

Gardner Megadome

by Howard Eskildsen

The structure sometimes known as the Gardner Megadome is visible just above the center of the telescopic image (Figure 1a, and Figure 1 below). Its namesake crater, Gardner, has a shadowed interior and lies near the northern margin of the proposed megadome. To the right of the megadome is the lava-flooded ring of Miraldi D. Several domes are visible south of the ruined crater as well as on the lower image.

A caldera-like structure lies near the center of the megadome and to the lower left irregular surface features resemble sinuous rilles, or weathered faults. To the southeast of the “caldera” the surface pattern

is less heavily cratered and younger than the western surface. Chuck

Wood has proposed that this represents more recent lava flow from the caldera (<https://www.lpi.usra.edu/meetings/lpsc2005/pdf/1116.pdf>).

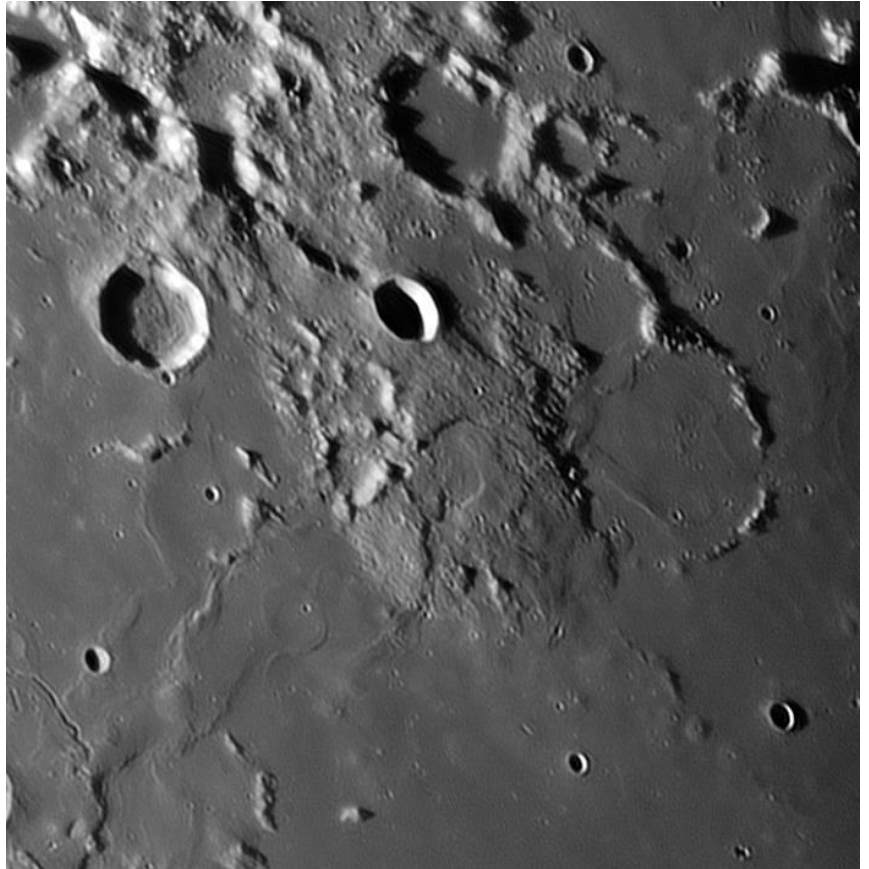


Figure 1a

LROC QuickMap was used to generate elevation charts across the megadome from roughly north to south (N-S) and from west to east (W-E). The paths were chosen to intersect within a depression near the middle of the megadome, that might represent a caldera. Figures 2 through 5 show the sampling paths and corresponding elevation profiles. The megadome appears to be approximately 112 km on the N-S sample path and 90 km W-E with a geometric mean diameter of 100 km. Average megadome height above the surrounding surface for the N-S path is 1366 meters and 1206 meters for the E-W path, for a mean height of 1286 meters. This implies an average slope of 1.5°. However, the elevation chart shows steep upslope at the

megadomedome margins with a plateau-like top. The major part of the upslope at the margins measures approximately 3.7° W-E.

