Nordegg earthquake research aids Alberta scientists

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STAFF REPORTER

Cascading caverns, rolling rivers and forests full of lodge-pole pines: when one thinks of Nordegg's natural attractions, earthquakes don't come to mind. But for a group of geophysicists, the seismic activity around Nordegg and much of central and southern Alberta is providing a host of interesting data for exploration.


Jeff Gu

According to ongoing research coming out of the University of Alberta's physics department, earthquakes in Nordegg and around Rocky Mountain House are more prevalent than you would think and it is one of the most seismologically active areas in all of Alberta. For the past twenty years, the area around Rocky Mountain House has had a steady diet of one or two earthquakes per year. None generally posted higher than 3.5 on the Richter scale (in 1985 though, one posted 4.5 and shook bodies all around the county).

However, those minor earthquakes are being monitored to better understand earthquake dynamics: how many earthquakes does Alberta typically get over a set period of time, what is the geometry of those earthquake cracks and then, by extension, what does the earth's crust and mantle look like underneath Alberta?

"Partially, we're really trying to figure out how the ground formed and what makes it up now," said Jeff Gu, project leader of a team of geophysicists at the University of Alberta.

It's a kind of earthquake geography and history that provides the researchers with the who, what, where and why of earthquakes in southern and central Alberta and perhaps, by extension, the reasons why quakes happen in other places around the world too.

"The mechanism [shared between small, 3.0 earthquakes and larger 6.0 ones] would not be very different. It is a scaling situation," said Gu. "We're filling in the gaps of knowledge . . . While Alberta is relatively quiet compared to many other areas, there are fault lines

'While Alberta is relatively quiet compared to many other areas, there are fault lines here and there have been earthquake events, even recently.'

Jeff Gu
University of Alberta geophysicist

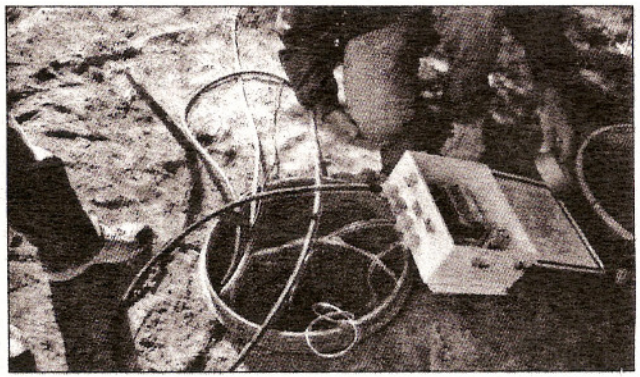
quake short term prediction will probably never be possible, but long term forecasting might be; his team's research could help to make that goal a reality.

His team has deployed 11 high-tech seismometers in a roughly 150 to 200 kilometers grid around central and southern Alberta giving the province its first "passive broadband seismic network." The closest one to Rocky sits somewhere in Nordegg on a piece of private property. The seismometers — they look like metal balls suspended on a tripod — are inserted into a barrel station every six months to retrieve data from an instrument attached to the underground technology and then bring it back to the U of A for research.

The seismometers are highly sensitive and can detect earthquakes from around the world, as they did with a 7.1-magnitude earthquake in Honduras last month, said Gu. They can probe several hundred kilometers into the ground.

Gu said that when an earthquake or other seismic activity happens, the frequency of the quake is picked up by the sensor and depending on how that frequency is received, the researchers can begin to understand what is in the ground. "Think of it like a CAT-scan," said Gu. If the scan goes through you with no interference, than you're tumor free. "However, if the signal is blocked, there's something inside. We try to then figure out what that something is," he said.

For instance, Gu said that around Nordegg, an anomaly of some sort means that certain seismic frequencies coming out of Slave Lake area that were picked up by


The seismology equipment is secured in a barrel and then buried into the ground and powered by a solar panel and battery.
SUBMITTED | JEFF GU

that something different is happening underneath Nordegg. It may be Nordegg is producing it's own seismic signals due to hidden faults and ground motion underneath the hamlet. It might be due to some sort of change in the rock composition.

"We don't know yet, but it's just something else to try and figure out and explain," said Gu. The signal appears to be persistent over time and overwhelms signals induced by water waves in Slave Lake.

Gu said that research into the data, which his team has been collecting for the past two and a half years is ongoing, but there is still much work to be done.

suggest that the Earth's crust and mantle beneath Edmonton may be quite different from Nordegg both in temperature and in mineralogy.

Gu said that knowledge like this and the other discoveries his team hopes to make, has many uses. There's just the simple thrill of finding out how something works, especially something as massive as tectonic plates. There's more practical applications, such as determining where old, dormant fault lines exist and whether or not drilling for oil or minerals in those areas might reactivate those fault lines and cause a quake. The research could potentially aid the determination