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THE DEPTH OF THE LUNAR DUST LAYER. T. Gold, Center for Radiophysics and Space Research, Space Sciences Bldg., Cornell Univ., Ithaca, N.Y. 14850.

Evidence from topography seen in Orbiter pictures, the Apollo seismic evidence, the long wave radar investigations, and the detailed survey of the mascons all give a clear indication that the moon has generally a deep deposit of fairly compact but finely divided material. While there is some layering apparent in some areas, there has been no indication of the widespread presence of subsurface rock, and such rock would indeed be incompatible with radar data at a depth of less than 50 meters, and with the seismic data at a depth less than several kilometers. Many steep sided craters or rills show very little general layering, and it therefore seems most likely that the dusty soil on the surface is similar to the medium that extends down to a depth of several kilometers.

Topographic evidence shows clearly that surface flows of powdered rock have taken place on a substantial scale and with rather unusual detailed properties. All steep slopes show characteristic patterns and erosion features associated with them. The evidence from Apollo core samples showing a delicate layered structure makes clear that surface flows rather than ballistic effects have dominated the deposition of the present mare surface.

The long wave radar evidence indicates that rocks, possibly similar to the ones distributed over the surface, exist also throughout the deep soil deposit. The density of such rocks is regionally very variable, and appears to be lowest in Mare Procellarum. This low density of internal rocks seems characteristic of mare surfaces that are not mascons.

The distribution of rocks in a deep layer of soil is also indicated by the fact that many old and eroded slopes show a higher concentration of rocks, as if the fines had been removed leaving the coarse material behind, and the same is true of ridges which sometimes show a concentration of rocks along their crest.

We have experimented with electrostatic processes that may be capable of transporting the lunar soil. Electron bombardment with electrons in the range of 200 volts to 2 kilovolts has been found to be most effective through a variety of interesting local electrostatic instabilities that are produced. Very fast surface flows can be generated in circumstances of electron bombardment that actually occur on the moon. The strongest source of kilovolt electrons striking the moon is in the magnetic tail of the earth and not in the free solar wind, and this gives immediately a reason for the striking difference between the near and the far side of the moon. The far side evidently contains many basins that are unfilled, while on the front all low-lying areas appear to be filled.