UNITED STATES
DEPARTMENT OF THE INTERIOR
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PRELIMINARY STUDY OF HYCON PHOTOGRAPHS, APOLLO 14.

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A brief analysis of the Hycon photographic strip taken during Apollo 14 revealed several areas of some scientific interest. Apollo sites within the area of this strip would be, however, less rewarding in terms of general scientific return than the presently designated Descartes site farther to the east. The floor, walls, and central peak of the crater Theophilus probably offer little of geological significance beyond that already acquired by Apollos 11, 12, and 14. Additionally a fairly thick fragmental layer seems to be nearly ubiquitous in this area. No prominent escarpments, unique landforms, obvious outcrops, or probable volcanic features can be recognized. A number of sites probably suitable for Apollo landings are present, however, and an attempt was made to evaluate three of these from the standpoint of possible scientific return. The three sites are shown on the accompanying annotated photographs (figs. 1-3) and are described briefly below, in order of scientific merit.

(1) Floor of crater Theophilus (26.3° E., 11.0° S.): Of the three sites, the maximum amount of scientific information might be obtained from a landing on the floor of Theophilus (fig. 1). The selected site is near the base of a dome-shaped hill on which blocks and tiny fresh craters occur, and would allow the roving vehicle access to a fresh, rayed, blocky crater (~ 200 m diameter) and to the base of the central peak. In addition, at least one crater with a convex floor might be visited.

(2) Northwest of Kant B (18.3° E., 9.5° S.):

This site (fig. 2) offers a smooth surface with few large craters, and numerous small ones (10-20 meters). Both a fresh, blocky, rayed crater just east of the proposed landing ellipse and an older crater with a convex floor to the northeast would be accessible. The surface is faintly textured with lineated and apparent "herringbone" patterns. The northwest rim of Kant B, about 6.5± km to the east, might be of interest, if it could be reached during the traverses. The site lies within hilly Cayley Formation, as mapped by Milton (1968), but without a prior sample of the more widespread smooth facies of Cayley Formation, the data and samples returned from this site would be of limited application to the broad problems of the evolution of the lunar surface.

(3) Northwest rim of Theophilus (24.2° E., 10.6° S.):

Numerous blocks can be identified in this area (fig. 3), particularly in and around the southernmost large crater. The surface within the proposed landing ellipse is somewhat undulating but free of large craters, although the entire map area appears to have a much higher crater density in general than the other two sites. This area lies within the hummocky Theophilus Formation, mapped and interpreted as volcanic by Milton (1968), and it might have been of interest to sample this unit eventually if the Apollo program had not been curtailed. The sample would be representative, however, of only a small part of the lunar surface which is not of Moon-wide significance.

Of possible additional local interest are several small vertical-walled, flat-floored craters; these appear to be somewhat anomalous when compared with the more numerous bowl- or cone-shaped craters. They may be of internal origin, or perhaps they represent a resistant rock layer at shallow depth exposed by impact cratering. A number of these have been designated on the map as possible mission objectives.

In summary, the available Hycon photography from Apollo 14 offers little in terms of landing sites of regional geologic significance in spite of its high technical quality and the presence of areas in which Apollo might land without undue hazard. The Descartes site (Hodges, 1971; Milton, 1971) which lies in materials of greater importance to an improved understanding of the terrae, is clearly the preferable scientific objective.

References

Hodges, C. A., 1971, Sketch map of the candidate Descartes Apollo 16 landing site: U. S. Geol. Survey open-file report.

Milton, D. J., 1968, Geologic map of the Theophilus quadrangle of the Moon: U. S. Geol. Survey Misc. Geol. Inv. Map I-546, scale 1:1,000,000.

Milton, D. J., 1971, Geology of the region around the candidate Descartes landing site: U. S. Geol. Survey open-file rept.

