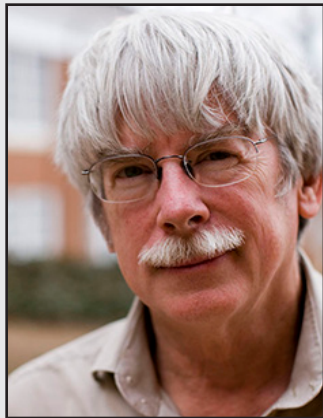


# 2013 MEDALS & AWARDS

## G. K. GILBERT AWARD

Presented to  
**Alan D. Howard**



Alan D. Howard  
*University of Virginia*

### *Citation by William E. Dietrich*

Alan Howard has been a pioneer in quantitative earth and planetary surface processes for the past 50 years. He has written seminal papers on karst, channel network development, dune transport, river meandering, floodplain formation, alluvial fan evolution, river incision into bedrock, soil transport, groundwater seepage erosion, and even the growth of ice pinnacles on Jupiter's moon Callisto. In one of the most cited papers in the geomorphology, Alan presented a model that coupled for the first time advective, diffusive and threshold controlled processes to predict controls on the evolution of three-dimensional landscapes under various boundary conditions. Alan's publications have stimulated and guided generations of geomorphologists. Starting in the 1970's, he brought these insights and quantitative skills to the challenging problem of deciphering the planetary surfaces of our solar system, especially Mars, as these landscapes became progressively more revealed through better spacecraft imaging. The recurrent theme in his work has been to explore what the geomorphology can tell us about the climate history and landscape evolution of Mars and other planetary bodies.

The climate history of Mars is a challenging and controversial problem, but Alan's experience and insight has led to strong, quantitative findings. Initially exploring the polar caps of Mars, he moved to channel networks and the role of groundwater

seepage versus rainfall-runoff cut channels. He introduced a numerical model to explore Mars landscape evolution (with impact processes) and made it freely available for others to use. With his students and collaborators he has shown, among many other findings, that the geomorphology indicates the likely existence of a relatively warm, wet early Mars. The studies of Alan and his colleagues conclude that the end of the era of heavy bombardment was accompanied by widespread, intense fluvial activity that dissected the cratered highlands. Perhaps a few hundred-million years later, local, large alluvial fans formed on crater walls and shallow mid-latitude valleys developed, in colder, perhaps snow-melt driven environment. Alan, with his collaborators, has taken their discoveries of Martian meandering channels and alluvial fans back to earth and initiated research programs to determine controlling mechanisms. He has recognized that the Mars discoveries, in effect, revealed fundamental knowledge gaps in our understanding of these ubiquitous geomorphic features here on Earth. Alan's publications are characterized by depth, detail, quantitative analysis, and great insight. His collaborators on these publications are numerous, and, especially in his planetary science papers, these colleagues have frequently been young scientists, several of whom have subsequently established their own significant research programs.

Everyone who has had the pleasure to know and work with him has felt Alan's inclusive generosity, his great experience and knowledge, and his contagious joy of discovery in planetary science. His selection as the recipient of the Geological Society of America G. K. Gilbert Award is perfect. Alan cut his research teeth in the Gilbert country of the southwestern United States and took that experience to other planets, bringing us discoveries that both reveal planetary histories and generate new questions about the geomorphology of earth. Alan Howard has been a "great engine of research" these past 50 years, and for his numerous stimulating papers in planetary science he is honored with the Geological Society of America G. K. Gilbert award of 2013.

### *Response by Alan D. Howard*

There are few disciplines in which the paradigm of an intrepid lone scientist exploring uncharted territory is less apropos than in planetary science. First I must thank the citizens and representatives of our country for thinking that the then barely visible hunks

of dirt, ice and gas orbiting throughout the Solar System were worthy of study. I have brought my training in geomorphology to bear in my planetary work, and I am indebted to my advisors Reds Wolman and Charlie Hunt for instilling the ethic of relentlessly questioning the landscape to tease out its secrets and providing the opportunity to literally trail G. K. Gilbert's giant footsteps through the Henry Mountains.

My entry into planetary science was unintentional. As Mariner 9 was approaching Mars, Steve Dwornik, the director of the planetary geology program at NASA, actively recruited universities to participate in planetary research, and Bob Dolan and I took the bait. I have been involved to a greater or lesser degree in martian planetary research through the exciting days of Viking, the long dry period until the mid-90's, and now the wealth of planetary data during recent years. Steve Dwornik also provided the means for new planetary scientists like me to enter the field through an extended summer workshop at JPL and USGS Flagstaff, and, for several years, the command performances at his yearly meetings.

For the exciting planetary data I acknowledge the nearly uncountable cadre of engineers and scientists who have conceived, planned, and operated the missions. In particular, I am indebted to whoever targeted the high resolution Viking imaging of the northern polar cap of Mars and the NASA Goddard scientists who conceived the Mars Orbiter Laser Altimeter, which has revolutionized quantitative martian geomorphology.

I thank the graduate students who have worked with me over the years on planetary topics, some of whom I had to entice, and some, like Bob Craddock, Ross Irwin, Sharon Wilson and Yo Matsubara, tracked me down despite my pessimism (during the lean years) about the future of planetary science. I am particularly indebted to Jeff Moore, who sought me out for a long journey of collaboration, counteracted my tendency to lollygag, and more recently has beamed me to contemplate the icy worlds of the outer Solar System. I have had the privilege of participating in a community of some of the most brilliant scientists of our age and collaborating with several of them through the years. My wife, Marlowe, has provided a loving environment that has supported my research throughout the years. Finally, I am grateful to those individuals who have considered my planetary research to be worthy of the G. K. Gilbert Award.