

¹D. Pesce,¹R. Pozzobon,¹M. Massironi

¹Dipartimento di Geoscienze, Università degli Studi di Padova

Geological Map of the Crommelin Crater, Mars

Geologic Features

Aeolian Deposits (AD)

Dark sandy deposits, with very low relative albedo, concentrated in the most depressed areas within the main crater. They are also present inside smaller superposed craters and in accumulations in shadows zones with respect to the prevailing direction of the winds in the area. In high resolution HiRISE images it is possible to see extensive ripple patterns that mark the surface of these deposits, in particular in correspondence of thinner coverages scattered throughout the crater basin.

- Very dark toned, often patchy deposits, with dunes and dust devil's tracks and sometimes forming wind streaks associated with yardangs.
- Mid dark toned, more diffuse and scattered deposits, in transition with the darker AD1, but showing a more homogeneous surface from which patches of the substrate often emerge (evidence of the limited thickness of these deposits).

Superposed Craters (SC)

The material related to superposed craters marking the Crommelin area is mapped with the following geological units.

- Radial material around superposed craters, mostly the biggest ones located on the main crater rim, characterized by intermediate relative albedo and forming extensive mesas with flat tops and sometimes ray-like outlines.
- Proximal ejecta and material forming the crest and slopes of superposed craters.
- Superposed craters' floor deposits.

Layered Deposits Units (LD)

These deposits are the ELDs that occupy the crater depression between the central bulge and the rim. These deposits are clearly formed by light-toned, meter-scale layers, often interlayered with thinner dark-toned beds. Light and dark strata seems to have different mechanic behaviour, with the darker ones more subject to erosion than the light layers. The stratification, generally characterized by gentle dip angles, shows signs of folding. The LD sequence stays stratigraphically on top of bulge's units, and the three recognized LD units seem to be at least partially in mutual heteropic contact in the lower part of the sequence. Moreover, in its upper part the LD sequence shows several mounds of a few hundred meters in diameter, on top or in heteropic contact with the layered sequence and located mainly near the contact with the rim units, which can be interpreted as the so-called mounds unit, or MU (Pondrelli et al., 2011 and 2015).

- Covering the western and southern side of the main crater basin, this unit is characterized by very well-defined stratifications and low relative albedo, and presents evidence of large scale folding. In the western area, the layers are grouped into thick banks (tens of meters of thickness) that stand out from the topography, while in the southern area the layers form a series of elongated basin-like structures (Franchi et al., 2014).
- Prevalent on the northern and eastern side of the main crater basin, this unit is characterized by thinner and less defined layers, with intermediate relative albedo. Both stratigraphically and topographically below the LD1, this formation also shows signs of deformation, but the more subtle stratification (and unfortunately, the worst image quality in this area of the crater) makes more difficult to identify clear deformation structures.
- This unit seems to be in overlay on the rim units, and it is considerably more prominent in the northern part of the crater. LD3 shows high relative albedo and a very rugged and bumpy appearance, with extensive yardang structures that indicate a higher erodibility compared to the other layered units.

Central Bulge Units (CB)

These units make up the main body of the central bulge of the Crommelin crater, and seem to be organized in a loosely concentric ways, with the stratigraphically lower unit exposed in the central part of the bulge. They are overall characterized by an intensive aeolian erosion, evidenced by the presence of many canyons, knobs, ridges and yardangs.

- This formation mainly dominates the north-eastern and steepest side of the bulge, showing an intermediate to low relative albedo, a layered structure, visibly folded and deformed, and signs of greater erosion, with deeply incised valleys and irregular yardang crests.
- Alongside with CB1, this formation make up the rest of the sides of the bulge but, unlike CB1, it seems to surround and enclose the innermost CB3. CB2 shows a more homogeneous surface, with pitted and somehow fibrous-like appearance and intermediate relative albedo.
- The last and stratigraphically deepest unit of the bulge mostly occupies the central and topographically highest part of the bulge. Showing high relative albedo and an overall rugged and eroded appearance, it forms extensive mesa mainly on the very top of the bulge.

Rim Related Material and Proximal Ejecta (RM)

These units consist of impact-related brecciated material and ejecta that constitute the main rim of the Crommelin crater. They have a very similar appearance, but they are distinguished by a significant difference in relative albedo.

- Bumpy but overall regular appearance, low relative albedo.
- Bumpy but overall regular appearance, very high relative albedo.

Surrounding Terrains (ST)

- The oldest unit cropping out in the study area are the heavily cratered surrounding plateau, showing rough textures on medium-resolution images, interpreted as the Cratered Unit: a Noachian plateau sequence consisting of pyroclastics, lava flows and impact-related ejecta and brecciated material (CU, Tanaka et al., 2014; Pondrelli et al., 2015).

Geologic Contacts

- Contact, certain
- Contact, approximate
- Contact, gradational approximate
- Contact, inferred

Structural Features

Faults

- Fault, certain
- Fault, inferred

Morphological Features

Ridges

- Yardang ridges
- Radial hardened ridges

Craters Outlines

- Crommelin crater outline
- Superposed craters outlines

