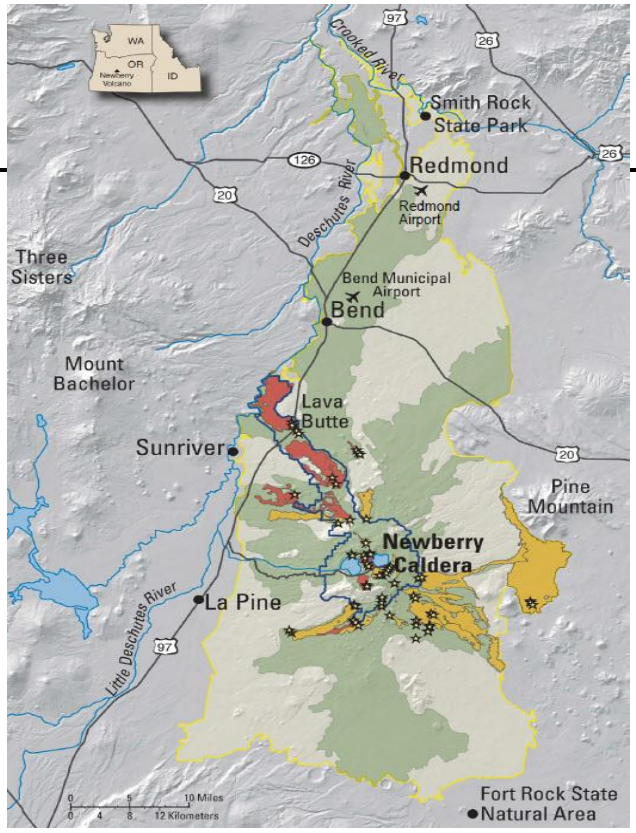
Meet a Cascades Volcano Observatory Scientist:

Dave Ramsey, Geologist

Dave Ramsey, Geologist at the Cascades Volcano Observatory (CVO), visiting Mount Shasta, California. Dave specializes in making maps of volcanoes. He started with the USGS in 1997 and has been a geologist at the USGS-CVO since 2005. Visit Dave Ramsey's professional page to learn more about his work.

What kind of work do you do at CVO?

I am a geologist who uses a computer and special computer programs to make maps of volcanoes. It's a process called digital mapping. Some of the maps show the different rock types, sediments and other features found at volcanoes (geologic maps). Other maps show areas where people are at-risk during volcanic eruptions (hazard and risk maps). The maps help me and other scientists with their volcano studies, and they help people who live near volcanoes to identify the locations of hazard zones.



Geologic map of Newberry Volcano in central Oregon. The black and white base is a digital elevation map. The colors represent different lava flows. The older lava flows are yellow and green, and the more recent lava flows are orange and red. The locations of volcanic vents are black and yellow stars. Notice that the cities of Bend and Redmond are built on older Newberry flows and the towns of Sunriver and LaPine are not far from recent vents and flows. Mapping the location of lava flows helps to understand how a volcano has behaved in the past and provides clues about how it may behave in the future. These maps also help determine who may be at-risk during the next eruption.

How do you create maps?

All of the information we collect about a volcano goes into my GIS computer files so that I can make very detailed maps. The computer program I use is called GIS (Geographic Information Systems). It allows me to create, store and retrieve mapmaking information. Instead of drawing maps on paper, I can create digital maps in just minutes. The maps can be on any scale – large area maps that show thousands of volcanic vents in the western U.S. or maps that show just one volcano.

So, you spend a lot of time in front of a computer?

Yes [laughs]. But the work begins outside, in the field. The first step is to go see the volcanoes and volcanic deposits and to understand how they formed. After the work is done, it is an incredible feeling to stand on a high peak and be able to identify the volcanic vents and lava flows from a map just completed!

What volcanoes have you visited?

I have traveled to work at volcanoes in Washington, Oregon, California, Wyoming, Arizona, Colorado, New Mexico, and even Japan.

Tephra layers (white and beige) as seen in a cliff near Summer Lake, Oregon. Tephra is a general term for fragments of volcanic rock and lava regardless of size that are blasted into the air by explosions or carried upward by hot gases. It can travel hundreds to thousands of miles downwind, sometimes making it very difficult to figure out which layer goes with a specific volcanic eruption.

What work do you do at a volcano that helps with mapmaking?

