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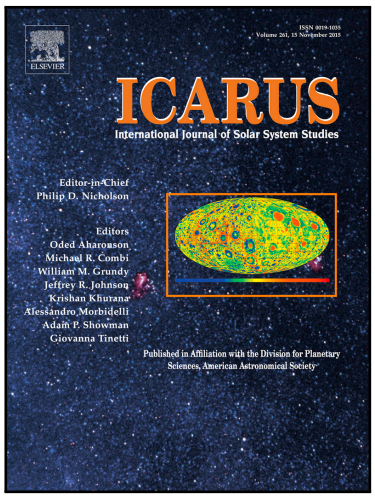

Small lunar craters at the Apollo 16 and 17 landing sites - morphology and degradation

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Highlights

- Detailed morphological analysis of small craters (SLC; size 35 m 250 m) at the Apollo 16 and 17 landing sites.
- The freshest observed craters are relatively shallow (d/D $<$ 0.17) and have moderate wall slopes (median wall slopes $\sim 22^{\circ}$). Assuming SLCs are formed with deeper transient cavities (d/D $>=$ 0.2), we suggest that SLCs undergo an initial rapid degradation until their shapes attain stability, followed by a slower degradation rate.
- Most small craters are degraded (class C), resulting in a landscape dominated by shallow, inverted cone-shaped craters at the sites. More than 50% of the crater evolution time (formation to obliteration) is spent as a class C crater while less than 5% is spent as a class A crater.
- Increased degradation rate is observed at plains of Apollo 17 Taurus Littrow compared to Apollo 16 Cayley. It is proposed that seismic shaking and/or relatively unconsolidated target materials are responsible for the higher degradation rates.
- Due to the changing nature of relationship between morphological parameters for craters forming in regolith (influence of target and seismic activity) generic regression models are insufficient in describing morphological relationships for SLC. Probability based models coupled with regression models can precisely describe such relationships.
- A new classification method was introduced that enables standardized morphology-based cross-comparison of SLC degradation states. Three different crater shapes (Sigmoid type 2, Sigmoid type 1 and inverted cone) are formally defined to compare of SLC shapes across the Moon in future work.

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