EXPLANATION

Proposed landing ellipse

Topographic Symbols

Craters with distinct but somewhat rounded rim crests (dash-dot circle), and apparent outer limit of rim materials based on topographic expression (long dashes)

Ray materials surrounding fresh craters with sharp rim crests

Sharp rim crests of small craters; rim materials not distinguished

Rim crests of subdued, shallow craters lacking obvious topographic expression of rim materials

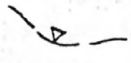
Convex crater floor

Blocks distinguished around or within crater

x

Location of discrete blocks several meters in diameter

Axes and crest of dome-shaped hill



Base of distinct slope or scarp

Geologic units

(After Milton, 1968)

Cth

Hummocky facies of Theophilus Formation, apparently masking Theophilus ejecta; possibly thin mantle of volcanic materials formed after, and as a result of, the impact which produced Theophilus

Ccfh

Hilly floor materials of crater Theophilus; probably brecciated bedrock and ejecta, and(or) post-impact volcanic material

} Copernican System

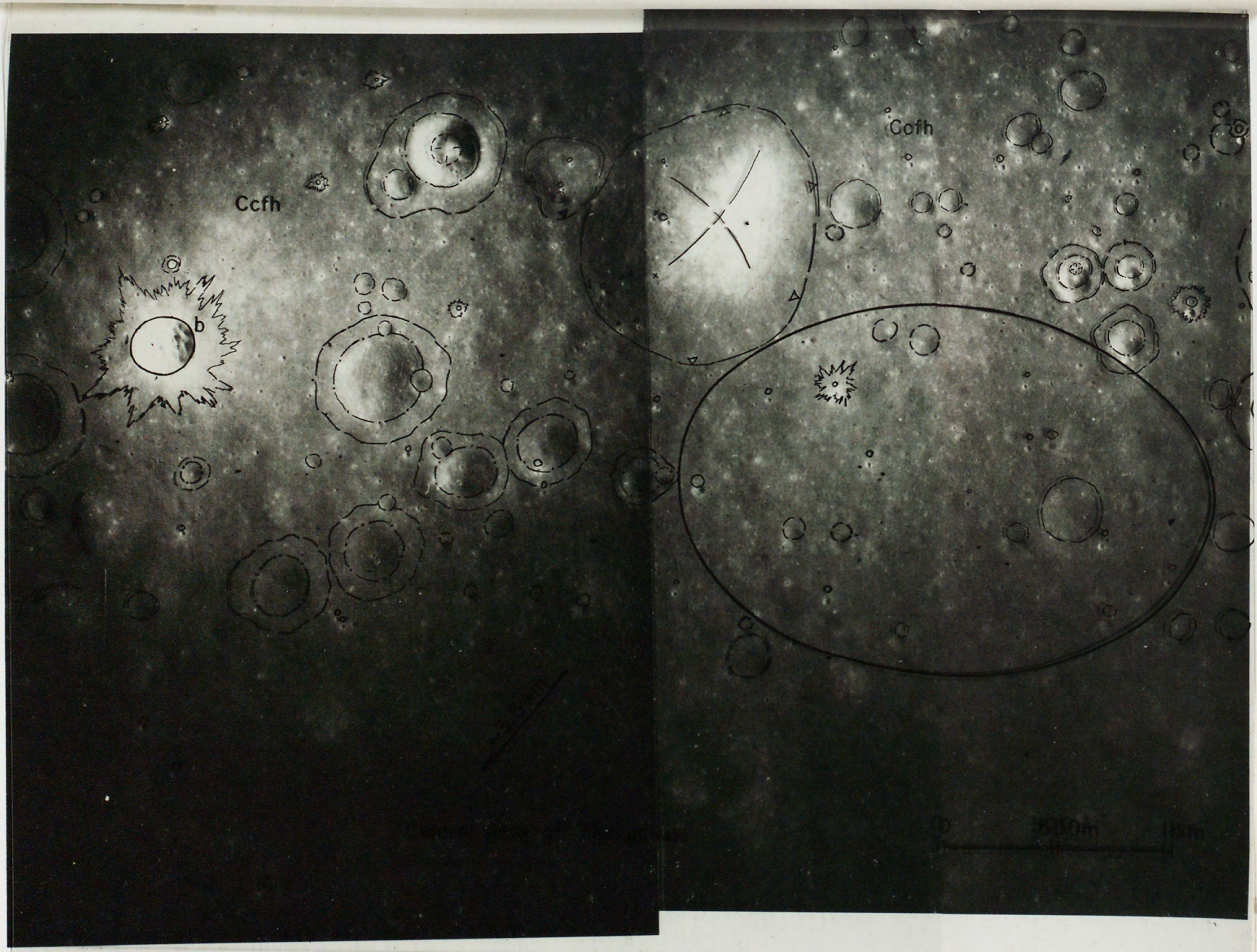
Icah

Hilly facies of Cayley Formation forming generally level plains interrupted by low hills and irregular depressions; possibly composed of volcanic materials, but no obvious volcanic landforms recognized within map area

} Imbrian System

Fig 1.--Floor of crater Theophilus (26.3° E., 11.0° S.)

Hodges sec. 9.


Ccfh
b
Ccfh
0
500m
1km

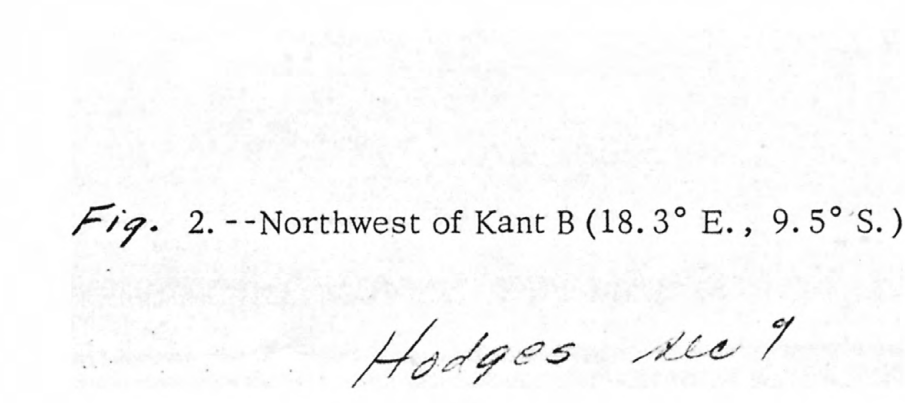


Fig. 2. --Northwest of Kant B (18.3° E., 9.5° S.)