I make observations and take measurements. At Medicine Lake volcano in northern California, for example, I used a tablet computer to mark the locations where tephra (airborne volcanic rock and ash) layers cover the ground. I am doing similar work at the Summer Lake region of south central Oregon, where there are many layers of tephra, but no nearby volcano. Eruptions over the past 200,000 years from Mount St. Helens, Medicine Lake, Newberry, Mazama, and the Three Sisters volcanoes sent tephra all across this area. The challenge is to discover where the tephra came from and the timing of deposits. I have helped other geologists with similar work at Newberry Volcano in central Oregon and at Mount St. Helens.

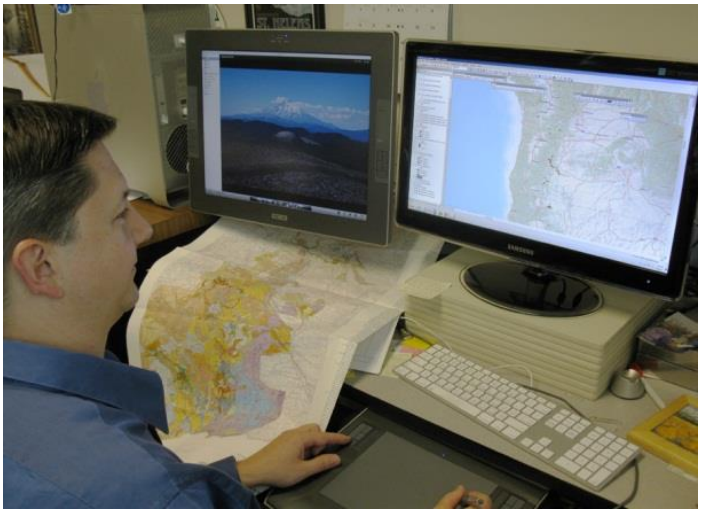
What is your favorite project that you have completed at CVO?

One of my favorite projects was the creation of a map poster called Crater Lake Revealed. To make it, we collected information from a lot of sources - lake depths were collected using a specialized boat that made a bathymetric survey of the floor of Crater Lake and a mini-sub collected rocks and took pictures of features on the lake floor. Based on what we know about Crater Lake's eruptive past, the bathymetry, rock samples and pictures, we created a geologic map of the lake floor and produced a poster. That's me on Wizard Island with the poster!

Dave Ramsey holds the Crater Lake Revealed poster while standing on the rim of Wizard Island in Crater Lake, Oregon. The poster shows the geology of the lake floor.

What are your current projects?

I am compiling an enormous database for all the volcanoes of the western United States. It includes volcano location, type, past eruptions, rock composition, and much more. Everyone knows about the thirteen big volcanoes in the Cascade Range, but did you know there are at least 2,856 volcanic vents in the Cascades that have erupted over the last couple of million years? Before I am finished, the database may include even more. Getting this information requires that I talk to geologists, students, and their professors - people from all over the United States who have studied volcanoes for many years. It is a big job, but well worth the effort.



Dave Ramsey works with a database to digitally draw a geologic map of the Cascade Range that includes cities, towns and highways that may be at risk during the next volcanic eruption.

That sounds like a big database! Why is this database and map so important?

All this effort is worthwhile because it will allow many scientists to do important studies by looking at patterns of eruptions. Their work can help us understand how frequently volcanoes erupt, where the next eruption might happen, and what areas of the United States might be affected during future eruptions. My long-term goal is to help create a web-based database where people find whatever volcano data they want. Emergency managers will be able to find information about volcanic hazards, geologists will obtain data for studies, and students can get very specific information for their homework assignments.

In the United States, there are many geologists studying volcanoes, and we want everyone to benefit from their work. We want everyone to be able to live safely and be more informed about volcanoes.

What attracted you to geology? Tell me about your educational path.

I have always liked the outdoors, maps and learning about the world. My first college geology course (at Mount Union College in Ohio) showed me how the mountains and valleys formed -- it was one of the most interesting classes I have ever taken. My college professors encouraged me to continue my education and I went to graduate school at Bowling Green State University. While there, I learned about digital-map making. This skill helped me to qualify for many good jobs, and it lead to my current job at the USGS.

What kind of classes would you recommend to others?

For anyone interesting in pursuing mapmaking, I recommend taking classes in geology, computers, and geography. There is so much that needs to be done in the digital mapmaking world -- old paper maps must be digitized so they are available to everyone online, new maps need to be assembled, and databases put together. There is a lot of great work to do!

Thank you!

For more information on mapping and volcano hazards, visit:

- Cascades Volcano Observatory (http://volcanoes.usgs.gov/observatories/cvo/)
- National Geologic Map Database (http://ngmdb.usgs.gov/ngmdb/ngmdb_home.html)
- Volcano Hazards (http://volcanoes.usgs.gov/)