STUDY OF PLATO CRATER WITH THE MINI-RF

OPN Calla*  
opnc06@gmail.com

Shubhra Mathur*  
shubhra.icrs@gmail.com

Monika Jangid*  
monika.jangid.icrs@gmail.com

*International Center for Radio Science, Jodhpur Rajasthan India

A Brief Overview

Mini-RF combines SAR at two wavelengths (S-band and X-band) and two resolutions (150 m and 30 m) with interferometric and communications functionality.

STUDY AREA - PLATO CRATER (51.6°N 9.3°W)

Plato is the lava-filled remains of a lunar impact crater on the Moon. In Figure 1 the optical image of the Plato crater is overlaid with the S and X band images [1,2] having the common area. There are some places on the lunar surface where the data of both S and X band. Such type of study with both frequencies is very useful for analyzing the surface properties in more enhanced manner.

Dielectric Constant

Campbell’s model[5] is used for estimating dielectric constant of rock-poor mantling dust based on the normalized ratios between the horizontal and vertical backscattering coefficient. Dielectric constant is calculated over the Plato crater using equation given below:

$$\epsilon_r = \left( \frac{\sin \varphi}{\sin \left( \cos^{-1} \left( \frac{\sigma_{||}}{\sigma_{\perp}} \right) \right)} \right)^2$$

Conclusion

This decomposition shows that floor of the crater is slightly rough because of presence of small and secondary craters and the maximum points of volume scattering over rim with some points over crater floor is due the presence of lava deposits. The decomposition image over S-band data shows less roughness when it is compared with the decomposition image of X-band. In case of S-band value of the dielectric constant varies from 0 to 20 with the maximum points observed between 1 to 4 and some anomalous points while in X-band maximum points are observed between 1 to 3 with few points above the given range, i.e., 1 to 3 are shown in the figure 3 along with the colour bar indicating the dielectric constant values.

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The Scattering behavior of Plato crater has been observed using different decomposition techniques like m-degrees and m-chi[4]decomposition which represents the combination of surface, double bounce, and volume scattering in RGB format.

References


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