

LUNAR SURFACE PROCESSES: IMPLICATIONS FROM APOLLO
11 AND 12 SPECTRAL REFLECTIVITY MEASUREMENTS

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Apollo 12 surface fines are slightly brighter and have notably stronger optical absorption bands than the Apollo 11 fines. With depth in the Apollo 12 core tube the fines become brighter and absorption bands become stronger. These optical properties of the fines are controlled by different proportions of brown glass. Intense microfracturing of the outer surfaces of rocks increases the albedo and steepens the spectral reflectivity curves. Absorption bands at approximately 0.96 and 2.2 micrometers occur in the spectra of the fines and of the two ²⁺ rock types studied. The bands are caused by absorption by Fe²⁺, mainly in pyroxene. Apollo 11 and 12 laboratory reflection spectra correlate closely with McCord's telescopic measurements of the respective landing sites. With an understanding of the differences between the Apollo sites and among the various samples it is possible to interpret telescopic spectral reflectivity curves of other lunar areas. In general, highland surface material is considered to differ from mare by being more feldspathic, having highly microfractured mineral grains, and by having less dark glass. Bright craters of the Kepler, Aristarchus type appear to expose some fresh rock and to have little dark glass at the surface. Clinopyroxene appears to be ubiquitous over the lunar surface, but to vary in relative abundance. The combined laboratory and telescopic optical data now support a set of internally consistent conclusions regarding surface processes and rock types on the moon.