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The evolution of lunar rock size-frequency distributions: An updated model

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The model for the catastrophic rupture of rocks on the lunar surface [1] is revisited by considering new functions describing rock shattering by impacts and size-frequency distributions of meteoroids. The input functions are calibrated by comparing the model block size-frequency distributions with the measured size-frequency distribution of ejecta blocks around Tycho crater, which formation age is known. We find that the evolution of lunar block size-frequency distribution in the range 1–50 m is as follow: For young (≤ 50 Myr) population, the size-frequency distribution is best approximated by a power law, whereas for older populations, the extrapolation at small diameters is best performed by an exponential distribution. New destruction rates are in better agreement with recent measurements [2,3] compared to the original model. For rocks above ~ 5 cm the survival time increases with increasing size, whereas for rocks below ~ 5 cm the survival time slightly increases with decreasing size. The updated model allows the estimation of both the exposure age and the initial abundance of a block field using the measurement of a block size-frequency distribution from LROC/NAC images.

References: [1] Hoerz et al., 1975, *The Moon* 13, 235–258. [2] Basilevsky et al., 2013, *PSS*, 89 (118–12). [3] Ghent et al., 2014, doi:10.1130/G35926.1.