DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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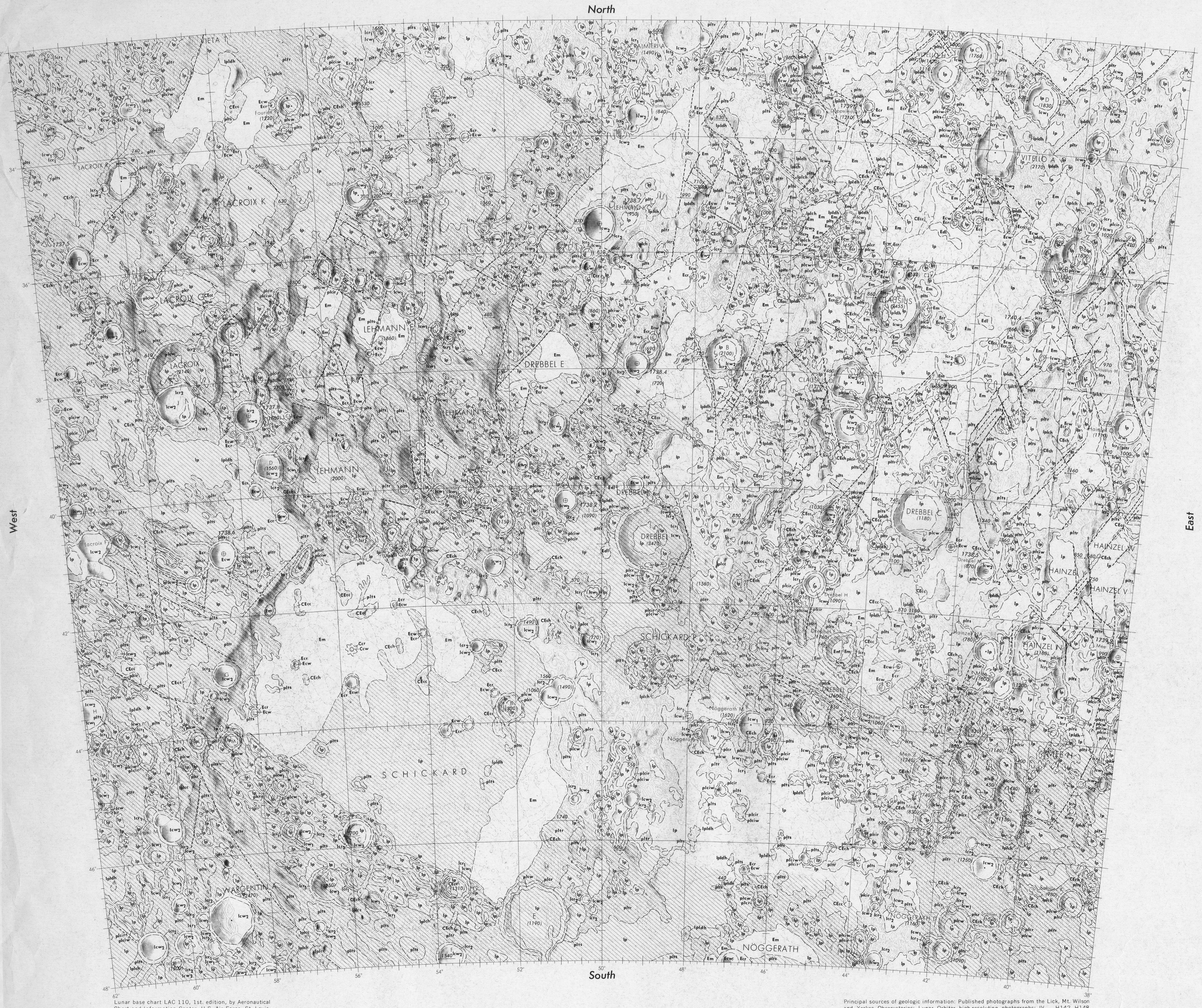
SCHICKARD
LAC 110

