

YOUNG IMPACT CRATERS AS POTENTIAL SITES FOR THE EXPLORATION OF THE MARTIAN SUBSURFACE.

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Orbiter and lander data indicate that a global, oxidizing regolith may blanket the surface of Mars. New sub-km crater counts by Hartmann (1999 *Meteor. Plan. Sci* 34: 167) indicate that an impact-gardened regolith may exist to a depth of at least 15 m (assuming a mean surface age of 2 Gyr), although the original meter-scale geology may still persist at certain locations such as the outflow channel of the Pathfinder landing site. The pervasive regolith appears to have an aeolian-mobilized component which may frustrate attempts to find key minerals such as carbonates or nitrates. It may also stymie searches for physical and chemical signs of past or present life. Various mechanical (penetrators, drills) means of obtaining

access to the subsurface have been proposed: Here I propose to let Nature do the work by using a young impact crater. Both the nearby ejecta blanket and the crater rim may provide freshly exposed subsurface material. The crater must be large enough to penetrate the regolith but still young enough that chemical and physical weathering of exposed material is minor. A high latitude site may be preferable since organics may oxidize much more slowly at low temperatures (McDonald et al 1998 *Icarus* 132:170). The tradeoffs in crater and site selection are presented, and possible crater exploration strategies are suggested.