

Morphological Analysis of Surface Features Found at the Apollo 17 Landing Site



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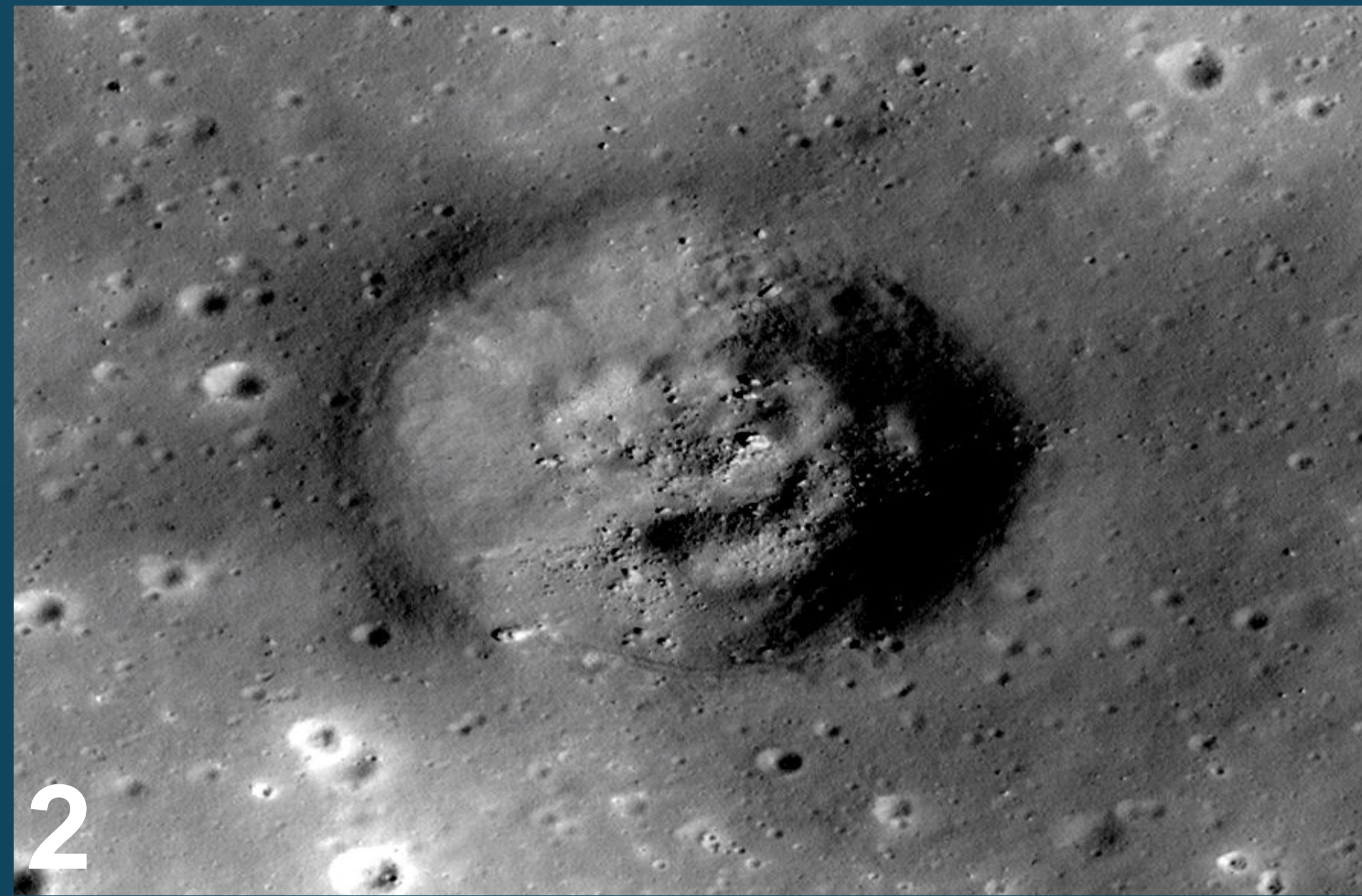
Introduction: Tycho is a lunar impact crater located in the southern lunar highlands. It is a younger crater with an age of 108 million years (Garner). The crater's morphology is sharply defined, unlike older degraded craters.

Key Science Question: What types of craters and other features are present at the Apollo 17 landing site, and could any of the craters be secondaries from Tycho?

Methods: Use LROC images (~0.5-2 m/pixel) to morphologically investigate craters and other features in the Taurus-Littrow Valley to determine if any craters are secondaries from Tycho. This is important because it has implications for crater and sample ages from the landing site, emplacement of the light mantle, and for the possible presence of Tycho materials at the landing site.