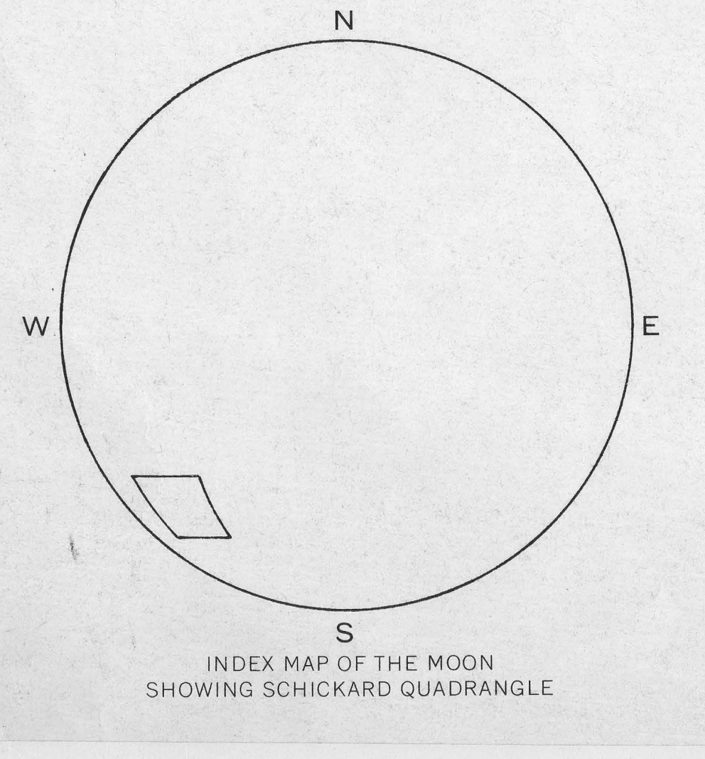


Lunar base chart LAC 110, 1st. edition, by Aeronautical Chart and Information Center, U.S. Air Force, St. Louis, Missouri 63118, with added secondary topographic relief patterns compiled from Lunar Orbiter IV photography.

Principal sources of geologic information: Published photographs from the Lick, Mt. Wilson and Yerkes Observatories; Lunar Orbiter high-resolution photographs: IV — H142, H148 H155, H160, H167, H172, (Langley Research Center, NASA, 1966, 1967), and from full-Moon plate 5818 taken at U.S. Naval Observatory, Flagstaff, Arizona.

