

Heart Lake holds water for Yellowstone's hydrothermal diversity theory

February 14 2012

Within Yellowstone National Park, the water emanating from the park's famous hot springs and geysers seems to belong to either one of two distinct types. In some areas, subterranean waters rich in chlorine and dissolved silicates burst from the ground to create the park's iconic geysers. In other areas, highly acidic mud pools form from chlorine-deprived waters rich with sulfate ions.

In the 1950s, researchers proposed that these two distinct surface features actually stem from a single type of underground water. Across Yellowstone, geysers and mud pools are often separated by defined geographic boundaries, making a test of their interrelatedness difficult. In northwestern Wyoming, however, acid-rich and silica-rich waters coexist within a roughly 12 square kilometers (4.6 square kilometers) watershed that drains into nearby Heart Lake.

Drawing water and gas samples from pools and steam vents distributed throughout the Heart Lake Geyser Basin, Lowenstern et al. find support for the single-water-source hypothesis. On the basis of a wide array of chemical and hydrological analyses, including measurements of the concentrations of various dissolved minerals, isotope ratios, flow rates, and gas fluxes, the authors find that the diverse features in the Heart Lake Geyser Basin could stem from a single source of 205-degrees-Celsius (401-degrees-Fahrenheit) subsurface water.

The authors suggest that the chlorine-depleted, acidic mud pools, which populate the upper reaches of the basin, form as thermophilic bacteria to



break down dissolved <u>hydrogen sulfide</u>. That sulfur is carried from the water as it boils below the surface. Further downstream, after subsurface flow, boiling, and dilution with rain water, the original source <u>water</u> arrives at the surface as the chlorine- and silica- rich waters typically associated with Yellowstone's geysers.

More information: Generation and evolution of hydrothermal fluids at Yellowstone, *Geochemistry, Geophysics, Geosystems*, <u>doi:10.1029/2011GC003835</u>, 2012

Provided by American Geophysical Union

Citation: Heart Lake holds water for Yellowstone's hydrothermal diversity theory (2012, February 14) retrieved 27 April 2024 from <u>https://phys.org/news/2012-02-heart-lake-yellowstone-hydrothermal-diversity.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.