Mercator Projection

Crater-cluster materials Characteristics Composed of materials of several craters of the Cc₆ type having a limited geographic distribution. Composed of materials of several craters of the Cc₅ type having a limited geographic distribution. Composed of materials of several craters of the Cc_{Δ} type having a limited geographic distribution. Composed of materials of several craters of the Cc₃ type having a limited geo-graphic distribution. Composed of materials of several craters of the Cc₂ type having a limited geo-graphic distribution. Composed of materials of several craters of the Cc1 type having a limited geographic distribution. Materials of secondary impact craters. Numbers 1 through 6 indicate decreasing relative age. Degradation is accomplished by micrometeorite and cosmic ray erosion, blanketing by ash falls, and slumping due to seismic activity. ______ Contact

Solid where approximately located; dashed where inferred. (Ccc) Concealed contact Queried where relationship is indefinite. Buried unit indicated by symbol in paren-_______ Fault Dotted where buried. Bar and ball on downthrown block. _____ Lineament 6 9 Graben -Very narrow trough

Crater materials 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; materi-als within areas of less than 400 meters are unmapped. Characteristics Crater materials, undivided. Includes very bright

> Crater materials, undivided. Includes ray material; abundant blocks present on rim deposits but less extensive than in unit Ccg; crater rim crest

ray material and satellitic crater material; a-bundant blocks present; crater rim crest sharply

Cc6 Ccr6 Ccf6 Cc6, crater materials, undivided. Unit is bright; abundant blocks present; crater rim crest sharply raised. Ccr6, rim and wall materials, undivided. Forms rolling to hummocky surface; abundant blocks Ccf₆, floor material. Forms flat to broadly convex-upward surface; hummnocks are common in unit.

5, crater materials, undivided. Unit not bright; abundant blocks present; strong concentric structure occurs in rim deposits; crater rim crest subdued but well defined. Cc₅, crater materials, undivided. Unit is bright; abundant blocks present; abundant structure occurs in floor; crater rim crest very slight-

4 Cc4 Ccr4 Ccf4 4, crater materials, undivided. Blocks common in unit; concentric structure occurs in rim deposits; crater rim crest moderately subdued. Cc, crater materials, undivided. Abundant blocks present; crater rim crest slightly subdued. Ccr₄, rim and wall materials, undivided. Forms rolling surface; abundant blocks present; block fields extend one to two crater diameters from crater rim crest. Ccf₄, floor material. Forms convex-upward surface; abundant blocks present; central pro-

3, crater materials, undivided. Blocks sparse on rim deposits; blocks common to abundant on walls of crater. Cc₂, crater materials, undivided. Unit not bright; blocks common in unit; crater rim crest moderately subdued. Ccr3, rim and wall materials, undivided. Has gently undulating surface; rim materials are moderately cratered; wall materials are sparsely cratered; few blocks occur on crater rim crest; abundant blocks occur out-

Ccf3, floor material. Forms broadly convexupward surface; moderately blocky to blocky.

minence occurs in some craters.

Cc2, crater materials, undivided. Few blocks on rim deposits; abundant blocks on walls of crater: crater rim crest moderately subdued Ccr₂, rim and wall materials, undivided. Forms gently rolling, concave-upward surface; blocks sparse; includes material of common to abundant fresh-appearing craters on rim deposits. Facies grades outward to Crr2. Crr2, radial rim material. Forms surface having radial grooves and ridge structures whose crest lines point toward center of crater; Ccf₂, floor material. Has flat to broadly

convex-upward surface; blocks sparse to com-

l, crater materials, undivided. Sparse blocks and patterned ground occur on crater wall; associated crater is a pan-shaped depression. Cc1, crater materials, undivided. Blocks and patterned ground occur in interior units; blocks in rim deposits are sparse; crater rim crest subdued. Ccr₁, rim and wall materials, undivided. Similar to Cc, but facies grades outward to Crr, . Crr₁, radial rim material. Forms surface having very subdued radial grooves and very subdued ridges; surface is almost flat.

Materials of primary impact craters. Numbers 1 through 8 indicate decreasing relative age of materials. Degradation is accomplished by micrometeorite and cosmic ray erosion, blanketing by ash falls, and slumping due to seismic activity. rr, area of excavation and deposition by second-

Mare material Albedo 0.109-0.120 (Pohn and Wildey, 1966, map). Unit forms extensive flat to gently undulating surfaces that abruptly terminate against tu. Interpretation Volcanic materials: either lava or pyroclastic ash deposits or both, mantled by rubble layer. Older than crater materials which are superposed on this unit.

Mare material Characteristics
Albedo 0.109-0.120. Unit has strongly undulating and highly cratered surface. Interpretation $Mare\ material\ similar\ to\ m_2\ but\ older.$

Interpretation
Talus deposits.

Terrace material Has gently sloping surface and is localized at the base of steep terrae slopes. Unit has finely patterned texture.

Terra materials, undivided Characteristics

Unit is topographically higher than surrounding units. Forms undulating surface and exhibits patterned ground. Albedo low to high. Interpretation
Old upland materials composed of crater materials, impact ejecta, ash flows, and original DEPARTMENT OF THE INTERIOR

Crater materials, undivided

Interpretation

Materials of a young impact crater whose in-

terior has been possibly modified by post

Characteristics Materials in and around a linear array of cra-

Cr_a Cr_b Cr_c

Copernicus ray materials

Cra, materials of crater whose rim crest is

herringbone pattern.