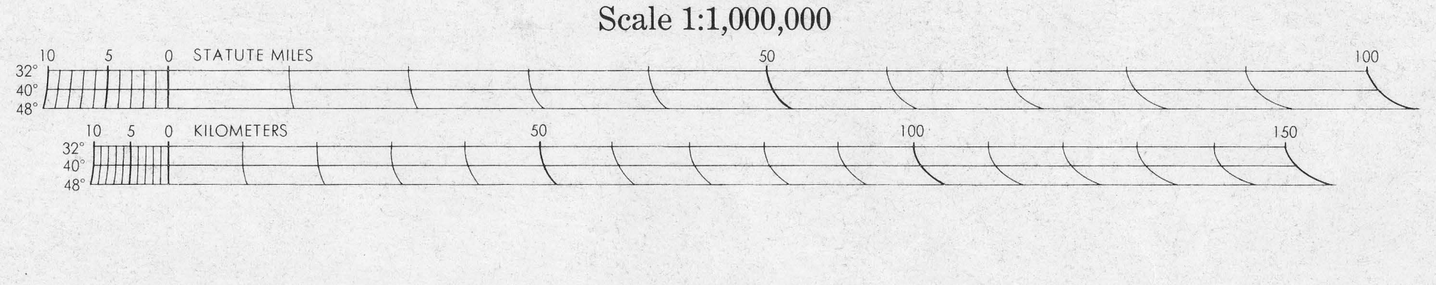
PRELIMINARY GEOLOGIC MAP OF THE SCHICKARD QUADRANGLE OF THE MOON

By
Thor N. V. Karlstrom
1971



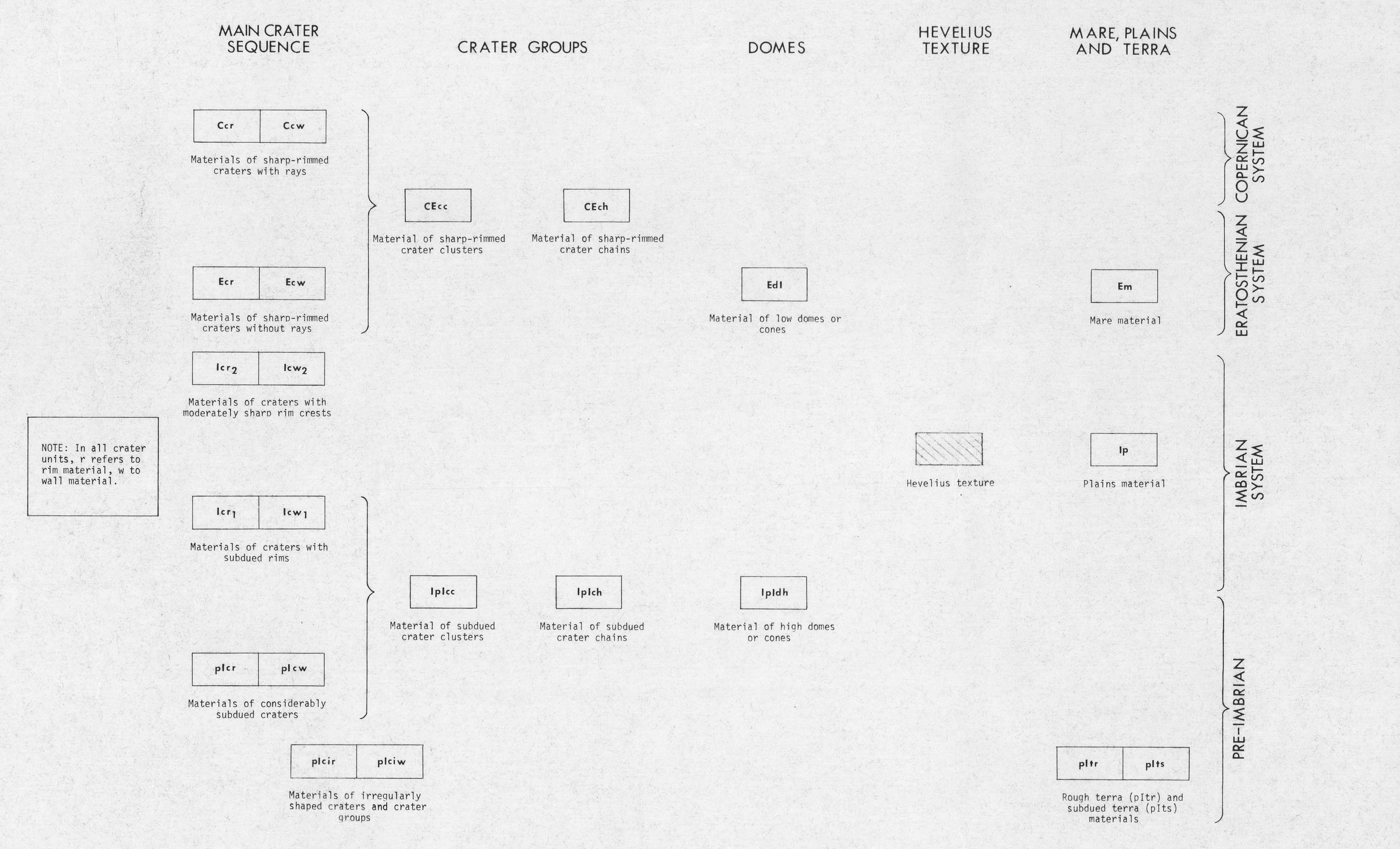
INDEX MAP OF THE MOON
SHOWING SCHICKARD QUADRANGLE

Lambert Conformal Projection
Scale 1:1,000,000



This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.

EXPLANATION



MAIN CRATER SEQUENCE

Ccr, Ccw--Materials of sharp-rimmed craters with rays

Characteristics: Sharp-rimmed craters with rays are rare in the quadrangle. One of the two mappable rayed craters occurs in the floor of crater Schickard, and has a rim diameter of 2 km; the other occurs in terra near crater Lehmann K, and has a rim diameter of 7 km

Interpretation: Craters assumed to be of primary impact origin. The paucity of small craters and absence of moderate and large size craters of Copernican age in the region, however, is difficult to explain by the constant flux impact model

Ecr, Ecw--Materials of sharp-rimmed craters without rays

Characteristics: Sharp-rimmed craters without rays range in size from 2 km to 20 km rim crest diameter; occur in mare, plains, and terra units; locally are superposed on larger craters having more modified morphologies. In terra, commonly occur along ridge crestlines. In mare and plains, crater distribution may be random, but craters commonly occur along lineaments, at lineament intersections, and in line with crater chains, domes and smooth crested terra ridges that project as peninsulas into the plains unit

Interpretation: Craters of Eratosthenian age of presumed primary impact origin. Topographic relations to terra ridges, domes, rim crests, and chain craters can be explained by random impact cratering of surfaces with pre-existing complex surface textures, but the possibility cannot be excluded that some of these craters resulted from tectono-volcanic processes involving extrusion, localized explosions, or subsidence along crustal fractures

Icr$_2$, Icw$_2$--Materials of craters with moderately sharp rim crests

Characteristics: Craters range in size up to 25 km rim diameter, and include numerous couplets and triplets with well defined, straight to curvilinear common rims or septa. Most are circular in outline and have steep, smooth to ridgy interior walls with inconspicuous floors; a few of the larger craters are floored by plains material or mare material, or both. Craters occur nearly exclusively in the terra units, most commonly on crests of terra ridges, but locally are superposed on larger craters and crater clusters with more highly modified forms. One forms the summit pit of the dome near crater Vitello A. Another, a doughnut-shaped crater located 75 km northwest of crater Clausius, has an inner circular ridge surrounding a plains floor. Subdued ridgy patterns within the interiors of some of the larger craters appear to be similar to, and extensions of, those present outside the rims. This is particularly well shown by the 15 km rim-diameter crater in the floor of crater Schickard, where the spiral crater rim-shape and interior floor ridge conform with trends of ridges making up the northwest oriented sinuous ridge system of the subdued terra unit on which it occurs. In general, however, and in striking contrast to all older crater classes, the craters have rims that are not conspicuously serrated by structural trends associated with the principal northwest, and subordinate north and northeast lunar grid directions

