

## Mineralogical characterization of the basaltic floor of Tsiolkovisky crater, Moon with Chandrayaan-1 Moon Mineralogy Mapper

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This study has explored the mineralogical abundances of the far side basaltic pool, present within the Tsiolkovisky crater floor. This crater serves the best example of the far side volcanic activity. Mineralogical study of the mare basalts provide the clue regarding its mode of formation, temperature-pressure condition and the possible source depth. Detailed compositional abundances has been investigated using Moon Mineralogy Mapper (M<sup>3</sup>) data from India's Chandrayaan-1 mission [1]. M<sup>3</sup> level-2 data which is pixel located, thermally corrected, photometrically corrected [2], [3] reflectance data with optical period-OP1A and OP1B from the 100 km orbital altitude is acquired from PDS Geoscience node. Integrated Band Depth (IBD) Parameter technique has been utilized to derive spatial distribution of different basaltic units [4], [5], [6]. Based on the colour variation in the IBD false colour composite image, the basaltic floor is divided in to three spectral units i.e. Ts1, Ts2 and Ts3. Number of small craters were spectrally sampled from each unit and detailed spectral analysis was done by calculating band depth, band center and band area ratio. The result shows presence of high calcium pyroxene bearing material particularly augite to sub augite bearing mineralogy in Ts2 and Ts3 unit and olivine- high calcium pyroxene mixture bearing material in Ts1 unit. Mineralogical difference of these basaltic units indicates multiple episodes of the lava flows. Ts1 basaltic episode would have erupted first and occupied the southern most part of the floor, Ts2 and Ts3 would have erupted in the next episode of volcanic eruption and flowed from northern to central part of the crater floor. Mineralogical abundances of the Tsiolkovisky basaltic floor indicates moderate to greater source depth for this far side basaltic pool, which may have formed due to very intense impact on the thicker crust of the far side of the Moon.

### References:

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