Drilling to Magma

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The geosciences provide a long history of surprises when some thought the big discoveries were over: basalt as an igneous rock, an old but hot Earth, evolution, plate tectonics, life punctuated by extraterrestrial events, and climate change caused by humans. Drilling to magma will likely provide another such surprise. Although we tend to believe our untested cartoons, consider whether the characteristics of hydrocarbon reservoirs would have been accurately rendered without drilling. We must drill to magma to understand how continental crust formed, how to use heat of crystallization coupled with enthalpy of magmatic water and thermal cracking as a clean energy source, and how to forecast catastrophic volcanic eruptions from direct measurements in magma. I will trace the progression from coring lava lakes, through shifts in thinking about magma bodies, to exciting data from accidental drilling encounters with real magma, to what the future of scientific drilling to magma could hold.

Biography: John Eichelberger's career spans volcanology, scientific drilling, and international Arctic education. Educated at MIT and Stanford, he was on the research staff at Los Alamos and Sandia National Laboratories in New Mexico from 1974–1979 and 1979–1991, respectively. In 1991 he became Professor of Geology and Geophysics at the University of Alaska Fairbanks (UAF) where he greatly expanded volcano monitoring and student engagement in the Alaska Volcano Observatory. During that time, he initiated cooperative volcano monitoring, research, and educational programs with the Institute of Volcanology and Seismology, Russian Academy of Sciences in Petropavlovsk-Kamchatsky. He was also co-originator of the Unzen Scientific Drilling Project, which cored through the conduit of Unzen Volcano, Kyushu, Japan after the volcano's eruption ended. Eichelberger left UAF in 2007 to serve as Program Coordinator for Volcano Hazards at the U.S. Geological Survey headquarters in Reston, Virginia but continued to work on Russian-US collaborations in natural hazards under the Bilateral Presidential Commission. He returned to UAF in 2012 as Dean of the Graduate School. The European Geosciences Union awarded him the Soloviev Medal in Natural Hazards in 2015 and the Geological Society of America designated him Distinguished Lecturer for Continental Scientific Drilling for 2020–2021. He is now semi-retired but continues development of the Krafla Magma Testbed, Iceland, following his career-long goal to sample magma directly by drilling.