Interpretation: Craters of late Imbrian age of presumed impact origin. Particularly, the crater on the dome near Vitello A, the doughnut-shaped crater and the spiral rim crater may be of volcanic origin

Icr$_1$, Icw$_1$--Materials of craters with subdued rims

Characteristics: Craters range in size up to 30 km rim diameter; they have more rounded rims, a greater number of superposed younger craters, more irregularly textured walls and floors, and more are floored by mare and plains materials than those of younger morphologic age classes. Craters are generally restricted to the terra areas and chiefly occur on ridge crests and terra summit areas; locally they are superposed on larger craters with more modified morphologies. Oldest superposed craters are of late Imbrian age

Interpretation: Craters of early Imbrian age of presumed impact origin

pIcr, pIcw--Materials of considerably subdued craters

Characteristics: Craters range in size from 5 to 35 km rim diameter; they are more polygonal in shape, and have more irregular rim textures than superposed craters of early Imbrian and younger ages. Craters are restricted to the terra units where they occur on broad terra ridge complexes and summits, and locally on more irregularly shaped craters and crater groups of pre-Imbrian age

Interpretation: Craters of late pre-Imbrian age of presumed impact origin

CRATER GROUPS

CEcc--Material of sharp-rimmed crater clusters

Characteristics: Undifferentiated material of non-linear arrays of three or more relatively sharp-rimmed craters of comparable morphology that form conspicuous crater clusters superposed on the terra, plains and mare units. Most occur on the plains unit near contacts with terra ridges, domes, and mare. In several places, the clusters occur at the ends of terra ridges projecting out into the plains unit, and are elongated parallel, or transverse, to ridge trends

Interpretation: Grouping and distribution patterns can be explained by either a secondary impact or volcanic origin. Those superposed on terra and in the centers of plains and mare units are most likely to be of secondary impact origin. Those occurring near plains contacts with domes, terra ridges, and mare are more likely to be of volcanic origin. Sharpness of rims and superposition on youngest as well as oldest surfaces in the quadrangle suggest that the clusters are Eratosthenian to Copernican in age

CEch--Material of sharp-rimmed crater chains

Characteristics: Undifferentiated material of linear arrays of three or more sharp-rimmed craters of comparable size and morphology that are overlapping, tangential or alined along inferred fractures or ridge crestlines. Occur throughout the quadrangle on terra, plains, and mare surfaces, and locally on rims of craters ranging in age from pre-Imbrian to Imbrian. Trends range from straight to curvilinear, chain lengths from 5-20 km, and crater sizes from 1-5 km rim diameters

Interpretation: Alinement and distribution patterns suggest either a secondary impact or volcanic origin. Chains alined parallel to inferred fracture trends and along terra ridge crests are most likely to be of volcanic origin. Sharpness of crater rims and local superposition on mare and plains and on craters as young as Imbrian in age suggest that most, if not all, of the chains are Eratosthenian to Copernican in age

IpIcc--Material of subdued crater clusters

Characteristics: Undifferentiated material of non-linear arrays of two or more relatively subdued craters of similar morphologies that form conspicuous crater clusters restricted to the terra units. Cluster shapes range from irregular to looped and sizes from 10-15 km longest dimensions. Craters are commonly coalescent, range from 2 to 5 km rim diameters, and have shallow bowl-shaped interiors without distinct floors separated by straight to curvilinear common rims or septa. The clusters are locally superposed on craters as young as early Imbrian, and appear to overlie the northwest trending ridge texture of Hevelius formation. Oldest superposed craters are of late Imbrian age

Interpretation: Grouping and distribution patterns suggest either a secondary impact or a volcanic origin. Rim morphologies and superposition relations to dated craters suggest a middle Imbrian age for most of the crater clusters but a few may be older. Cluster form and apparent superposition on the northwest trending Hevelius texture is consistent with the interpretation (Wilhelms and McCauley, 1970) that some may be secondary impact or satellitic craters, representing late impact events during deposition of an Orientale basin ejecta blanket in middle Imbrian time