Cr_b, ray material. Unit conspicuously subdues subjacent topography. Herringbone pattern is present in much of unit.

Forms surface that exhibits noticeable

topographic relief when viewed stereo-

no conspicuous pattern or topographic relief as in Cr_b. Unit slightly subdues subjacent craters.

Cr_C, ray material. Underlies surface having

Distribution of Copernicus ray materials has

been mapped from Orbiter V photography and

ejected materials from the crater Copernicus.

nterpretation Materials of secondary impact craters and

Ring material

Forms subdued circular structure and exhib-

its patterned ground. Numerous arcuate

troughs occur below rim crest and subdued craters are common on the flanks.

Interpretation
Ring-dike complex which may postdate the mare

Earth-based full-Moon photographs.

moderately subdued. Distally unit has

ters of similar size.

Interpretation

Maar type volcanic material.

Includes material of rays and satellitic cra-

ters similar to Ccg but crater has rim crest and interior features similar to Cc3.

Characteristics

This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature. UNITED STATES GEOLOGICAL SURVEY
OPEN FILE REPORT

> Lunar Orbiter site III P-9 occupies a lowland area between Mare Cognitum and Oceanus Procellarum, approximately 135 km southeast of the crater Lansberg and approximately 240 km due south of the crater Reinhold. The site is almost wholly covered by Imbrian mare mate-

rial (Eggleton, 1965); several small patches of terra material occur on the western edge. Uplands surround the site. Although the site itself is almost devoid of structural features, both mare and uplands to the north and northwest exhibit numerous graben and scarps. The earliest event to affect the area was the formation of the Imbrium basin. The Imbrium event reactivated much of the lunar grid structure. The area was blanketed at that time by ejecta from the Imbrium basin. This blanket was prob-

ably several tens of meters thick in the site inasmuch as the uplands still retain strong evidence of the Imbrian sculpture. In mid-Imbrian time, the craters Reinhold and Lansberg formed. Both of these events contributed to the blanket of ejecta at the site. The terra material which crops out to the west and northwest is probably Lansberg ejecta. The area was relatively inactive until the end of the Imbrian period, when extensive mare materials were deposited. The blanket of mare material which shoals in all directions from the site, may be only 0.5 km deep at the center of the site. This deposition was succeeded by another period of relative inactivity. In the west-central part a fault formed, and in the northeast part a ring-dike structure formed and was faulted. Also during this time there was some reactivation of the north-south structures.

The last major phenomenon to influence the site was the Copernicus impact, which covered much of the area with a discontinuous blanket of ejecta and subdued much of the cratered mare surface. Two major deposits of ray material from the crater Copernicus are present, one to the east and one to the west of the center of the site. The western deposit lacks topographic expression; however, crater frequencies are slightly lower along it. The eastern deposit, on the other hand, not only exhibits topographic relief but provides a means for establishing the relative ages of some materials in site III P-9. A classic example of a secondary impact crater occurs at the northern end of this ray. The northern wall (toward Copernicus) is continuous, whereas the southern wall is breached. A herringbone pattern extends southward from the breach and grades into a depositional pattern which has subdued the pre-existing topography.

Two 1.4-km-diameter craters of type c₁ occur approximately 16 km south of the secondary crater. The eastern crater has been subdued by the ray material but not the western one. Modification of the surface in the site was produced by

the formation of both primary and secondary impact craters. By assuming that most of the craters within specific size categories initially had similar morphologies, it is possible to designate relative age categories (fig. 1). Chain-crater material

CRATER DIAMETER

Exploration of two features in the site would be particularly productive of geologic information. One, a ring structure at lat 2° 50' S., long 22° 08' W., is most probably a volcano-tectonic phenomenon. There is a good possibility of sampling the materials at a shallow depth within the annular graben. The other, at lat 3° 35' S., long 23° 35' W., presents a good opportunity for clarifying a geologic problem. The exterior deposits resemble those of a fresh impact crater while the rim crest and interior deposits are quite subdued and resemble those of an aged crater.

Apparently, only two mare units are present in site III P-9. Although certain highly lineated areas (notably in the NW corner of the site) might suggest the presence of a third unit, the author feels that the frequency of lineaments is due to shoaling of the mare material on the structurally altered terra and that the unit is the same as unit m₂ because the crater frequencies are comparable. The frequency of craters surrounded by coarse debris indicates that a cohesive layer is present at a shallow depth. This substrate is mantled by a rubble layer.

Surveyor III made 8 bearing tests and 14 impact tests in the site. One of the rocks was subjected to a pressure of 10² psi without crushing. Static bearing strength was determined to be 3-8 psi, the soil cohesion to be 10-² psi to 10-¹ psi, and angle of internal friction 35° (Natl. Aeronautics and Space Adm., 1967, p. 1-2). REFERENCES CITED

Eggleton, R. E., 1965, Geologic map of the Riphaeus Mountains region of the Moon: U.S. Geol. Survey Misc. Geol. Inv. National Aeronautics and Space Administration, 1967, Surveyor III--A preliminary report: NASA Spec. Pub. 146. Pohn, H. A., and Wildey, R. L., 1966, A photoelectric-photometric map of the normal albedo of the Moon, in Astrogeologic Studies Ann. Prog. Rept., July 1, 1965-July 1, 1966, pt. A: U.S. Geol Survey open-file report, p. 211-

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