10^9$) from samples of double drive tube 15010.

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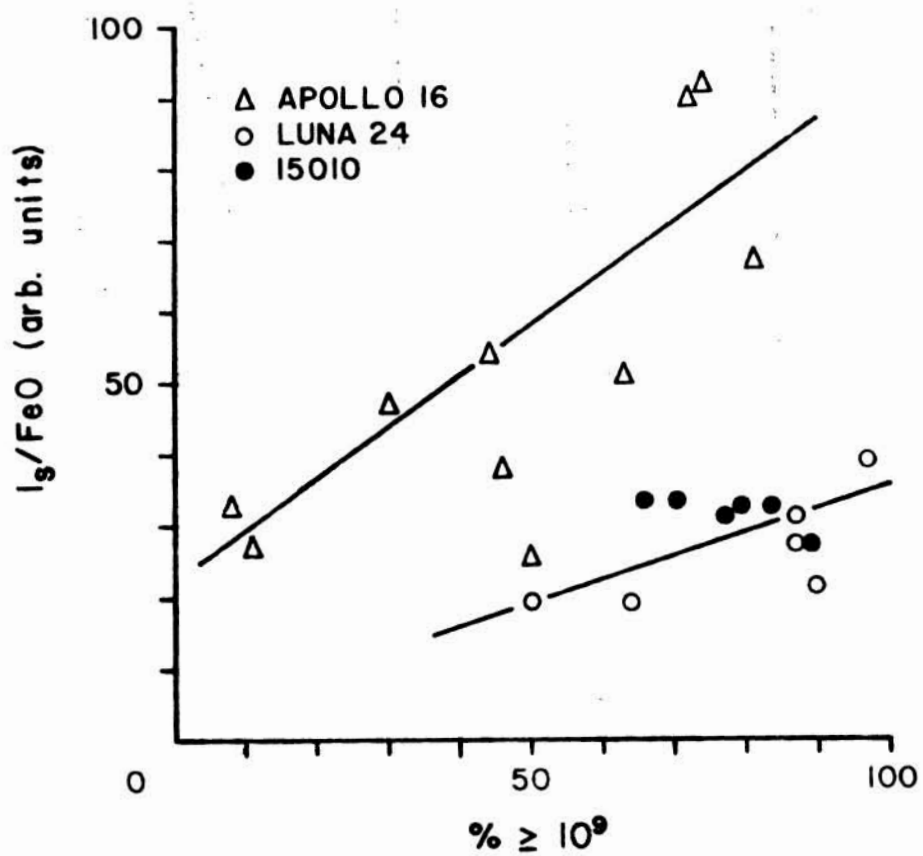
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Fig. 2 Correlation plots of I_s/FeO versus % $\geq 10^9$ for samples from Apollo 16, Luna 24 and 15010.