IpIch--Material of subdued crater chains

Characteristics: Undifferentiated materials of linear arrays of 3 or more subdued, rimmed craters that are overlapping, tangential, or alined with inferred fracture trends. Chain trends range from straight to curvilinear; lengths from 6 to 25 km. All occur within terra and plains units where they are locally superposed on pre-Imbrian crater rims, either along rim crests or transverse to rim crests. Some are associated with domes where they occur on summits or as marginal slope features. Some chains are made up of coalescent craters with rectilinear rims that aline with intersecting fracture trends inferred from nearby features. Orientation of chains is variable throughout the quadrangle but many aline parallel to the inferred NW, N and NE trending lunar grid directions

Interpretation: Alinement and distribution suggest either a secondary impact or volcanic origin. Chains alined parallel to inferred fracture directions or on crests of secondary terra ridges and crater rims are most likely to be of volcanic origin. Subdued morphology of crater rims, local superposition on more modified craters no younger than pre-Imbrian age, and local superposition by sharp-rimmed craters and crater chains of Eratosthenian age suggest an Imbrian to pre-Imbrian age. Chains alined with the northwest trending Hevelius texture may indicate development as secondary impact crater chains. Alinement of similar appearing chains with other lunar grid directions, however, indicate that a volcanic origin cannot be eliminated for any of the chains in the quadrangle solely on the basis of the available directional and morphologic data

pIcir, pIciw--Materials of irregularly shaped craters and crater groups

Characteristics: Subdued, generally narrow rimmed and irregularly shaped craters or crater groups ranging from elongate individuals (elongation 2:1 or more) to groups and chains of coalescent craters with numerous rectilinear to curvilinear common rims and septa. Septa may or may not be present between coalescent craters. Where present, septa are commonly less well developed, more discontinuous, or lower, than outer rims. The craters occur on crests of the largest terra ridges, occupy depressions between ridges, or form summit pits on some irregular domes. Elements of secondary terra ridge patterns outside of the craters appear to be traceable with minor deflections at rims across interior walls onto floors. Irregular-shaped crater groups in the plains unit are generally smaller, angular to sub circular in outline, and are locally associated with smooth-crested, bulbous, subdued terra ridges. Superposed craters range in age from early pre-Imbrian to Copernican

Interpretation: Irregular shapes and relationships to primary and secondary terra ridges suggests either caldera subsidence along the broad crests of extrusive ridges or highly erosionally and tectonically modified and partially buried groups of primary and secondary impact craters. Irregular craters with segments of smooth sinuous bulbous rims, some with crater pits, are most likely to have been formed, or modified, by volcanic processes. The age of the irregular craters can only be determined in a broad way. Similarities in morphology and local superposition by craters of pre-Imbrian age indicate that most of the irregular craters in terra are probably pre-Imbrian in age. The less modified rims of the irregular craters in the plains unit suggest that some of these craters may be as young as Imbrian in age

DOMES

Edl--Material of low domes or cones

Characteristics: Bulbous, low domes or cones with low to moderately steep slopes and convex upward profiles. Most have summit craters or furrows. Linear to elliptical to irregular in plan. Height variable but generally less than 500 meters. Occurrence restricted to plains and mare units; those associated with plains materials have somewhat higher albedo than those associated with mare materials

Interpretation: Bulbous form and alinement with mare or plains ridges suggest volcanic intrusive-extrusive constructs localized along major fractures or fracture intersections developed during extrusion and solidification of plains and mare volcanic rocks. Although differences in albedo suggest at least two volcanic episodes accompanying both plains and later mare emplacement, the domes are all shown as Eratosthenian in age

IpIdh--Material of high domes or cones

Characteristics: Materials of steep-sloped domes which may have small summit or flank craters or furrows. Some are round to elliptical to arcuate in plan with smooth, convex upward profiles; others are linear with angular outlines and profiles. Height to width ratio is variable but generally around 1:10. Occurrence restricted to terra and plains units, most commonly along terra ridge crestlines, at the termination of ridges, or at intersections of ridge systems. The large irregular fracture-bounded domes in the northern part of the quadrangle have coalescent crater pits with subdued morphologies

Interpretation: Either volcanic constructs in part alined with major fracture trends, or isolated, locally fracture-controlled, higher hills of undivided terra materials. Arcuate domes may be emplaced along concentric and intersecting fractures resulting from local magma up-doming of crustal rocks, or along arcuate fracture sets inherited from earlier cratering events. Relations to terra ridges suggest that some may represent bulbous constructs resulting from late extrusive events concentrated along, or at intersections of, major fracture sets. Morphology suggests Imbrian and older ages

HEVELIUS TEXTURE

Dominant NW trending ridge systems

Characteristics: Materials in areas characterized by a predominance of sinuous to curvilinear ridges and troughs alined parallel to the northwest lunar grid direction and radially to the Orientale basin about 1200 km to the northwest of crater Schickard. Because of the complexity of the secondary ridge patterns throughout the quadrangle, boundaries drawn between areas with predominant NW trends and those with more pronounced transversely oriented trends are at best approximate. Where present, the pronounced NW trending ridge systems are best developed in terra units, are only subtly expressed in the plains unit, and are inconspicuous or absent in the mare unit. They are well developed on the rims of craters pre-Imbrian to early Imbrian in age but generally are absent on rims of craters of late Imbrian and younger age

