Small-scale Crater Counts of MER Landing Sites

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Rationale

- Crater counts from MOC images yield information about km-scale resurfacing events not represented by larger craters.

- These counts may reflect ages of materials accessible to the MER rovers.

If it’s not accessible, it doesn’t matter!
Elysium western portion of ellipse (highest crater density)
Isochrons after Hartmann, 1999
Elysium Wind Safe Site
Elysium Wind Safe Site

• Interpreted to be highlands colluvium.
• Some LN/EH terrain in west perhaps preserved on topographic highs.
• Amazonian resurfacing due to mud volcanism?
• Ridges in every image
Isidis Center of Ellipse
Isidis Site

Oldest due to secondaries

youngest

Oldest due to secondaries
Isidis Planitia

- LH/EA materials
- Area of Amazonian age near center of ellipse.
- Mass wasting of highland materials?
- Highland channel deposits in ellipse?
Gusev Crater Site (TCM-5 DeltaDOR, -2Day:
MER-A; Open of window=dashed, Close=solid)

T. J. Parker, A. Watson, F. S. Anderson, JPL
Gusev Crater
Near center of Ellipse

Unit AHgf₂ of Kuzmin et al., 2000: Fluviolacustrine Sediments
Gusev Crater
Western Ellipse

Unit AHgf$_2$ and/or AHgf$_1$ of Kuzmin et al., 2000:
Fluvial lacustrine Sediments

Bright material - No fresh craters
Gusev Crater

- Very young aeolian surfaces; dust devils
- Multi-layered materials
- Exposed Noachian-age materials near center of ellipse overlain by Amazonian-age craters
- Exhumation of Noachian materials in the Amazonian?
Terra Meridiani Hematite Site
Hematite Site (center of the ellipse)
Hematite

- Amazonian hematite-bearing unit atop probable Noachian unit
- Both materials likely accessible to the rover throughout ellipse
- Both materials likely recognizable (albedo, spectrally, material strength) to the rover throughout ellipse.
Summary

- Oldest surfaces: Gusev (2 data points) and Hematite (Stealth)
- Potential of Noachian colluvium and alluvium in Elysium and Isidis as resurfacing agent, but surfaces generally LH/EA
- Good access to ridges in Elysium; possible mud volcanism as resurfacing agent.
- Youngest surfaces: Gusev bright and Hematite-rich
- Hematite best chance to access and recognize the two terrains of interest