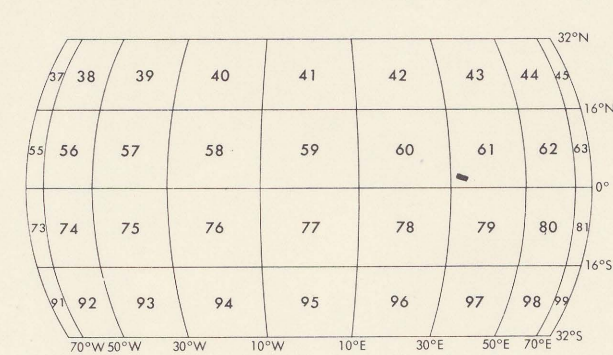


Controlled base prepared by Army Map Service, Corps of
Engineers, U.S. Army, Washington, D.C. 20315

SITE LOCATION DIAGRAM KEYED TO LAC

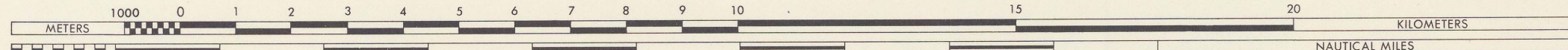


PRELIMINARY GEOLOGIC MAP OF LUNAR ORBITER SITE ORB II P-2

By
M.H. Carr
1967

Mercaator Projection

Principal sources of geologic information: Lunar Orbiter I, II, and III photographs
(Langley Research Center, NASA, 1966, 1967); albedo data from Pohn and Wiley (1966)
and from full-Moon plates 5818 and 5819 taken at U.S. Naval Observatory, Flagstaff, Ariz.



Cdc
Dome crater material

Cd
Dome material

Cp
Pitted material

Ceta
Apron material

CEm
Moderately cratered mare material

Ec
Crater materials, undivided

tu
Terra material, undivided

Characteristics
Material in cluster of large craters and a crater chain in the center of the dome (Cd) in the south-central part of the site. Albedo intermediate. Associated large craters intersect and have rounded rim. Patterned ground on the steep slopes.

Interpretation
Material of a group of volcanic craters associated with the formation of the dome. Probably fragmental volcanic debris reworked by successive impacts.

Characteristics
Material occurring on broad low domes. The surface of the domes resembles that of unit Ctm. Contact is shown at the break in slope between the dome and the surrounding terrain.

Interpretation
May represent volcanic extrusion or near-surface intrusion. If extruded, the near-surface fragmental layer may differ in composition from the surrounding material; if intruded the material exposed at the surface is identical to the surrounding material.

Characteristics
Forms gently rolling topography with low hills as much as 200 meters across. Many subdued craters mostly less than 200 meters in diameter occur. Only occurrence is just north of the dome (Cd) in the south-central part of the site.

Interpretation
Probably indurated ash and lava of volcanic hills and craters covered with a shallow fragmental layer. Volcanism was related to formation of dome (Cd).

Characteristics
Occurs at the base of steep slopes. Mapped only where units are clearly defined. Unit is gently sloping and is characterized by patterned ground; terminates abruptly against adjacent units with sharp break in slope.

Interpretation
Apron of debris that has accumulated at the base of steep slopes as a result of mass wasting. Consists of fragmental debris. Process of formation still continuing.

Characteristics
Occurs mostly in the west half of the site between outcrops of terra material. Albedo intermediate. More craters than that of Ctm. Unit forms a low undulating surface with areas of low positive relief. Grades imperceptibly into tu as the positive relief elements become more numerous and into mare material as the positive relief elements decrease. In number and craters become more frequent. Fewer craters between 0.05-0.5 km in diameter than in the mare. Fresh blocky craters larger than 0.1 km are absent and craters larger than 0.5 km in diameter are mostly shallow rimless depressions.

Interpretation
Slightly cohesive fresh volcanic debris mixed with colluvium and impact ejecta. Overlies an old cratered terrain. Some of the large shallow craters are partly buried craters of the underlying terrain, and some areas of positive relief are areas where the unit is thin and the ridge-like structure in the eastern part of the site may be site of intrusion or extrusion of volcanic material.

Characteristics
Occurs mostly in the east half of the site. Albedo low to intermediate. More craters than Ctm. Unit forms a low undulating surface with areas of low positive relief. Grades imperceptibly into tu as the positive relief elements become more numerous and into mare material as the positive relief elements decrease. In number and craters become more frequent. Fewer craters between 0.05-0.5 km in diameter than in the mare. Fresh blocky craters larger than 0.1 km are absent and craters larger than 0.5 km in diameter are mostly shallow rimless depressions.

Interpretation
Probably volcanic flow or tuff. The large pan-shaped craters are probably remnants of craters that formed in the underlying terrain which may consist of terra or older mare materials. Burial of older craters. Indicated units is 50-200 meters thick. Near-surface fragmental layer is as much as 10 meters thick.

