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The smallest crater production size-frequency distribution on Mars

Stephanie C. Werner (1), Olga P. Popova (2), Cathy Quantin (3), and William K. Hartmann (4)

(1) Centre for Earth Evolution and Dynamics, University of Oslo, Oslo, Norway (stephanie.werner@geo.uio.no), (2) (Institute for Dynamics of Geospheres of the Russian Academy of Sciences, Moscow, Russia, (3) Laboratoire de Géologie de Lyon Terre, Planètes,Environnement (CNRS-ENSLyon-Université Lyon1),Villeurbanne, France, (4) Planetary Science Institute, Tucson, AZ, USA

We selected areas on Mars that are mapped as very young, where we anticipate minimal surface modification since crater formation. By comparing shapes of the size-frequency distribution (SFD) of craters, measured with HiRISE and other image data in several such areas, we attempt to determine the least altered SFD, and thus identify the shape of the pristine, or "production" distribution (PSFD) at meter- and decameter-scale crater sizes on the surface of Mars. We identify several effects, dependent on factors such as surface materials, layered target materials, surface elevation, and the somewhat stochastic meteorite breakup mechanics, which may cause modest variations in the shape of the observed distributions at meter scales from one place to another on Mars, and suggest that surface modification on Mars, especially aeolian deposition modifies the crater record in very short time-scales.
Better understanding of the PSFD shape not only allows more accurate crater chronometry of Mars, but also places limits on losses of weak bolides during passage through the atmosphere of Mars. We estimate the PSFD of Martian craters (including the effects of atmospheric loss of weak meteoroids, for craters down to diameter D $\sim$ 2m) and will propose a new polynomial description for the smallest crater range currently covered by modern imagery.