Surface Age Estimation of Selected Lunar Features Using Crater Size – Frequency Distribution (CSFD) Technique



Name: Tirtha Joshi Designation: Research Intern Institution: ISTAR - CVM UNIVERSITY	Guide: Dr. R. Phani Rajasekhar	
	Contact e-mail: rajasekhar@sac.isro.gov.in	
	Internal Guide: Dr. Krunal Suthar	25
	Contact e-mail: krunal.suthar@cvmu.edu.in	

MAJOR OBJECTIVES:

- 1. Learn how to use Crater Size Frequency Distribution (CSFD) technique for estimating the surface ages of lunar geological features.
- 2. Utilize high-resolution lunar datasets, specifically LRO NAC and SELENE TC Orthoimages and Digital Terrain Models (DTMs), for geological analysis.
- 3. Develop skills to map impact craters on lunar surfaces by utilizing Geographic Information System (GIS) Software particularly ArcGIS and its CraterTools add-in.
- 4. Process crater diameter data and produce surface age estimates using the CraterStats software, as per the CSFD Method.

METHODOLOGY FLOW CHART:

Acquiring Lumar datasets (LRO NAC, SELENE TC) by using QuickMap, USGS Pilot, and SELENE Data Archive

Mapping impact craters on selected lunar features utilizing ArcGIS and CraterTools.

Measuring and exporting crater diameters within ArcGIS environment for analysis.

Deriving Surface Age Estimates by using Crater Size – Frequency Distributions using CraterStats Software.

RESULTS/MAJOR FINDINGS:

- Crater mapping was completed for nine domes in Mare Insularum region and four buried craters in Mare Fecunditatis region using LRO NAC and SELENE TC orthoimages within an ArcGIS environment.
- Crater diameters were measured for each mapped crater, and the data was compiled for input into CraterStats.
- CraterStats analysis produced crater size-frequency distribution plots, from which surface age estimates were derived for each feature.
- The estimated surface ages for the domes within Mare Insularum region range from 87.5 million years to 3.55 billion years, and for the buried craters within Mare Fecunditatis, range from 3.48 billion years to 3.62 billion years.

CONCLUSION:

The CSFD method was applied to estimate the surface ages of selected lunar features in Mare Insularum and Mare Fecunditatis, yielding surface age estimates. These findings have implications for our understanding of lunar volcanism, suggesting that volcanic activity in this region occurred over an extended period. The variations in dome ages may reflect different episodes of volcanic eruptions or distinct magma sources.



02 DEC 2024 to 01 APR 2025