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Comparison of Rock Population Evolution Around Copernican Craters, Mare Versus Highlands

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Previously, we have determined the ages of Copernican craters (younger than ∼1.5 billion years old) larger than 10 km in diameter, using the rockiness of their ejecta (Mazrouei et al., 2018). Young surfaces have fresh, large rocks, while older terrains have lower rock abundances. Large rocks are transformed to regolith over a period of about a billion years, providing an inverse relationship between the rockiness of craters' ejecta and their age (Ghent et al., 2014). This method works on the assumption that all craters larger than 10km produce statistically similar initial rock populations.

In this work, we investigate the evolution of rock population around Copernican craters and compare across different target terrains (mare versus highlands). This is done by mapping boulders in the ejecta of four similarly sized Copernican craters (using high resolution images from the Lunar Reconnaissance Orbiter's Narrow Angle Camera), two on the mare and two on the highlands. We choose same-sized craters (∼10 km), because resulting boulder sizes from an impact are proportional to the crater diameter. The pair of craters from each target terrain differ in age, a young one (∼100 Myr) and an old one (∼700 Myr). We use our data from the young craters to see whether the initial rock populations are similar for both mare and highland craters. We study the evolution of the rock populations, using the data from all four craters, to determine if terrain target has any effect on the survival rate of different sized rocks. Our preliminary results support the assumption that craters larger than 10km have similar initial rock populations, regardless of their target terrain.

References:

Mazrouei, S. et al. New evidence for a Phanerozoic increase in the impact flux on the Moon and Earth. Science (in review).

Ghent, R. R. et al. Constraints on the recent rate of lunar ejecta breakdown and implications for crater 248 ages. Geology 42, 1059–1062 (2014).