NEW DATED IMPACTS ON MARS AND THE CURRENT CRATERING RATE. Ingrid J. Daubar[1], A. S. McEwen[1], S. Byrne[1], M. Kreslavsky[2], L. Saper[3], M. R. Kennedy[3]. [1]University of Arizona, Tucson AZ, 85721. (ingrid@lpl.arizona.edu) [2]University of California Santa Cruz, Santa Cruz, CA, 95064. [3]Malin Space Science Systems, San Diego, CA, 92191.

Introduction: Over 400 new impact sites have been found on Mars, discovered by characteristic dark blast zones absent in earlier images [1]. These form by disturbance of high-albedo surface dust in impact blasts. Because this is key to the identification of new impacts, they are found mainly in dusty areas. We minimize this bias by scaling the size frequency distribution of new impacts to dusty areas with repeat coverage and correcting for spatial randomness in order to calculate the true current production function & compare to model predictions.

Measured crater production function (PF): The current PF is scaled to an ATF (Area-Time Function: sum of area covered repeatedly by the Context Camera (CTX) multiplied by the time difference between images at each spot [1]) of 4.68×10^7 km^2 yr. It uses effective diameters combined for clusters as in [2] for 110 impacts with CTX before and after images. The resulting measured PF, which includes only primary craters, falls ~4× below model PFs [3, 4]. If Mars's long-term orbital eccentricity were taken into account [3], this discrepancy increases to ~8×. A correction for spatial randomness [5] increases the derived cratering rate by a factor of 1.7×, bringing our current PF back to ~4× lower than models. The slope of our new impact differential PF is -2.55±0.19, shallower than models over the same diameters.

Discussion: Although the agreement between our measured PF and model predictions is quite good, our improved statistics and extended range of diameters reveal a divergence between them that increases at smaller diameters. This may support the hypothesis that the primary PF for small craters is significantly less steep than that of combined primary+secondary craters in this size range [e.g. 7], or it could be due to atmospheric effects. Complications include unrecognized secondaries in model fits, clusters on older surfaces being mistaken for separate impacts, short-term variation in the impacting population, or target property effects. All of these issues imply that craters <~50 m diameter should not be used for dating unless error bars are adjusted accordingly.

Conclusions: New meter- to decameter-sized craters on Mars are currently forming at a measurable rate: 3.1×10^{-6} craters/km^2/yr with $D_{eff}\geq3.9$ m. This modern PF results in ages ~4× lower than those from models commonly used to estimate crater retention ages on Mars using very small craters. Our current impact rate statistics provide the best empirical isochrones for the youngest surfaces on Mars, but they still include uncertainties of a factor of ~4.

References: [1] Daubar *et al.* (2013) *Icarus* 225, 506-516 [2] Malin *et al.* (2006) *Science*, 314, 1573-1577 [3] Ivanov (2001) *SSR* 96, 87-104 [4] Hartmann (2005) *Icarus* 174, 294-320 [5] Daubar *et al.* (2014) 8th Mars International abs. 1007 [6] Xiao & Strom (2012) *Icarus* 220, 254–267