Name Enrichment

Predicting Volcanic Eruptions

Date

For people who live near volcanoes, knowing when they are about to erupt can be a matter of life or death. The earlier scientists can predict when a volcano is likely to erupt, the more lives they can save. Over the past few decades, scientists have developed several techniques, which they can combine, to help them assess the activity of volcanoes and predict major eruptions.

Measuring Tremors

The most telling indicator of a pending volcanic eruption is seismic activity created by rising magma inside the volcano. As the magma rises, the intensity and frequency of tremors increase. These tremors are measured with a seismograph. The data recorded by the seismograph are transmitted twenty-four hours a day to remote stations where scientists analyze it. This technique helped to predict the 1991 eruption of Mount Pinatuba in the Philippines.

Sensing Details About the Magma

When magma rises it also creates ground deformations, or bulges in the volcano's outside surface. Tiltmeters are sensors that use laser beams to help create maps of the physical changes that rising magma causes. Tiltmeters sense how deep a magma source is, how fast it is moving, and where it might erupt.

Another technique used is to measure the levels of gases escaping from a volcano vent.

1. Why is predicting volcanic activity important?

Carbon dioxide and sulfur dioxide are two of the gases scientists measure. Until recently, researchers sometimes had to climb volcanoes to install the measuring devices by hand, placing themselves in danger. Now, however, new devices are available that allow them to measure the amount of infrared light absorbed by the gas molecules. Using this equipment, the researchers can calculate the concentration of the gas in the air without having to climb a volcano.

Measuring Magma's Electric Currents

Gravimeters are another useful tool. They measure the electric currents given off by magma. An increase in electric current indicates a rise in the level of magma. These devices can also locate areas of flowing magma.

The most recent development in predicting volcanic activity involves the use of satellites to detect heat from the hot gases that a volcano emits. Scientists call the system "Hotspots." The Global Positioning System reads satellite signals to pinpoint and monitor ground deformations on Earth. Finally, scientists are making use of the Landsat satellite, which uses infrared sensors to monitor the temperature changes created by gases escaping from cracks in the volcano that can indicate increased volcanic activity. This technique is still new, and scientists expect improvements over the next few years to help them predict major eruptions earlier than ever before.

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2. Name three indicators of volcanic activity.

3. What are some limitations of seismography in detecting volcanic activity?