

**Geology of study region:** Serenitatis is the oldest impact event in this investigative region, which occurred at Lunar Heavy Bombardment (LHB) period. Analysis of Apollo 17 felsic clast of breccia rocks age dating concluded that Serenitatis impact event occurred at  $3.87 \pm 0.04$  Ga [1]. Serenitatis shows mass concentrations (Mascon) inside it and filled with several series of magmatic activities [2,3,4]. Imbrium basin is second most large impact basin in the study region and also most significant event in shaping the near side of the lunar surface. The Impact occurred at 3.85 Ga [5]. The

produced by product of meteoroid impacts ranging from nanometer to kilometers. These regolith particles will react with the solar wind from sun and galactic cosmic rays forms iron agglutinates. This will affect the optical properties, prolonged exposure to space leads to darkening and reddening. The reflectance spectra from matured region exhibits low value. Fresh craters shows higher OMAT value and brighter in tone indicates lower matured region with fresh materials. Regional dark mantling deposits are lower OMAT value and darker in tone indicates highly matured region (1a-d, Figure 2). Ejecta blanket of south-eastern Serenitatis basin (2) shows lower OMAT value indicates this part of terrain is prolonged exposure to the space weathering process (Serenitatis impact event 3.87 Ga).

Serenitatis impact is first multi-ring impact event in the study region excavated the anorthositic highland terrain. Later, Imbrium is also multi-ring impact event that shaped the nearside of the moon. Imbrium may be one among inducing factor in basaltic lava flows into surface. Probably after the two major impact events, fire fountain volcanism had erupted with explosive nature. These explosive volcanism had brought the deeper mantle materials into surface and composed of quenched volcanic glasses, pyroclastic deposits and even spinel in Sinus aestuum. Later to this basaltic flows is erupted is various episodes. In recent lunar geological period (Copernican period) the degassing of carbon monoxide was inferred from Irregular Mare Patches morphology. Cooling of interior moon and basaltic lava flows had created lobate scarps recently was observed from the high resolution data sets like LRO LROC NAC images.

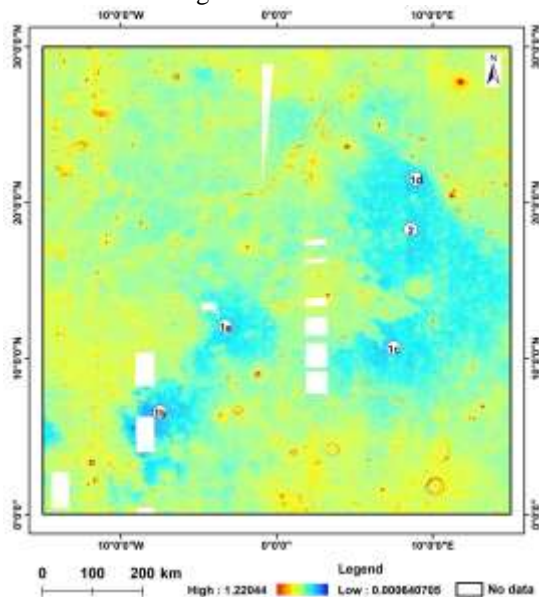


Figure 2. The optical maturity (OMAT) map of the study region with colour coded. Higher value of

OMAT indicates these are unwethered and fresh materials (Red in colour coded image). Lower value of OMAT indicates weathered zones and highly matured region (Blue in colour coded image). 1(a-d) – Matured dark mantling deposits (DMD); 2 – Matured south-eastern ejecta blanket of serenitatis basin.

**Conclusion:** Clementine multispectral global data sets is capable in compositional analysis and calculation of optical maturity variations. Evolutionary history of the region was finally brought out for the Interbasinal region between Imbrium and serenitatis basin.

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