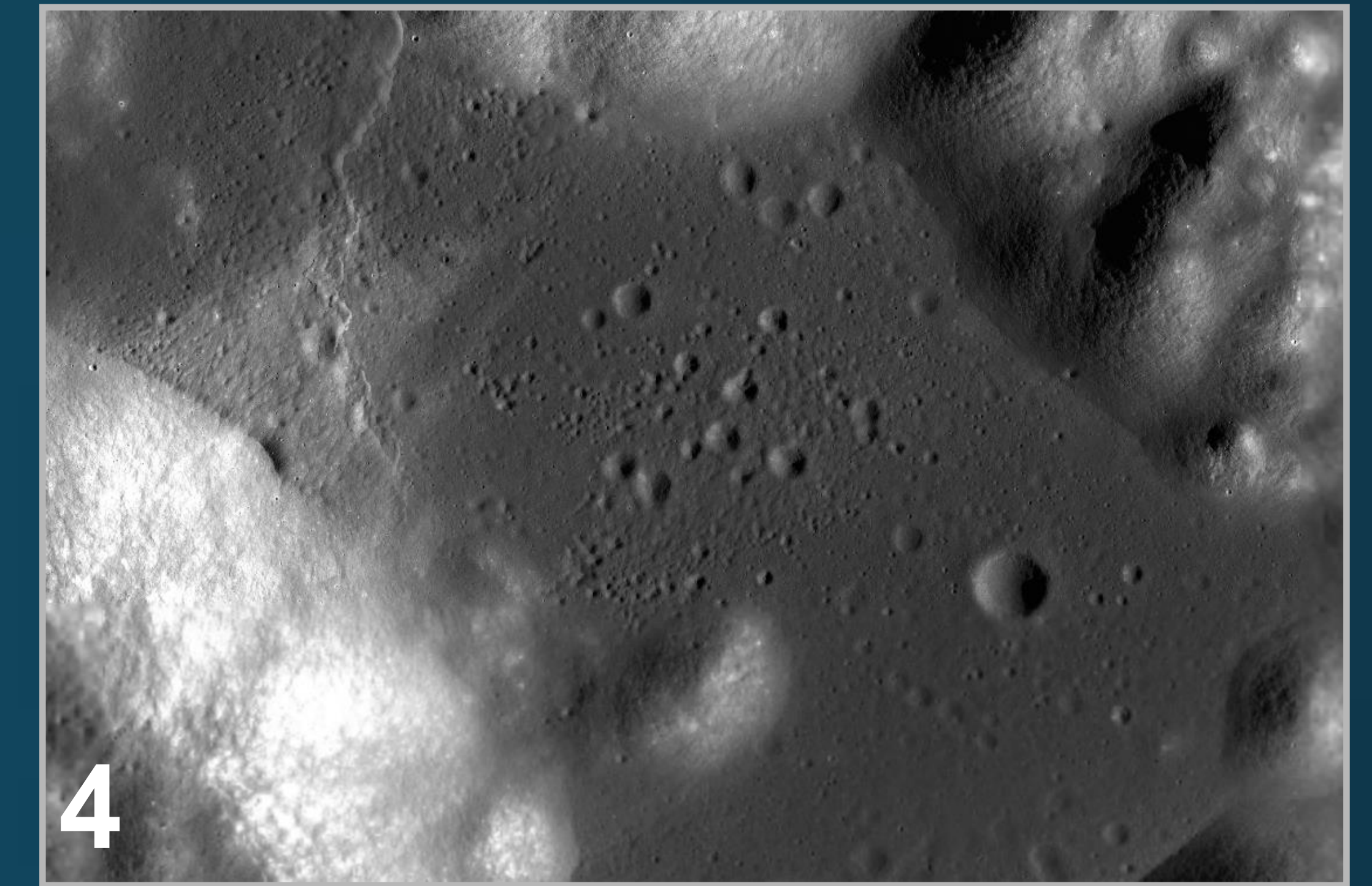
This photo (M134991788R) is taken from an incline on the North Massif of the Taurus Littrow Valley. The illumination is from the left. Our examination of this photo reveals multiple boulders that have rolled on the Moon and have left behind boulder trails. There are also simple craters, rover tracks, and skipping stone patterns. The boulder pictured here was sampled by the Apollo 17 astronauts at Station 6.



Shorty Crater (110 m diameter) is featured in this image (M175077349L; illumination from the right). Shorty has slightly degraded edges, smaller craters inside of it, and visible ejecta. There are small clusters of craters spread around Shorty crater. Some secondary craters are too smooth and defined to have come before this old crater, hence our reasoning that this is potentially a secondary crater produced by Tycho.



Here (M162107606L) we have a string of secondary craters on the edge of the South Massif, near the Apollo 17 site, that were ejected from Tycho. There are some primary craters also present. The newer craters are generally smaller in size. Note the central uplift in many craters and how there is a patch of highland area in the bottom left corner. Illumination is coming from the top right and there is also an abundance of mare seen in the photo.



This is a bird's-eye view LROC image of the Apollo 17 landing site in the Taurus Littrow valley. The image shows features such as craters, regolith, highlands, and mare. The tracks seen on the mountainsides are most likely caused by boulders sliding down the mountain side. Most craters in this picture are simple.

Conclusions:

- Our analysis of LROC images of the Apollo 17 landing site reveal a variety of morphologic features:
 - a) Multiple small craters, boulders, and boulder tracks down the side of the North Massif, as seen in the first photo.
 - b) Morphologic analysis of Shorty crater in the second photo leads us to believe this crater may be a secondary from Tycho.
 - c) The third picture reveals a string of secondaries that we believe originated from Tycho, as well as several small primary craters.
 - d) The fourth photo gives an overview of what the entire valley looks like in relation to the landmarks we analyzed.
- We conclude that there is secondary cratering which we believe is a result of the Tycho impact. This has implications for the ages of the features in the Taurus-Littrow Valley and for the possible presence of Tycho materials.
- More analysis of LROC images is needed to verify these findings and to determine the implications for samples returned by the Apollo 17 astronauts.

References:

Center For Lunar Science And Exploration (CLSE)
Lunar Reconnaissance Orbiter Camera (LROC)
Garner, Robert, and Brian Dunbar. "The Floor of Tycho Crater." NASA. NASA, 19 Jan 2010. Web. 12 Apr.

Region Of Research:

Apollo 17 Landing Site, The Taurus-Littrow Valley