# MAPPING ACTIVE HOT SPRINGS USING AVIRIS AND TIMS

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## ABSTRACT

This research is studying the occurrence and characteristics of both active and fossil hot springs systems using Thermal Infrared Multispectral Scanner (TIMS) and Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) data to provide insights into the origins of hydrothermal systems and precious metal ore deposits. At Steamboat Springs, Nevada, TIMS delineates the silica sinter associated with active alkaline-type hot springs, while AVIRIS data map alteration minerals including alunite, kaolinite, and hydrothermal silica associated with inactive acid-sulfate hot springs. Sites studied at Yellowstone National Park, Wyoming, include Mammoth Hot Springs, consisting of several ages of travertine terraces as well as glacially-transported travertine material. Hot springs in the Firehole River basin, include active hydrothermal areas associated with the Upper, Midway, and Lower geyser basins, with mineralogy characteristic of the both the alkaline and acid-sulfate type hot springs, including hydrothermal silica, alunite, and kaolinite. Surface exposures in Hayden Valley and in the Norris and Gibbon Geyser Basins indicate predominantly acid-sulfate alteration, along with smaller occurrences of silica sinter. Study of the nature and spatial distribution of specific hydrothermal alteration minerals at active hot springs using hyperspectral remote sensing provides insight into the geochemistry of these systems, and to the occurrence and characteristics of hot springs systems in the fossil record. These findings potentially could lead to new and/or improved exploration methods for epithermal ore deposits.