

Earthquake swarms not just clustered around volcanoes, geothermal regions

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An earthquake swarm – a steady drumbeat of moderate, related seismic events – over hours or days, often can be observed near a volcano such as Mount St. Helens in Washington state or in a geothermal region such as Yellowstone National Park in Wyoming.

New research led by a University of Washington seismologist shows, however, that such swarms can occur anywhere that is seismically active, not just near volcanoes or geothermal regions.

"In our research we saw swarms everywhere and we could see the broad characteristics of how they behaved," said John Vidale, a UW professor of Earth and space sciences and director of the Pacific Northwest Seismograph Network.

Vidale and two colleagues, Katie Boyle of Lawrence Livermore National Laboratory and Peter Shearer of the University of California, San Diego, examined data from 83 Japanese earthquake swarms over about 25 years. Their findings confirmed work they published earlier this year that looked at data from 72 events in southern California during a 19-year span.

Both studies examined data collected from swarms in which at least 40 earthquakes were recorded in a few-mile radius over two weeks. The swarms did not follow the well-recognized pattern of an earthquake burst that begins with a main shock and is followed by numerous smaller aftershocks.

"We saw a mix of the two kinds of events, swarms or earthquakes and aftershocks, wherever we looked," Vidale said. "It confirms what people have suspected. There are earthquake swarms and they are responses to factors we can't see and don't have a direct way to measure."

The Japanese research is being published tomorrow in the online edition of *Geophysical Research Letters*.

The scientists suspect that "swarminess" in volcanic and geothermal zones might be driven by hot water or magma pushing fault seams apart or acting to reduce friction and enhancing the seismic activity in those areas.

Away from volcanic and thermal regions, it is unclear what triggers swarms that don't include main shocks and aftershocks, Vidale said. It is possible that swarms are driven by tectonic movements so gradual that they take many minutes to weeks to unfold but still are much more rapid than normal plate tectonic motions.

The researchers also found that, contrary to expectations, swarms occurring within 30 miles of Japan's volcanoes lasted perhaps twice as long as swarms in other types of geological formations. It was expected that earthquake episodes would have been briefer in hotter rock formations.

The results help to provide a clearer picture of how seismic swarms are triggered and give a better means of assessing the danger level for people living in tectonically active regions where earthquake swarms might occur, Vidale said.

Source: University of Washington

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