Public Abstract
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The focus of this research is on characterizing the chemical changes undergone by thermal waters as they rise to the surface from their deep source reservoir, and to evaluate the ability of these waters to produce economic gold-silver mineralization. Beowawe is a very active geothermal site manifested by numerous hot springs, fumaroles, and before the installation of an electric power plant in 1986, spectacular geysers. Beowawe also bears many geologic similarities to ancient shallow-depth gold-silver ore deposits, suggesting that it is a modern-day example of one of these ancient systems.
Research efforts have been concentrated in three areas. The first is a study of the trace element composition of silica sinters that have deposited by Beowawe geothermal waters. The purpose was to look for evidence of episodic fluid flow, which would help explain the high temperatures of the flow system. The second is a study of fluid inclusions in minerals precipitated from the geothermal fluids. This has provided data on the composition and temperature of the flow system over time. The third used reaction path modeling of the interaction of water with rocks along the flow path. Although Beowawe is weakly mineralized with regards to precious metals, modeling the evolution of the fluid will provide insights into the maximum concentrations of precious metals the fluids are capable of carrying and precipitating. This will, in turn, provide insights into the degree to which Beowawe is a modern-day analog to fossil ore systems. Modeling results would also show how porosity and permeability would change with respect to precipitation and dissolution of minerals from and into the fluid which then can be used to calculate the longevity of flow in the system. Beowawe serves as an excellent case study from which principles can be learned that will be useful for geothermal energy and precious metal deposit exploration and development.