

Ejecta Thickness Distribution of Lunar Schrödinger Basin

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A hypervelocity impact on a target with solid surface forms an impact crater, and a fraction of debris is ejected and emplaced ballistically from the crater. The thickness distribution of primary ejecta gives insight into the processes of impact cratering, the stratigraphy of planetary crust, the evolution of planetary surface, and the source of lunar samples. However, the widely used empirical ejecta thickness distribution model of McGetchin et al. (1973) is inconsistent with recent observations of complex craters and the Orientale basin.

As a typical case to address this problem, here we conducted detailed measurements of ejecta thickness distribution for Schrödinger Basin, which is a large impact basin located near the lunar south pole, the best-preserved peak-ring basin, and the second youngest one on the Moon.

Based on LROC WAC, Kaguya TC, and LOLA DTM data, the thickness of primary ejecta is estimated indirectly from the measurements of partially filled pre-basin craters using crater morphometry and the effect of crater degradation is taken into considerations. The results show that the ejecta thickness distribution of Schrödinger Basin is more consistent with Pike (1974)'s model rather than McGetchin et al. (1973)'s, the excavation of Schrödinger basin-forming impact does not penetrate through lunar crust, and the rim relief of Schrödinger Basin consists mostly of rim uplift rather than the primary ejecta.

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