The presumed caldera measured 15 km N-S and 12 km W-E over the sampling paths. Its depth relative to mean rim height was 259 meters N-S path, and 137 meters W-E.

LROC QuickMap images show the area under low illumination (Figure 6), the Clementine UVVIS FeO Abundance (Figure 7), and the Clementine Color-Ratio (Figure 8). The letter “C” marks the caldera area on each image. The Clementine UVVIS FeO Abundance shows higher iron southeast of the Caldera than on the southwestern side of the megadome (Figure 7). The Clementine Color-Ratio (Figure 8) shows the megadome in yellow-orange color consistent with basaltic materials of high iron and lower titanium content while the Tranquillitatus mare basalts appear blue, due to higher titanium content. Red areas adjacent to the megadome are consistent with anorthositic highlands materials.

Therefore it appears that the megadome is composed of basaltic material rather than highland material, but is lower in titanium content than the mare basalts which embay the southern margin of the megadome. Also, the yellow-orange, low-titanium basaltic material extends well beyond margins of the megadome and appears to embay highland material to the east and to the northwest. It appears the megadome and its basaltic material is intermediate age between the older highland anorthosite and the younger, titanium-rich mare basalts to the south.

(See Figures beginning next page)

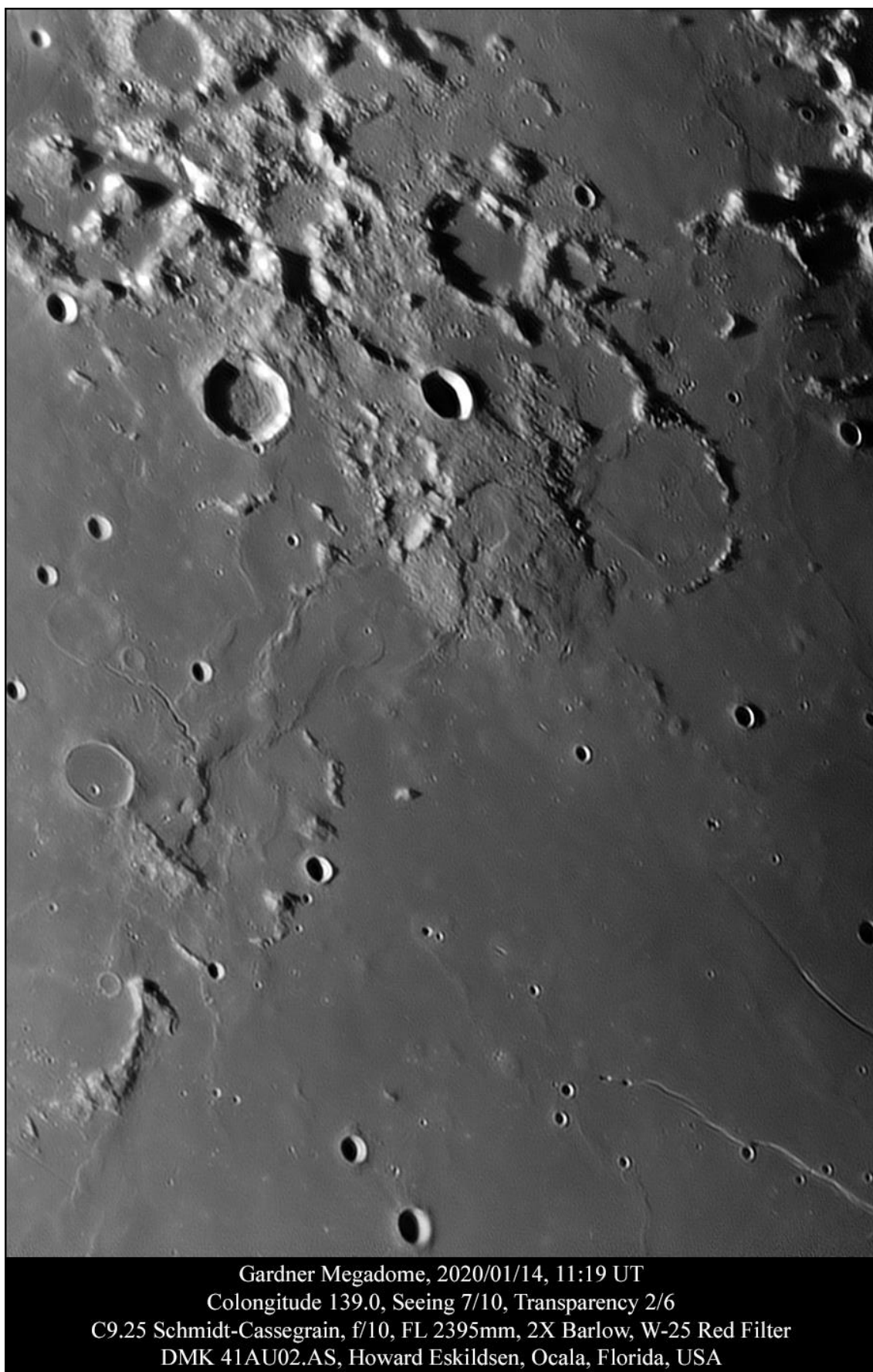


Figure 1

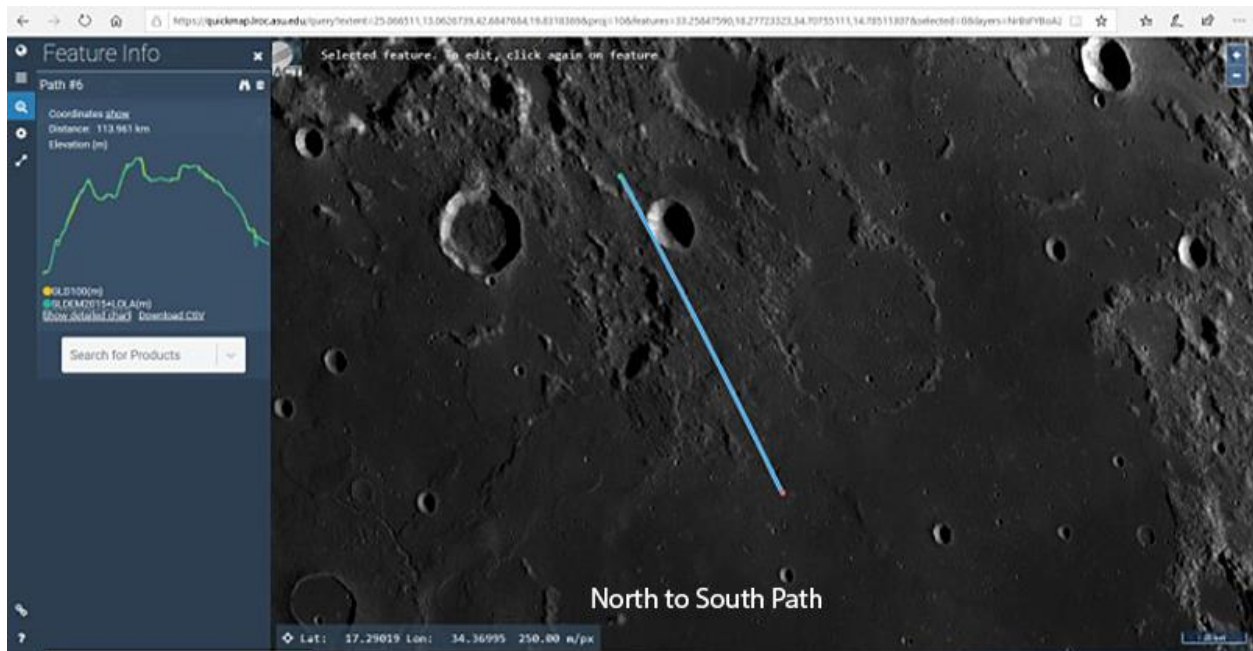


Figure 2

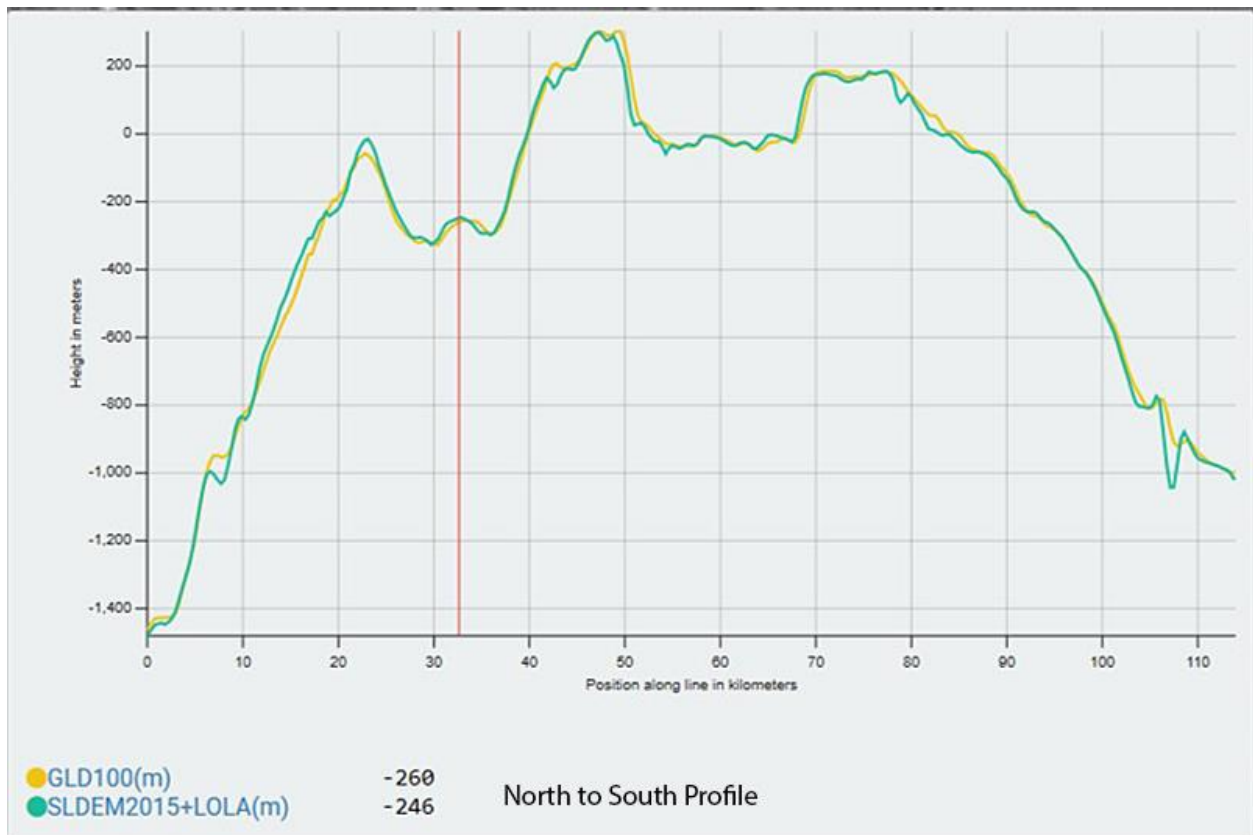


Figure 3



Figure 4

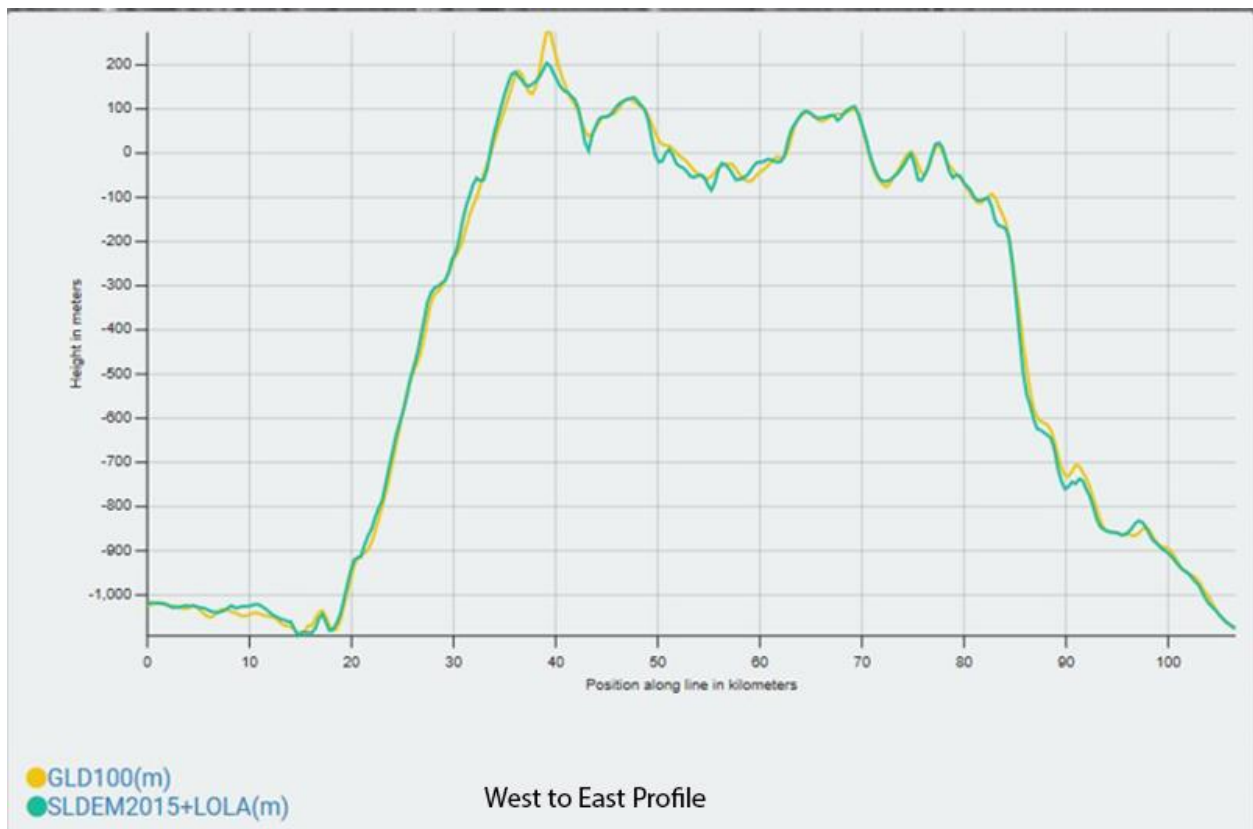


Figure 5

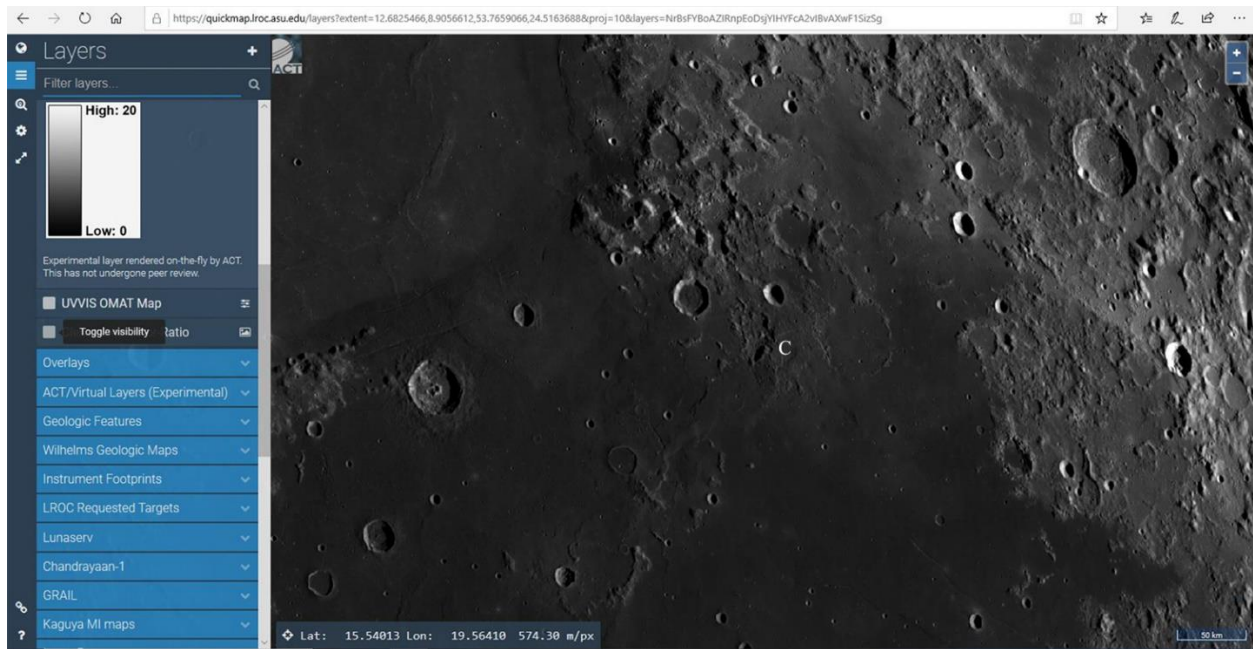


Figure 6



Figure 7

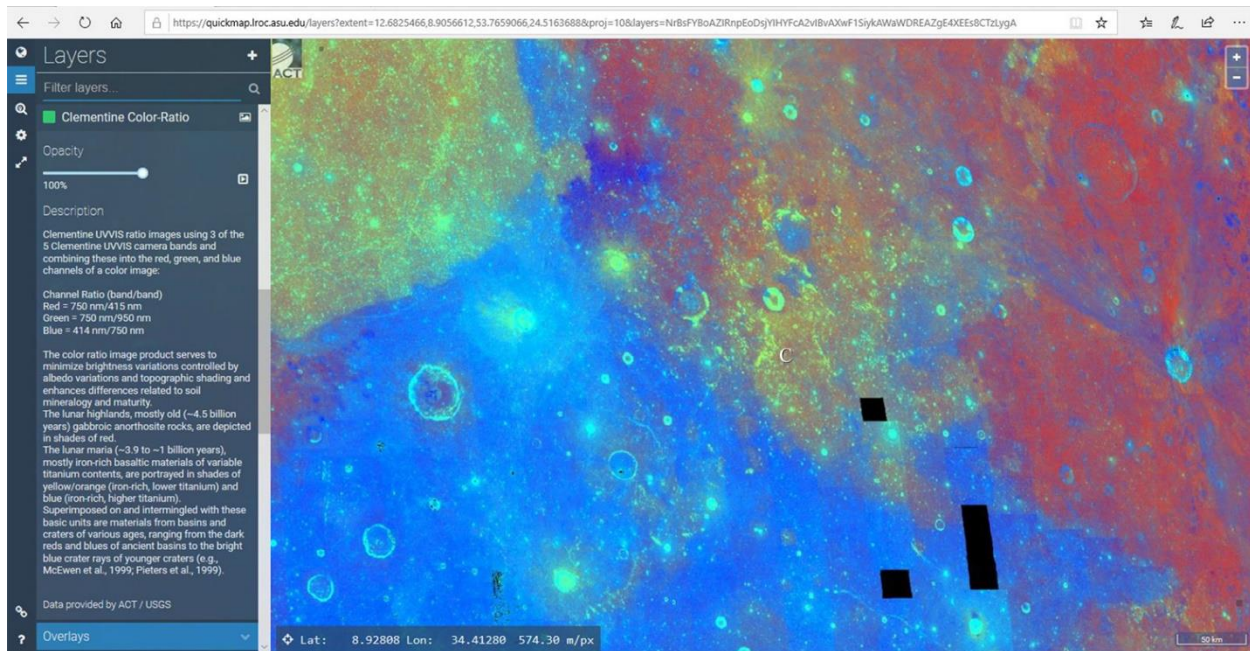


Figure 8