Collisional disruption of meter-sized boulders of the Moon

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The surface condition of planetary bodies reflects its geological evolution. Many boulders are observed on the surface of the Moon. It is thought that collisions of micro bodies disrupt boulders, and makes them fine. Recently, lunar explorations such as SELENE project and Lunar Reconnaissance Orbiter (LRO) obtained high-resolution images of the lunar surface. The high-resolution images allow us to perform statistic investigation of meter scale boulders on the lunar surface.
To reveal the time scale of boulder disruption on the Moon surface and to put constraints on dominant factors (for example, impacter frequency and boulder's strength) for boulder disruption, I performed size-frequency measurement of boulders (D >5 m) on ejecta of 19 small craters (D = 210–920 m), which exist on the floors of Copernicus crater (D = 92.5 km) and King crater (77.3 km). Also, the formation ages of the small craters were estimated from crater densities around the small craters.
The relationship between the boulder frequencies and the formation ages of the small craters indicates that the number densities of boulders decrease exponentially with time. The half-life period of boulder frequency in the King floor is estimated as 75 Myr, about 3 times longer than that in the Copernicus floor. A numerical model of boulder disruption reveals that the impactor frequency and boulder's strength have a significant influence on the survival time of boulders. The observed half-life period of boulders corresponds with a model for size-frequency distribution of impactors with a flatter slope.

Keywords: Moon, boulder, collisional disruption

