

## PREFACE

Harry Glicken died on June 3, 1991. At the time of his death he was actively working to convert his doctoral dissertation into a publication more readily fit for public consumption. Harry published bits and pieces of his dissertation in various outlets. These publications include:

Voight, Barry, Glicken, Harry, Janda, R.J., and Douglass, P.M., 1981, Catastrophic rockslide avalanche of May 18, *in* Lipman, P.W., and Mullineaux, D.R., 1981, eds., The 1980 eruptions of Mount St. Helens, Washington: U.S. Geological Survey Professional Paper 1250, p. 347-377.

Voight, Barry, Janda, R.J., Glicken, Harry, and Douglass, P.M., 1983, Nature and mechanics of the Mount St. Helens rockslide-avalanche of 18 May 1980: *Geotechnique*, v. 33, p. 243-273.

Glicken, Harry, Meyer, William, and Sabol, Martha A., 1989, Geology and ground-water hydrology of Spirit Lake blockage, Mount St. Helens, Washington, with implications for lake retention: U.S. Geological Survey Bulletin 1789, 33 p.

Glicken, Harry, 1990, The rockslide-debris avalanche of the May 18, 1980, eruption of Mount St. Helens--10th anniversary perspectives: *Geoscience Canada*, v. 17, p. 150-153.

Glicken, Harry, 1991, Sedimentary architecture of large volcanic-debris avalanches, *in* Fisher, R.V. and Smith, G.A., eds., *Sedimentation in Volcanic Settings*. SEPM Special Publication No. 45, p. 99-106.

Komorowski, J.C., Glicken, H.X, and Sheridan, M.F., 1991, Secondary electron imagery of microcracks and hackly fracture surfaces in sand-size clasts from the 1980 Mount St. Helens debris-avalanche deposit; implications for particle-particle interactions: *Geology*, v. 19, p. 261-264.

The full scope of Harry's work, however, has never been published. Nevertheless, it has greatly influenced the study of volcanic debris avalanches worldwide. Following the 1980 eruption of Mount St. Helens, debris avalanches suddenly were recognized at numerous volcanoes around the globe; criteria for recognition of debris avalanches, which Harry defined, have been used in numerous studies. His profound influence on studies of debris avalanches is evident in the many papers Harry coauthored on debris avalanches at other volcanoes, in various references to his Mount St. Helens work, and in acknowledgments to his input found in many papers on debris avalanches published since 1980.

The complete scope of Harry's study of the Mount St. Helens debris avalanche is contained in this publication. It represents the most complete and detailed investigation of a volcanic debris avalanche conducted to date. In this publication, Harry carefully lays out the geology of the former edifice of Mount St Helens, and the intricate, and sometimes chaotic, geology of the debris-avalanche deposit. He then links the geology of the mountain and features of the debris-avalanche deposit through careful geologic correlation combined with eyewitness observations. By combining careful geologic analysis with detailed eyewitness observations Harry is able to reconstruct the first several minutes of the catastrophic May 18, 1980 eruption and to provide insights into the transport mechanisms of the mass movement.

Perhaps the greatest contribution of this publication is the construction of detailed geologic maps of the debris-avalanche deposit. These maps illustrate in meticulous detail where various segments of the old edifice came to rest, how some segments were transported intact, how other segments blended and mixed together, and associations between the rockslide-debris avalanche and other volcanic processes such as the devastating lateral blast and the lahar of the North Fork Toutle River valley. Nowhere before has a deposit of this type been mapped in such detail. Furthermore, the Mount St. Helens deposit will never be mapped in such detail again. The deposit gradually is being eroded as the North Fork Toutle River channel

evolves. While some exposures are better than they were when Harry mapped the deposit, others no longer exist.

This publication reflects the work embodied in Harry's doctoral dissertation; however, owing to his tragic death, some modifications had to be made. The astute reader will recognize that the deposit geology on the lithologic maps does not correspond exactly to the base topography. Harry mapped the deposit lithology on a 1:12,000-scale base map constructed from a mosaic of specially made 1:4800-scale topographic maps. Unfortunately, the original base map was lost following Harry's death, and it became cost prohibitive to reconstruct that base map from the 1:4800 scale maps. We therefore compromised by overlaying Harry's detailed lithologic maps of the debris avalanche onto 1:24,000-scale topographic maps, compiled from 1980 photography, that were blown up to a 1:12,000 scale. This compromise presents a reasonable rendition of the geology of the debris-avalanche deposit with little loss of detail. In addition to this modification of the original maps I have updated, and in some cases added, citations to references where relevant.

Bringing Harry's work to publication has involved the efforts of many people. Foremost among these is Carol Ostergren, formerly an editor with the U.S. Geological Survey technical reports division. Carol refused to let this work wither away following Harry's death. This publication reflects her tenacity as much as anything else. John Costa and Dan Dzurisin of the Cascades Volcano Observatory felt that this was a sufficiently important piece of work to publish and provided the time and personnel necessary to see that it was published. Steve Schilling, Lisa Faust, Bobbie Myers, and Chris Janda tolerated my endless demands and spent many hours processing geologic maps, line art, photographs, and page layout. I am grateful for their willingness to involve themselves in this project and for the thoroughness they brought to their tasks.

Jon Major  
September 1996