Characteristics
Part of well-defined rim material may be covered with younger material; patterned ground and blocks on wall; no bright halo; crater rim crest well-defined.

Interpretation
Materials of relatively old impact craters. Rim material consists of shock-metamorphosed debris mixed with surrounding material. Wall material consists mostly of talus but brecciated bedrock may be exposed on the upper parts of the wall. Talus includes blocks of shock-metamorphosed bedrock.

Characteristics
Forms most of the high ground in the site, and occurs most extensively in the west half. Albedo intermediate. Terrain characterized by large (0.5 km in diameter) shallow craters, low rounded hills, and prominent northwest-trending ridges and intervening smooth areas. Patterned ground occurs in most areas. Grades imperceptibly into Ctm as the positive relief elements become more numerous and into mare material as the positive relief elements decrease. In number and craters become more frequent. Fewer craters between 0.05-0.5 km in diameter than in the mare. Fresh blocky craters larger than 0.1 km are absent and craters larger than 0.5 km in diameter are mostly shallow rimless depressions.

Interpretation
Old mare material. Probably volcanic tuff deposits or flows covered by a layer of fragmental debris. Blocks are visible around craters as small as 40 meters in diameter suggesting that the near-surface fragmental layer is less than 15 meters thick.

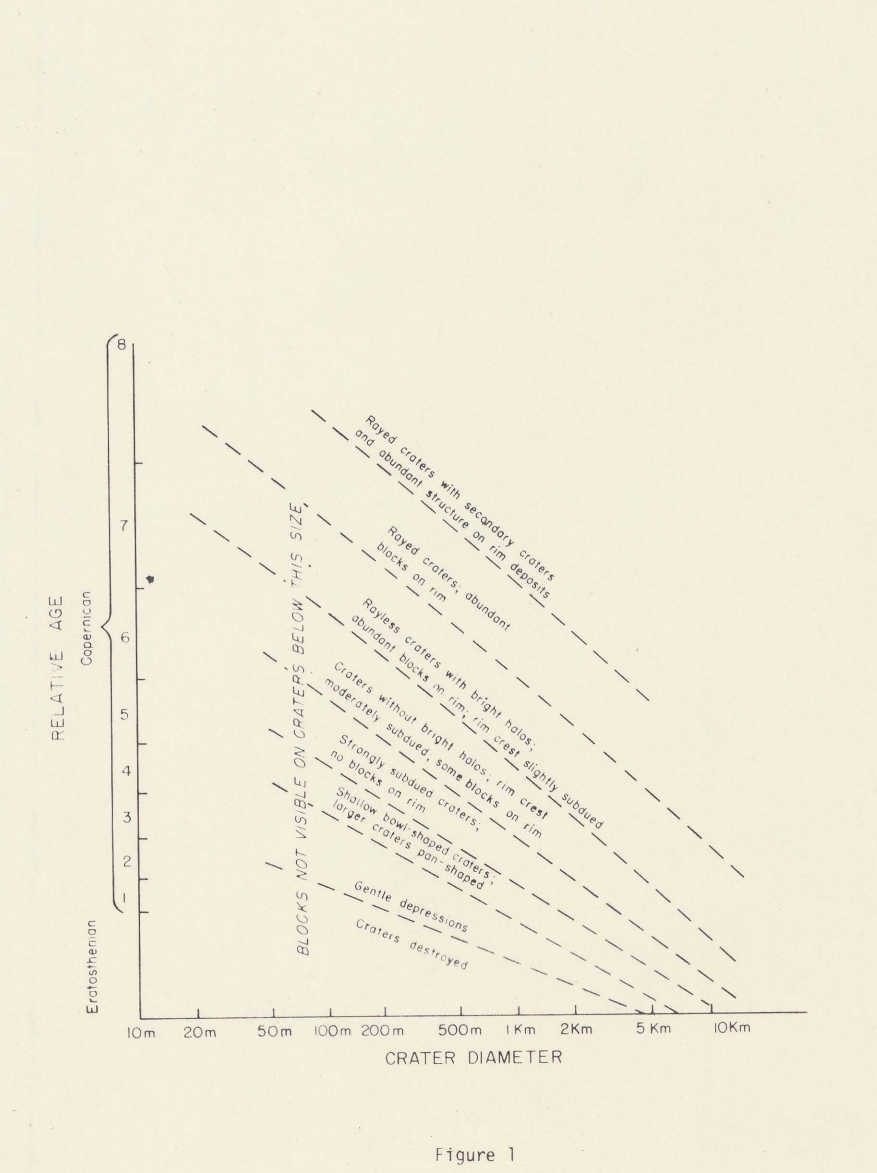


Figure 1

In the north-central part of the site, terra materials form a circular structure about 35 km across. The southeast limit of this feature is marked by a slight break in slope, and terra ridges outline the structure on the southwest. North of the site the structure is bounded by mare and terra ridges.