Interpretation: The strong northwest alinement along a direction radial to Orientale basin, and superposition relations with dated craters are compatible with the interpretation that the lineated ridge pattern represents the constructional surface features of the distal part of an ejecta blanket thrown out from Orientale basin in middle Imbrian time (Wilhelms and McCauley, 1971). Alternatively, the same morphologic relations of the ridges to lunar grid directions, plains, and superposed craters clearly do not preclude a tectono-volcanic origin for the lineated ridge patterns. Although the plains unit is shown as part of the Hevelius texture, it is probable, because of the subtle expression of such patterns, that the plains material was emplaced later and only partially buried the surfaces on which the texture was first developed

MARE, PLAINS, AND TERRA

Em--Mare material

Characteristics: Material having smooth, level surfaces and low albedo, occurs as irregular shaped patches within lighter toned plains material and in the floors of deeper craters. Topography somewhat smoother than plains material but includes low mare ridge complexes, and smooth-rimmed dark craters and domes. Contacts with plains and terra generally sharp, straight to curvilinear but locally gradational with numerous reentrants. Superposed craters, clusters, and chains are of Eratosthenian to Copernican age. Material floors craters as young as late Imbrian in age

Interpretation: Probably a relatively thin cover of young flows or pyroclastic material over thicker accumulations of Imbrian plains material. Shape of mare units and contact relations suggest extrusion both within fracture-bounded crustal blocks that subsided during extrusion, and within pre-existing low areas of the plains and in deeper craters. Low albedo, contact relations with plains material and dated craters suggest emplacement between late Imbrian and the end of Eratosthenian time, or seemingly contemporaneous with comparable dark mare materials in adjoining regions, including nearby Mare Humorum, dated as Eratosthenian in age. Igneous rocks from the Apollo 12 landing site, crater dated to the same time interval (Cannon, 1969), are radiometrically dated by Wasserburg and Papanastassiou (1970) at $3.3 \pm 0.1 \times 10^9$ years

Ip--Plains material

Characteristics: Material having relatively level surfaces with intermediate albedo; occupies topographic lows within terra and bottoms of large craters. Occurs at several elevations in many areas. Topographically smooth textured, but with undulating surfaces that are generally characterized by a complex pattern of intersecting, straight to curvilinear low ridges that in some areas appear continuous with ridge patterns in adjoining terra. Contact relations in other areas appear sharp and discordant. Generally occupies bottoms of deep craters of pre-Imbrian and early Imbrian age and in a few localities craters of late Imbrian age, but not craters of Eratosthenian and younger age. Albedo is locally variable, but in all areas is higher than the albedo of mare materials

Interpretation: Planar surfaces and smooth textures, distribution in topographic lows, discordant to gradational contacts, and association with domes and smooth-crested, sinuous ridges, suggest emplacement of both fluid and fragmental materials from subcrustal sources, thus probably lava and pyroclastics from many separate vents. Some of the smaller occurrences in the rugged terra, however may represent fine-grained ejecta material or fragmental material eroded from adjoining steep slopes. Variable albedo, contact relations to mare and terra, and relations to dated craters suggest several episodes of emplacement concentrated mainly in middle Imbrian time, extending locally into late Imbrian time, but with general termination prior to the emplacement of the Eratosthenian mare. Igneous rocks from the Apollo 11 landing site, crater-dated as Imbrian in age (M. West, 1969), are radiometrically dated at $3.65 \pm 0.06 \times 10^9$ years (Wasserburg and Papanastassiou, 1970)

pItr, pIts--Rough terra (pItr) and subdued terra (pIts) materials

Characteristics: Undifferentiated materials associated with the uplands. The higher areas (pItr) are topographically rugged with steep-sided, broad-crested, sinuous ridges surrounding irregularly shaped depressions with irregular to curvilinear to straight sides, and floored by smooth plains and mare materials. Local relief may range from 300 to more than 1500 meters within the unit. Subdued terra (pIts) is less rugged and includes (1) the broad irregular floors of upland depressions with ridgy topography and (2) benches, peninsulas and islands of comparable intermediate relief and secondary ridge patterns that are associated with the bordering plains and mare units. The elliptical to rectilinear secondary ridge patterns of the rugged terra are generally traceable into subdued terra areas without apparent discontinuities

