Appraisal of Physical properties of Petavius B crater using Mini-RF data

Shreekumari M. Patel*, Paras M. Solanki

Department of Geology, M. G. Science Institute, Ahmedabad, India 380009
*Corresponding Author E-mail: ipatelshree@gmail.com

Abstract: The study aimed to observe Petavius B (19.9° S, 57.1° E) under microwave radar data of Miniature Radio Frequency (Mini-RF), an instrument onboard Lunar Reconnaissance Orbiter (LRO) of NASA[1]. Petavius B is located on the near side of the Moon, in the east direction to Mare Fecunditatis and north to the crater Wrottesley. The characteristics of the crater impact ejecta melt in radar data that are not discernible in high resolution optical data Narrow Angle Camera (NAC) of LRO mission have been studied[2]. Circular Polarization Ratio (CPR) and m-chi decomposition images were developed using ENVI and ArcGIS software to understand the surface roughness and backscattering properties of Petavius B[3]. Petavius B have high CPR and even values inside the crater and the ejecta blanket, indicating either the exposure of fresh material or contributed due to surface geometry. The m-chi decomposition of the crater and continuous impact ejecta blanket shows a dominant yellowish hue conforming to the 7-fold colour classification signifying the backscattering combination of double-bounce (db) scattering and volume scattering (vs). Double bounce scattering might be either due to the dihedral or di-planes surface geometry of crater floor and crater rim, wall terrace, or dihedral boulders and blocks spread over the target region. At the same time, volume scattering suggests the presence of suspended particle beneath the thin layer of regolith formed by solar weathering over a while. The discontinuous ejecta blanket shows single bounce Bragg scattering, indicating the relatively thin fresh ejecta layer of a meter or less. Bragg scattering is the predominant scattering mechanism in the surrounding terrain due to a mature layer of lunar regolith.

Keywords: Petavius B, Circular Polarization Ratio, m-chi decomposition

[1] Raney, R. K., Cahill, J. T., Patterson, G. W., & D. B. Bussey, *JGR: Planets*, 117 (2012).
[2] Patel, S. & P. Solanki, *39th Asian Conference on Remote Sensing (ACRS)*, (2018).
[3] Thaker, A. D., Patel, S. M., & P. M. Solanki, *Journal of Earth System Science*, 129 (2020).