Using Crater Size–Frequency Distributions to Determine and Compare the Relative Ages of Selected Lunar Regions

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In this study, I applied the crater size–frequency distribution (CSFD) technique to determine and compare the relative ages of three distinct lunar regions: Mare Imbrium, Mare Nectaris (older), and the Aristarchus / Oceanus Procellarum region (younger). Crater diameters were systematically measured using the Lunar Reconnaissance Orbiter Camera (LROC) QuickMap tool within carefully delineated study areas to minimize the effects of secondary resurfacing and structural disturbances. Data were compiled into diameter bins and used to construct CSFD plots in log–log space, showing the cumulative number of craters per unit area against crater diameter. The resulting distributions were compared with standard lunar chronology models and previously published datasets to estimate absolute and relative ages.

By examining multiple regions of varying geological ages, this study provides a comparative framework to analyze differences in crater retention, resurfacing events, and surface histories. The comparative approach highlights how mare emplacement age, local geological processes (such as volcanism, tectonism, and secondary cratering), and target properties influence CSFD slopes and derived model ages. Graphical analysis is used to illustrate differences among the three regions, and results are interpreted in the broader context of lunar geological evolution.