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STUDIES IN PLANETARY VOLCANOLOGY

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This investigation involved research on several aspects of planetary volcanism:

1. Modeling and field studies of the potential for flowing lavas to erode the terrain over which they pass: this study involved numerical solutions for the heat transfer, and analysis of lava flows on Earth where erosion appears to have taken place, coupled with observations of active flows in Hawaii. The conclusion is that some basaltic lava flows are capable of both thermal erosion (melting) and mechanical erosion, depending on the composition and structure of the pre-flow terrain. The case of high-temperature komatiite flows was also considered, especially as a potential analog for some of the flows on the moon of Jupiter, Io.

2. Application of modeling studies and field investigations to extraterrestrial cases: this aspect involved an analysis of lava flows on the Moon, considerations of the 1997 eruption observed via spacecraft (Galileo) on Io, and a general review of volcanism on Mars.

3. Considerations of the interaction of lava flows and water: this aspect of the investigation involved a numerical analysis and incorporation of field studies in Iceland where such features occur; the final part of this study was to apply the results to Mars.

The details of these investigations are given the following papers, reprints of which are also included.

Publications resulting from this study: (Not enclosed)

Fagents, S.A., P. Lanagan, and R. Greeley, 2002, Pseudocraters on Mars: a consequence of lava-ground ice interaction, *Volcano-ice interaction on Earth and Mars, Geo. Soc. of London Special Pub.*, (in press).

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Greeley, R., S.A. Fagents, R.S. Harris, S.D. Kadel, and D.A. Williams, 1998, Erosion by flowing lava: field evidence, *J. Geophys. Res., 103*, 27,325-27,345.

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Williams, D.A., A.H. Wilson, and R. Greeley, 2000, A komatiite analog to potential ultramafic materials on Io, *J. Geophys. Res., 105*, 1671-1684.

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Williams, D.A., A.G. Davies, L.P. Keszthelyi, and R. Greeley, 2001, The summer 1997 eruption at Pillan Patera on Io: implications for ultrabasic lava flow emplacement, *J. Geophys. Res., 106*, 33,105-33,119.