Introduction

Wakulla Springs is one of the more popular Freshwater bodies found in Florida not because it is one of the largest springs in the world today, but also because human use this body of water as an activity center for summer vacations, a place to admire nature and view the wildlife, but most importantly as a place of scientific study to find out how organisms in the past survived, how humans can utilize this spring to sustain themselves, and how to prevent the destruction of this body of water. The scientific question that we chose to focus on is “How does Wakulla Springs obtain its water?” Studies have shown that Wakulla Springs gives off over 200 million gallons of water a day. Other studies have shown that this spring has been present since the times of pre-historic animals. To find out how this spring has survived thousands of years and drastic climate changes, we have decided to look for the source of Wakulla Springs water. We will use radioactive indicators to determine how many places and which places are providing water to this spring.

The Role of Uranium

Previous studies have proven that naturally occurring radioisotopes serve as excellent hydrologic tracers in the study off ground water and aquifers (Osmond, Buie, et al). Uranium is a silvery colored, unstable, radioactive metal that is naturally found in the soil, water, and in bedrock. Research has discovered that Uranium gets into water when groundwater dissolves into minerals. There are 3 main isotopes of Uranium found in water: Ur-234, Ur-235, UR-238, with Ur-238 being the most abundant isotope found. For our experiment, we chose to use Uranium as our indicator to trace water entering Wakulla Springs because Uranium can be traced back to its aquifer source by measuring the Uranium Activity Ratio.

Procedure

The purpose of this project is to determine what aquifers are providing water to Wakulla Springs. We believe that by this question can be derived by measuring the Activity Ratio of Uranium within collected sample sites. By measuring the Activity Ratio, we will use the Uranium as a finger-print to determine how many water sources are providing water into Wakulla Springs, determine the pathway the water travels to arrive at the Springs, and even determine the how long and what effects these waterways may have on the future water sources. The Activity Ratio will be measured using a mass spectrometer.

The sampling sites, which consisted of streams, lakes, and wells, were determined based on areas that would represent variability in the movement of groundwater within Wakulla Springs. Once these areas were determined, we went out and collected approximately two 500ml containers of water from each site visited. Once the water was collected and returned to the lab, we treated one of the containers with 6N HCl to prevent the Uranium from sticking to the sides of the plastic containers. Containers were then stored until it was time to run the collected water through the mass spectrometer.

Discussions

Currently, this research project is still ongoing because there are still many wells and lakes that we have not yet collected water samples from. Once we have collected water from all possible sites and run these samples through the mass spectrometer, we can then make a valid analysis about the Uranium content within the water and begin to trace this water back to its place of origin.

Future Explorations

Other factors we would like to look at while investigating the amount of Uranium within water at Wakulla spring is the pH of the water before collecting the water and after collecting the water and allowing it to sit in the collection room. We are aware that there will be a change in pH when the water is removed from its water source, but how will this pH affect the Activity Ratio of the Uranium within the sample is a question that we will want to explore. Another factor that we would like to observe is the temperature of the water both before we collect it from the source and once the sample arrives back at the lab. Temperature plays a role in pH so we are interested in determining the effect of temperature on pH of the sample and the activity ratio of Uranium.

References


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