Interpretation: Oldest materials exposed in the quadrangle, including unmapped deposits of large subdued crater-like forms, underlain by ancient crustal rocks broken and jumbled during the formation of the basins and craters. Craters of pre-Imbrian to Copernican age are either volcanic subsidence or explosion craters or are impact craters superposed on the primary and secondary terra ridges. Mantling crater materials are probably thickest on gentler slopes and in depressions, and may be discontinuous in areas of more rugged relief where ancient crustal rocks may be locally exposed. Two alternate working hypotheses are considered for the genesis of the ancient terra rocks in the quadrangle: (1) the terra includes ancient crustal rocks of unspecified origin that have been modified into present sinuous ridges, and deeply mantled by fragmental materials primarily by a long history of random impact cratering that has saturated the lunar surface. Subsequent volcanic episodes, which may or may not have been triggered by major impact events elsewhere, produced the plains and mare units that largely bury mature cratered surfaces within the quadrangle; (2) the terra represents intrusive-extrusive igneous rocks, emplaced along fractures, in part controlled by the lunar grid stress field, developed in the thin cooling crust of an early molten phase of a primordial rotating moon. Modification of this early volcanic surface by a complex history of repeated volcanic episodes, accompanying tectonic adjustments and impact cratering has produced the present cratered terra, plains and mare topography of the quadrangle

Introduction

The Schickard quadrangle lies in the southwest quadrant of the near side of the moon between the Humorum mare basin to the northeast, the Orientale basin multi-ring structure to the northwest, and the crater Tycho to the east. A northward trending arcuate chain of large craters occurs along the south and west margins of the quadrangle and appears to include the crater Schickard. The geology of the quadrangle should therefore record episodes related to the development of these nearby major lunar features considered to represent earliest (pre-Imbrian) to latest (late Copernican) events in the geologic history of the moon.

The region is part of the southern highlands and is characterized by a rugged and complex topography made up approximately of 40% uplands rising as much as 1600 meters above irregular patches of smooth plains and mare. The most conspicuous feature is the 180 km wide Schickard crater or basin that lies near the southwest corner of the quadrangle.

Topographic form is the primary basis for photogeologic interpretation, but by itself may not provide unambiguous geologic inferences relating to genesis of lunar craters and associated features (Karlstrom, 1968, p. 135). Mapping of the secondary topographic elements that make up the subtle textural patterns of ground surfaces shown on lunar photographs, may however extend photogeologic analysis. Because of this possibility, the trends of secondary topographic features have been graphically added to the Schickard base map. The resulting patterns of secondary ridges provide the basis for additional geologic inferences and serve to illustrate the degree of concordance or discordance along inferred geologic boundaries. Further, a deliberate attempt has been made through discription and selection of mapping conventions to emphasize the multiple working hypothesis approach in interpreting the genesis of the lunar features present in the Schickard quadrangle.

Mapping Conventions

Conventional map units that have been developed and refined over the years from systematic geologic mapping of the moon (McCauley, 1967; Wilhelms, 1970: Wilhelms and McCauley, 1971) have been applied to the geology of the Schickard quadrangle. Crater dating is based on the morphologic criteria most recently refined by Pohn and Offield (1970). Their age classification of lunar craters assumes impact origin, approximately similar original crater form, and uniform rates of crater modification with time by impact crater bombardment and solar radiation. Minor departures from conventional mapping procedures are as follows:

(1) The graphic portrayal, in part schematic, of the secondary topographic elements reveals a complex sinuous, intertwining ridge pattern. This pattern encloses elliptical to rectilinear shallow depressions that in part appear to be controlled by curvilinear to straight fracture trends including dominant NW, N and NE lunar grid directions (Strom, 1964). The resulting surface textures may represent surface depositional features, structures reflected through thin mantling deposits or combinations of these constructional and structural elements. For example, some intercrater surface textures should become progressively more obscure towards superposed crater rims because of thickening ejecta blanket deposits. At the scale and level of textural analysis in the Schickard quadrangle this generally cannot be demonstrated, probably because the pervading intricate cellular pattern primarily reflects structures or buried surfaces rather than the surface characteristics of a relatively thin mantle of fragmental materials that presumably exists throughout the region.

(2) In the absence of objective criteria for drawing the distal boundaries of ejecta blankets around most craters in the quadrangle, crater outer rim boundaries are conservatively drawn at the most conspicuous topographic break between crater crest and surrounding terrain. Since these boundaries are primarily topographic, not stratigraphic, they do not necessarily reflect superposition relations of craters to surrounding materials.

(3) Crater-dating has been extended to include craters as small as 2 km rim crest diameter in order to increase the representation of the dated crater populations in the quadrangle, and because craters of Copernican and Eratosthenian age appear to be under-represented in the larger crater-size classes in the region.

