Big lava reservoirs found, but Mount St. Helens not set to explode

Jake Ellison, San Francisco Chronicle, 11-11-15

Everyone loves that giddy, back-of-the-neck tingle from imaging a truly monumental disaster ... like "seeing" the city crumbling in the big one or one of our region's volcanoes exploding and disgorging lava.

And such thrills can be instructive, especially if you've imagined them so vividly that you lose sleep until you've built up your emergency supplies and gone over a survival plan, especially in this most-dangerous of naturally dangerous regions of the world.

Add into the mix scientific studies that explain how such disasters have and will happen and what damage they could reap and you've got some exciting thinking to do.

But that's not what a new report of magma under Mount St. Helens presented last week at the Geological Society of America's annual meeting was about ... despite headlines such as: "Could Mount St Helens be about to erupt? Massive magma chamber found below the volcano may reveal clues about future explosions."

Instead, the report showing magma reservoirs is one of many still to come from a very cool, in-depth study of St. Helens and the many forces at play in its geological life. And it's not the clearest picture we'll get of the dangerous mountain.

The root of the misconceptions, points out lead author Alan Levander of Rice University, stems from a graphic label used in those news reports that gives the impression of massive pool of lava about to come out just as we saw in Hawaii this past summer: "Magma chambers."

"There is no giant pool of lava down there," said Levander, one scientist in the project being led by the University of Washington called Imaging Magma Under St. Helens or iMush. "These things are almost solid rock that have a small percentage of melt moving through them. And so it's not sensational at all!"

Here's Levander's annotated map of what they believe their data so far shows.

Basically, the shallow magma storage reservoir drawn under MSH or Mount St. Helens shows some fluid (magma) present, but not a big "pool" of it. The seismic activity (the squares and diamond shapes) shows the path that magma traveled in the past and so may show association between the big red reservoir of magma and the shallow reservoir.

None of which points to a big pool of magma pushing to erupt out of St. Helens ... or certainly not anytime soon. However, the research did discover those bigger, deeper reservoirs and helped show the connections between them that led to the 1980 eruption.

Other research involving eight different geophysical and geological investigation techniques should be coming to fruition over the winter and have some preliminary results out by next summer, he said. The teams will then assemble the results into a much clearer picture of just what the heck is going on with Washington's problem volcano.

Technical note

Here's how Lavender explained in an email how to read the details of that graphic:

What we measure are the velocities of seismic waves in the earth. There are 2 types of seismic waves, P or compressional waves (volumetric change) and S or shear waves (bending). P waves travel at speed Vp, S waves travel at speed Vs.

Both Vp and Vs in rocks are reduced by heat, and by fluids in the rock, Vs more than Vp. In other words both P waves and S waves slow down, but S slows down more relative to P.

If you take the ratio of Vp to Vs it appears high if the rocks have a small amount of fluid, because Vs is more affected than Vp. We identify low Vp areas and high Vp/Vs areas as potential magma storage areas, if there is another line of evidence.

The top of the one directly under (St. Helens) was imaged in 2009 (by other scientists), and seismicity during the 1980 eruption occurs all through it. The deep low Vp zone has Deep Long Period Earthquakes associated with its side, and these are often associated with presence of magma.

The other hi Vp/Vs zome is beneath the Indian Heaven volcanic field, but there are no earthquakes linking it with the deep low Vp body. The bottom of the crust/ top of the mantle is called the Moho. Its almost at the bottom of the diagram.

In the end, Levander pointed out, "volcanoes give you a lot of warning in form of earthquakes before they erupt."

So, stand down ... but it is fun to imagine ... right? Or, maybe "awesome" is the correct word for such potential.