



Figure 16. Age estimates for units based on crater density calculations. Bars represent the range in age estimates for 1, 2, and 5 km-diameter craters. Age boundaries for epochs are from *Tanaka* [1986].

lies PL, but could have resulted from erosion of PL and subsequent deposition of WR within basins. Comparison of the mean elevations for WR (−1905 m) and PL (−1865 m) supports the former hypothesis of WR underlying PL. This also suggests that PL may be relatively thin (<40 m). On the basis of this model, Crivitz crater, to the northwest of the landing ellipse, corresponds to WR elevations and has been mapped as WR (Figures 4b and 14a). LB overlies WR in central Gusev and PL occurs at higher elevations than LB, further supporting the proposed WR-PL age relationship. It is certain that PL is present in western Gusev, but its easternmost extent is unclear. An escarpment near the southeastern PL boundary and the lack of PL exposure in eastern Gusev implies that PL does not extend into the eastern half of Gusev. However, an indistinct slope break near −1874 m in the ET-WR escarpment of northeastern Gusev may represent the topographic expression of PL in this area, suggesting PL deposition in eastern Gusev prior to ET. Lack of PL deposition in eastern Gusev would imply that ET directly overlies WR. The overlap in Late Noachian and Late Hesperian ages between ET and PL could support coeval deposition. If ET and PL were syndepositional, then a facies change may exist between these units. In either case, deposition of ET is contemporaneous with or post-dates PL deposition.

[50] Although PL overlies LB and WR, the age relationship between PL and MS is less clear. Observations suggest that MS had been dissected. However, elevation data are not clear as to whether or not the PL depositional/erosional event was responsible. Crater densities (Figure 16) however, suggest a relatively younger age for PL indicating that PL deposition may post-date MS deposition. Because MV is at higher elevations than PL both within Ma'adim Vallis and Gusev, we propose that MV postdates PL. Crater densities show that MV deposition happened near the time of PL deposition.

[51] Finally, with the low-albedo material showing redistribution during previous Mars missions (Figure 11), it is clear that this material represents the last stratigraphic event in Gusev.

[52] Thira's calculated excavation depth (−3884 ± 413 m) does not extend to the initial estimated excavation depths of Gusev crater (−9326 ± 2848 m elevation respectively). Within minutes of most impact events (for complex craters), crater wall collapse sends target rock down toward the center of the transient crater, enlarging the crater diameter and infilling the transient cavity, reducing the crater depth. Gusev's initial modified crater depth is uncertain. The relationship of final crater depth, d , to final crater diameter,