

Radar Observation of Lunar Craters Ohm and Stevinus using m-chi decomposition and Circular Polarization Ratio Techniques

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Abstract: The aim of the study was to observe two lunar impact craters of Copernican age, Ohm (18.4° N, 113.5° W) and Stevinus (32.5° S, 54.2° E) under microwave radar data of Miniature Radio Frequency (Mini-RF), an instrument onboard Lunar Reconnaissance Orbiter (LRO) of NASA, where Ohm is located on the far side of the Moon and Stevinus is situated on the near side of the Moon. We have analyzed the characters of impact ejecta melt of both the craters in radar data which are not evidently distinguished in the high resolution optical data of Narrow Angle Camera (NAC) and Wide Angle Camera (WAC) of LRO mission. Circular Polarization Ratio (CPR) and m-chi decomposition images were developed using ENVI and ArcGIS software which were used to understand surface roughness and backscattering properties of Ohm and Stevinus craters. Both the craters evidently have high CPR values indicating either exposure of fresh material or elevated surface roughness due to surface geometry. The m-chi decomposition of Ohm and Stevinus craters shows dominant yellowish hue suggesting a backscatter combination of double-bounce (db) scattering and volume scattering (vs) in contrast to the surrounding terrain which shows Bragg scattering (bs) according to the 7-fold classification colour-wheel. Using available optical and Mini-RF data Geological Maps of both the craters were generated including features such as boundary of ejecta blanket, ejecta boulders and mass wasting in the crater.

Keywords: Ohm, Stevinus, Circular Polarization Ratio, m-chi decomposition