Crater Correlations: A Morphological Analysis on Lunar and Mercurian Simple Impact Craters

Palma, Jasmine (School: Townsend Harris High School)
Wu, Michelle (School: Townsend Harris High School)

Impact cratering is the circular depression byproduct of meteorite collisions on a solid celestial body. Impact craters are important geological and geomorphological features that not only may have a commercial impact, such as reservoirs of ores, but also are pivotal for studying terrestrial geology, comparative paleontology, and other scientific pursuits and investigations. (Masaitis 1992) It was hypothesized that Mercurian craters (1) are shallower due to quicker landform degradation and topographical evolution on Mercury than on the Moon, and (2) have smaller ejecta radii on average when compared to Lunar craters due to the Moon's smaller gravity. Data was collected from NASA's Mercury Surface, Space Environment, Geochemistry and Ranging spacecraft (MESSENGER) and the Lunar Reconnaissance Orbiter (LRO). From ACT-REACT planetary interfaces, the depth, diameter, and ejecta radius of simple impact craters were measured via the respective body's QuickMap, then subjected to a linear regression analysis. It was found that between the two celestial bodies, the sequence from most to least familiar correlations was the crater depth vs diameter relationship, followed by the ejecta radius vs crater diameter relationship and the ejecta radius vs crater depth relationship. On average, it was found that Mercurian craters are shallower, supporting the first part of the hypothesis, and that Lunar ejecta radii are smaller, refuting the secondary hypothesis.