50+ Years Advancing the Scientific Understanding of Extreme Floods

My scientific work on extreme flooding began in earnest in 1969 when (1) as Boulder Colorado’s first City Geologist, I both experienced and documented the effects of the May 1969 flooding in that city, and (2) as a Ph.D. candidate at University of Colorado, I began to research the most extreme flood to have occurred on Earth within at least the last several million years. This megaflood impacted what is now the northwestern U.S., when a giant ice-dammed lake failed catastrophically during the last Ice Age about 16,000 years ago. From 1970 to 1981, as a faculty member in Geological Sciences at The University of Texas at Austin, my pure scientific work on the most extreme flooding phenomena greatly expanded because of the 1973 discovery that spectacular megaflooding had occurred about 3.5 billion years ago on the planet Mars. I also applied what I had learned about flood extremes to understanding the intense rainfall/runoff flooding that produces flood disasters in central Texas. To have real-world data on potentially calamitous flood extremes that greatly exceed conventional gage records, I developed a new science that, in 1982, I named “Paleoflood Hydology.” This interdisciplinary science combines hydraulic and hydrologic procedures with geological evidence to quantify both the magnitude and frequency of the most extreme floods that have occurred over the past several thousand years. After moving to The University of Arizona in 1981, aided by dozens of very capable graduate students. I continued to advance extreme flood science, both pure and applied. The applied research included the October 1983 Tucson flooding that was studied in detail by the students in my Geological Hazards class. I was one of the authors of the 1984 National Academy of Sciences report on the 1983 flood disaster. The winter 1993 Tucson flooding provided an opportunity for even more experience with local flooding issues. In 1996 I became Head of the Department of Hydrology and Water Resources (now Hydrology and Atmospheric Sciences, University of Arizona). In recent years I have been focused on fundamental problems involving the interface with between science and public policy, including the increasing incidence of disastrous extreme flooding that sadly seems to coincide with decreasing effectiveness of the public policies that have been implemented to alleviate such disasters. How can we remedy this unfortunate circumstance?