P.219

APOLLO 15 OBSERVATIONS; Farouk El-Baz, Lunar Exploration Department, Bellcomm, Washington, D.C. 20024; A. M. Worden and V. D. Brand, Astronaut Office, Manned Spacecraft Center, Houston, Texas 77058

Visual observations from lunar orbit constitute a significant complement to photography and other remote-sensed data. Utilization of the capabilities of a well-trained observer in lunar orbit is an illustration of the role of man in space flight. This is particularly significant when one considers the special characteristics of the human eye and the interpretive powers of the brain. The unaided eye resolves 20-30 m objects from 110 km orbit. It is also especially equipped, through its wide dynamic range, to distinguish subtle differences in brightness levels, color tones, topographic expressions and textural variations.

Fifteen lunar surface areas were studied in detail from lunar orbit on Apollo 15. The wide field of view allowed investigation of both the general and local settings at varying sun elevation angles and viewing directions. "On the scene" interpretations were made and later checked and confirmed on successive orbits. In certain cases, features and phenomena were compared to similar occurrences in other parts of the groundtracks. Results of the observation of eight targets are given and an example is provided of the geologic significance of observing cinder cones on the southeastern rim of Mare Serenitatis.

The more significant observations were made of the following features starting with the most easterly target: 1) Swirls of light colored markings on the floor of Mare Inginii on the lunar farside. No topographic expressions are associated with these sinuous markings which appear to have been the result of a "bleaching" mechanism. These markings are identical to those in northern Mare Marginis on the eastern limb of the moon; 2) An 80 x 70 km flow on the northwestern rim of the crater Tsiolkovsky was interpreted as a landslide bounded at the rim crest by two faults with about 10 km horizontal displacement. This lineated flow unit displays a larger population of small sharp craters than the floor material of the crater Fermi on which the landslide is superposed. Small flow units on the northeastern and southern parts of the crater rim display characteristics suggestive of somewhat viscous lava flows; 3) A brownish color tint

P.220

was detected in association with the crater Picard in western Mare Crisium. About 6 distinct layers were observed on the wall of the crater. Similar layering was also observed in the walls of the crater Peirce in the same region; 4) A fault zone appears to be associated with the ray-excluded zone of the crater Proclus on the western rim of Mare Crisium. The western part of the crater wall appears to be part of the fault plane and a displaced segment of the crater rim may have been responsible for ray-shadowing; 5) Cone-shaped hills with summit craters on the southeastern rim of Mare Serenitatis were interpreted as cinder cones, and as explained below they seem to have been the source of the dark smooth material which mantles both the highland and mare materials; 6) A subtle color difference appears to be associated with the flow scarp east of the Apollo 15 landing site in Palus Putredinis. A subsidence of a segment of the mare in this region may have been responsible for the "lava-mark" on Mount Hadley; 7) Numerous lava flows delineate a major flow front in western Mare Imbrium. Generations of flow were distinguished by their texture and subtle color tones. Lava flows in that area appear to have originated at a northwesterly wrinkle ridge in the mare; 8) Terminal portions of sinuous rilles in the Harbinger Mountains/Aristarchus Plateau regions appear to be filled by mare material. The younger (Eratosthenian) mare displays a brownish tint when compared with the gray tones of the older (Imbrian) mare materials.

Detection of what appears to be cinder cones on the southeastern rim of Mare Serenitatis has significant implications on lunar internal processes and the thermal history of the moon. The dark deposit is peppered with probable volcanic cones which surround the high hills of the southwestern Taurus Mountains. The unit mantles both plain-forming materials on the Serenitatis rim as well as the younger mare material and a wrinkle ridge in the southeastern corner of the mascon basin. This dark unit is interpreted as an ash deposit which came to the surface via volcanic conduits which formed the cinder cones. The deposit appears relatively smooth, which is confirmed by the lack of enhancements in Radar and IR maps of the area. These characteristics suggest a pyroclastic type material which originated at great depth and was extruded by explosive volcanic activity. The relative young age of the deposit may give additional information on lunar internal processes.