(4) Highly modified large crater forms, morphologically datable to early and middle pre-Imbrian age, are mapped as part of the undivided rugged terra unit of the quadrangle. The sinuous, intersecting, and, in places, intertwining nature of the terra ridge complexes appear similar in important aspects to the primary and secondary ridge systems of the larger mare complexes of the moon, suggesting the possibility of common genesis as intrusive-extrusive constructs. Although present morphologic data do not rigorously exclude an impact origin, the older crater-like forms within the Schickard quadrangle are not interpretively mapped as impact craters. This treatment emphasizes the possibility of an alternate working hypothesis for the genesis of the terra ridges, herein referred to as the "Tectono-volcanic hypothesis".

Tectono-volcanic hypothesis

According to this hypothesis, the terra ridges primarily originated as fracture controlled volcanic intrusive-extrusive welts encircling small as well as large depressions. It is assumed that the ridges and depressions were formed by marginal extrusion during differential subsidence of thin crustal plates that foundered during early phases of surface solidification and extrusion on a primordial molten moon. Modification of the earliest volcanic constructional surface has resulted from later volcanic episodes, accompanying tectonic adjustments and impact cratering. Associated plains material could have been emplaced penecontemporaneously with, as well as later than the ridges. Such a time relation is suggested by the mare ridge analog; by gradational as well as discordant plains contacts; by evidence suggesting multiple episodes of later plains, mare, dome, and ridge extrusions: the time relation is not precluded by superposition relations of the craters and other features mapped in the Schickard quadrangle.

According to the tectono-volcanic hypothesis the abundant irregular shaped craters and crater groups in the region are mainly of volcanic origin and represent calderas, rather than impact craters. It is further assumed that the larger size of the terra ridges reflects the more vigorous initial magmatic phases of a cooling molten moon, whereas the more regionally restricted, smaller mare ridges, reflect later less vigorous phases of more deeply confined, more basic and thus more fluid magma sources.

Implications of recent radiometric dates of

lunar rocks on the constant flux impact crater model and

the Tectono-volcanic working hypothesis

Radiometric analysis of igneous lunar rocks from the Apollo 11 and 12 sites located in maria crater-dated to the Imbrian and Eratosthenian periods, provide dates respectively of $3.65 \pm 0.06 \times 10^9$ years and $3.3 \pm 0.1 \times 10^9$ years (Wasserburg and Papanastassiou, 1970). If indeed these rocks are representative of comparably crater-dated units in the Schickard region, there is a strong suggestion that nearly all the inferred volcanic and impact events took place very early in lunar history and that a surprisingly small amount of topographic modification by surface processes has taken place since that time. In addition, features that have been attributed to extensive mass wastage of lunar slopes may instead be primary depositional features (Karlstrom, 1968, p. 135).

According to the interpretation of terra genesis based on the impact crater model, the ancient rocks of the terra should be at least several times older than the Imbrian plains materials, which poses problems for present cosmological concepts. According to the tectono-volcanic hypothesis, on the other hand, the most ancient terra rocks could be the same age as or slightly older than the oldest Imbrian plains materials. Because of these and numerous other unresolved geologic problems it is clear that many more lunar samples must be analysed from widely separate regions of the moon, and detailed field mapping of geologic relations accomplished in these sampling areas, before the complex interrelations between volcanic, tectonic, and impact cratering events can be established, and a firm geologic reconstruction made of lunar history.

Acknowledgements:

Geologic compilation of the Schickard quadrangle could not have been accomplished outside the conceptual framework refined by others over the past ten years from U.S. Geological Survey systematic geologic mapping of the near side of the moon. Special assistance was provided by Don Wilhelms who encouraged experimentation with different mapping approaches, and by Howard Pohn and Terry Offield who successfully checked out the reproducibility of their crater-dating criteria in the Schickard quadrangle by independently dating most of the craters 25 km rim diameters and larger. Dating of the smaller craters within the quadrangle was done by morphologic comparisons with the dated larger craters and by making adjustments, in part subjective, required by smaller crater size. Of course, the tentative interpretations placed on the geology of the Schickard quadrangle remain the sole responsibility of the author.

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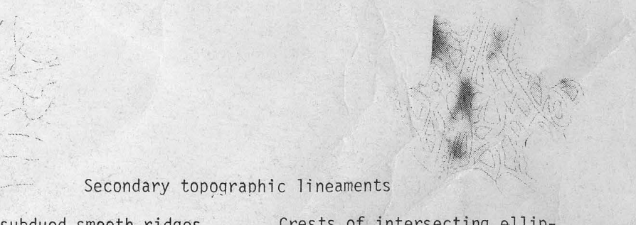
Approximate contact

Major fractures

Inferred from most pronounced topographic lineaments



Secondary topographic lineaments

Crests of subdued smooth ridges in plains and mare. Small circles and dots represent small young craters at the limits of resolution.

Crests of intersecting elliptical to linear secondary ridge systems and associated depressions in terra.