

Mineralogical diversity of Mare Undarum derived using Hyperspectral data

Arpita Purohit*, Shreekumari Patel and Paras Solanki
Geology Department, M.G. Science Institute, Ahmedabad, Gujarat
*arpitapurohit23@gmail.com

Abstract: Mare Undarum is an irregular, shallow maria seen on the eastern most part of the near side of moon. It's Selenographic co-ordinates are 7.49° N and 68.66° E and it is located in between the south-eastern part of Mare Crisium and west of Mare Marginis with a diameter of 244.84 km. The composition of this area is studied with the Moon Mineralogy Mapper (M³) data which is a push-broom Imaging Spectrometer. ENVI (ENvironment for Visualising Images) software is used to recognise the minerals present in this area by studying their spectral profiles. The minerals on the lunar surface are recognised with the spectral profile with wavelengths in between the visible and the near-infrared range.

From the M³ data, the minerals found are HCP (High-Calcium Pyroxene) which has been derived from the lower crustal portion. It indicates the presence of noritic rock composition which might have been formed due to magmatic differentiation. Olivine shows the presence of komatiitic basalt which has been derived from the mantle portion of the moon and has been exposed as a result of an impact phenomenon. Spinel mineral might form part of mafic intrusion which has been derived from the lower crustal region. The spinel is among the last mineral to be crystallised during solidification of a water-bearing magma ocean [1]. The origin of olivine and spinel could be linked with plutonic events, resulting in the intrusion of magmatic bodies into the lower crust [2]. Also, with the help of LROC-WAC data, TiO₂ abundance is found to be in between 3-5%, indicating the presence of low-titanium containing basalts.

This study has been carried out to understand the regional lunar sub-crustal stratigraphy which may help in further assessing the bulk composition of lunar interior.

References:

- [1] Lin et al. (2017) Nature Geoscience, 10(1), 14-18.
- [2] Pieters et al. (2011) Journal of Geophysical Research, 116, E00G08.