Site II P-2, on the southern edge of Mare Tranquillitatis, is in an area transitional between mare and terra. Mare or mare-like materials predominate; typical upland terra occurs locally, but is more extensive south and west of the site. A distinctive feature of the site is the exceptional smoothness of the mare in the east-central part; elsewhere, the mare is unusually deficient in craters. Also of interest, and possibly indicative of late-stage volcanism, is the large dome in the southern part of the site. Owing to the absence of fresh large primary impact craters, the site is relatively free of secondary impact craters.

The terra has been divided into two units: undifferentiated terra (tu) and mare-like terra (Ctm). The undifferentiated terra is typical of terra areas of low relief in that the terrain consists largely of intersecting craters, ridges, and low hills. The unit has more large (0.5 km diameter) craters than any of the other mare units. It is interpreted to consist of a non-cohesive mixture of volcanic debris, colluvium, and impact ejecta. Colluvium underlies, elsewhere, the paucity of craters results partly from the youthfulness of the material and partly from its lack of cohesion because of the latter. Impacts produce rounded, subdued craters that are rapidly degraded. The unit is thin where remnants of old craters and ridges occur at the surface.

The mare has been divided into two units largely on the basis of crater frequency. The more heavily cratered of the two units is considered to be the oldest (CEm). It has an especially high frequency of craters 50 to 100 meters in diameter and a greater proportion of shallow craters than the other mare units. On the heavily cratered mare, all gradations exist between fresh craters and shallow, subdued ones. Most of the craters larger than 500 meters in diameter on the moderately cratered mare material (Ctm) are shallow pan-shaped depressions; very few rimmed bowl-shaped craters of this size are present. The broad shallow depressions are interpreted as partly buried craters of an older terrain.

Three domes—broad low positive features bounded by a sharp or gentle break in slope—have been mapped. A group of craters, possibly the remnants of a crater chain, occurs in the center of the largest dome. The domes probably represent laccolitic near-surface intrusions, and the craters in the center of the largest dome may be volcanic.

The aforementioned units have all been cratered in varying degrees. Crater material in site II P-2 have been assigned relative ages (Ccc, oldest; Ctm, youngest) according to the morphologic criteria shown in Figure 1, which was constructed on the basis of the observations that (1) craters are degraded with time and (2) the rate of modification is inversely proportional to crater size.

Moon (orb site). Geol. 1:100,000. 1967.
Sheet 2P-2,
Cop. 1.

NOTE: Crater materials occupying areas larger than 800 meters in lateral extent, including deposits outside the rim crest, are outlined by geologic contacts; materials occupying areas between 400 and 800 meters in lateral extent are assigned numbers only, unless a crater has a bright halo more than 400 meters across, in which case the materials are outlined; materials covering areas less than 400 meters in extent are unmapped. Craters in terra material (tu) were not numbered because they are probably degraded faster than craters in units with less relief.

Characteristics
Materials of dense clusters of craters. In most clusters, craters are small (<0.05 km) and have sharp outlines. Albedo is higher than that of the surrounding materials.

Interpretation
Probably clusters of very small secondary impact craters. The two large clusters mapped may be volcanic in origin.

Characteristics
Occurs mostly in the west half of the site between outcrops of terra material. Albedo intermediate. More craters than that of Ctm. Unit forms a low undulating surface with areas of low positive relief. Grades imperceptibly into tu as the positive relief elements become more numerous and into mare material as the positive relief elements decrease. In number and craters become more frequent. Fewer craters between 0.05-0.5 km in diameter than in the mare. Fresh blocky craters larger than 0.1 km are absent and craters larger than 0.5 km in diameter are mostly shallow rimless depressions.

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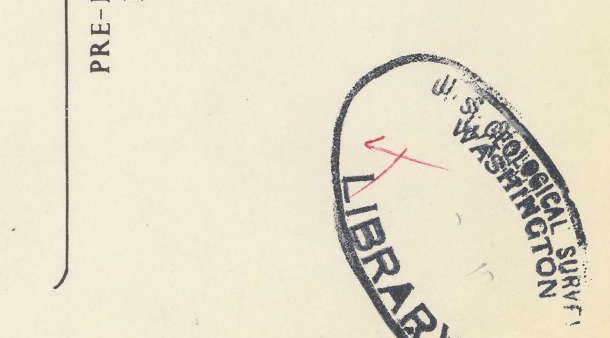
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COENECIAN SYSTEM

ERATOSTHENIAN SYSTEM

IMBRIAN AND (OR) ERATOSTHENIAN SYSTEM

PRE-IMBRIAN OR IMBRIAN



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