Hodges Rec 9


Icah
~6.5 km
NW rim of Kant B
Icah

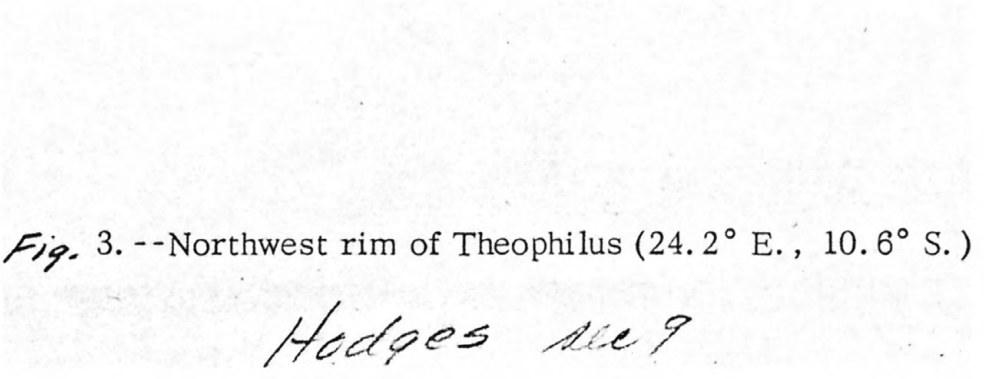
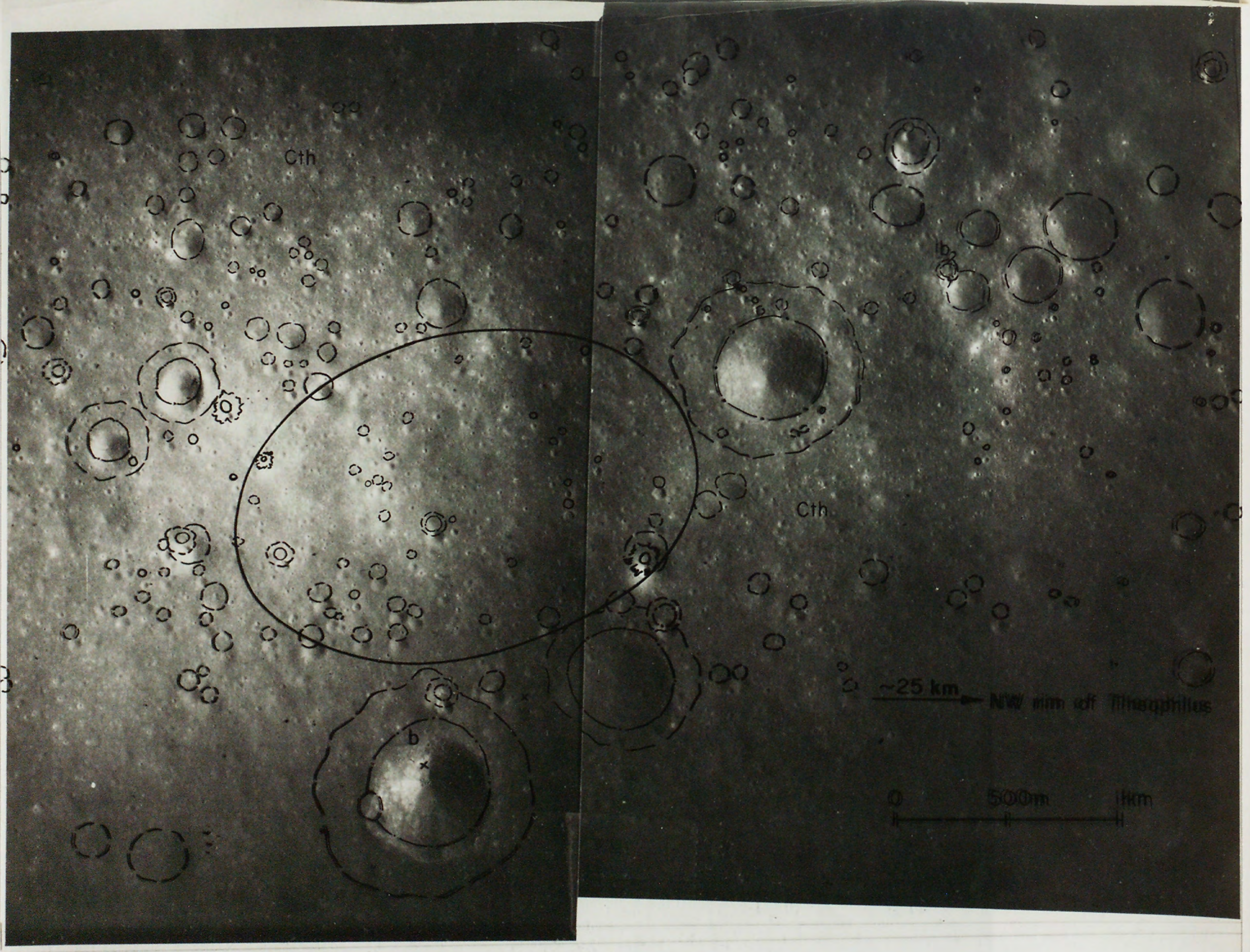


Fig. 3. --Northwest rim of Theophilus (24.2° E., 10.6° S.)

Hodges Ac 9



Cth
lb2
Cth
b
~25 km → NW rim of Theophilus
0
500m
1km