Explaining Hot Springs

MSB Capstone

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Where Does the Heat Come From?

Heat starts underground in the core or center of the Earth, where temperatures can reach 9900 degrees Fahrenheit or more. The heat travels through the core of the Earth to the mantle, which is the middle layer of the Earth, and then to the crust, the outer layer of the Earth. When heat from the core heats the mantle, the mantle become less dense and rises toward the lithosphere, the solid part of the Earth. The mantle rises a few inches every year. The cooler rock is denser and sinks. It is then heated and rises. (Science Clarified) This cycle is continually going on. The process is called convection. It can be compared to what happens when a pot of water is heated on the stove. The water at the bottom is hottest and becomes less dense, and makes its way to the top of the pot. The cooler water sinks to the bottom of the pot. When it becomes hot, it will once again rise to the top. The currents formed by the circular motion of substances are called convection currents.

How Does Water Get Hot?

Hydrothermal (relating to heated water in the Earth's crust) landforms such as hot springs and geysers are mainly found above the areas in the crust where magma, or melted rock, has risen to a shallow depth below the surface. The magma forms a magma chamber, a pool of molten rock,

3 to 6 miles below Earth's surface. There are several ways water gets heated in the Earth. Sometimes the magma heats groundwater. Groundwater is the water that exists in the spaces like cracks and crevices underground. The groundwater gets heated to more than 400 degrees Fahrenheit. The superheated water stays in the liquid state because it is under intense pressure caused by overlying rock and other groundwater. Hot springs can also form when rainwater seeps into the ground and gets heated by hot rocks below the surface of the Earth. This is how the water in Hot Springs, Arkansas is formed. (Science Clarified)

What is Hot Springs Water Like?

The average temperature of water in hot springs is about 147 degrees Fahrenheit. In the past it was believed that there were no bacteria in the water, but it depends on the hot springs. In some there are actually very small bacteria living in the water. There are natural minerals in it as well. These minerals come from being dissolved out of the rocks below the surface of the Earth. People have used the hot springs water to soak in to alleviate symptoms of arthritis, gout, and joint and rheumatic issues. (Fox News) There are bathhouses and spas that are used for this purpose.

The time it takes for groundwater to circulate downward, become heated, and come back to the Earth's surface in the form of a geyser is about 500 years. The water in the Hot Springs National Park in Arkansas is even older. It is estimated to be over 4000 years old. The closer the water is to the surface of the Earth, the lower the pressure exerted on it. Therefore, when it reaches the surface, it does not burst out of the ground but rather fills the hot spring pool. (Science Clarified)

Hot Springs National Park, Arkansas

Hot Springs National Park covers more than 5550 acres and contains 47 natural hot springs. It became a national park in 1921. The water in the springs of Hot Springs National Park is not heated by underground magma. Hot Springs water is heated when rainwater soaks into the ground and travels downward 2000-8000 feet. There it is heated by hot rocks. The water rises due to convection for about one year through cracks and faults and forms the Hot Springs. The total amount of water that comes out of the springs averages about 850,000 gallons a day. Scientists have found micro-bacteria in the water of Hot Springs National Park. It is still considered safe to drink. The minerals in it come from dissolving rock below the Earth's surface. The average temperature is 143 degrees Fahrenheit. (Science Clarified)

There are various hot water "jug fountains" within the national park. They dispense hot spring water that does not need to be treated. The National Park Service certifies that the water is safe to drink. The water is tested regularly at different points in the park. (National Park Service)

Hot Springs National Park is the most-visited tourist site in Arkansas, with 6-7 million visitors per year. (Mershon) The Chicago White Stockings, Cincinnati Reds, Pittsburgh Pirates, Boston Red Sox, and other baseball teams used to go to Hot Springs for spring training from the 1880s to 1940s; the bathhouses helped with sore muscles. (*The Encyclopedia of Arkansas History and Culture*) Hot Springs National Park has been popular for many years, and continues to draw people to its waters. (Mershon)

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