Predicting the impact of an Auckland eruption

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Jenni Hopkins with a map showing Auckland's volcanic field.

Rangitoto, Mt Albert, Lake Pupuke, Orakei Basin, Mt Eden and One Tree Hill are some of Auckland's most familiar landmarks. But they are also reminders of the city's fiery history and the looming threat of future disasters.

A clearer understanding of the risk posed by a new volcanic eruption in

Auckland has emerged from doctoral research undertaken by a student at Victoria University of Wellington.

Jenni Hopkins, in collaboration with GNS Science and the University of Auckland, has reconstructed the eruptive history of Auckland's volcanic field, which comprises more than 50 craters dating back around 200,000 years. While currently dormant, the field is expected to erupt again from a new site within potentially as little as a few hundred years.

"The 53 volcanoes in Auckland are almost entirely monogenetic, which means they generally only erupt once," says Jenni. "But what was previously unknown was the order in which they erupted—I wanted to find that out so that we could establish the characteristics of the field and get an idea of what a future eruption might be like."

To reconstruct the eruptive history, Jenni examined the ash deposits taken from a number of lake sediment cores to see the thickness of the layers and the order in which they'd been deposited. She also helped develop ground-breaking new geochemical techniques which have allowed, for the first time, the ash deposits to be accurately linked to their source volcanoes.

Using core samples that were drilled by GNS Science and The Auckland Council's research programme DEVORA (DEtermining VOlcanic Risk in Auckland), Jenni analysed the elemental make-up of ash deposits with an electron microprobe and laser ablation techniques. Each layer was shown to have a unique geochemical 'fingerprint' of trace elements which could then be matched to lava from the source volcanoes.

"Being able to pinpoint the volcano from which each layer of ash was derived means we can see how far ash was dispersed in each eruption. We can use this geological evidence to make estimates about the areas that will be affected by eruptions in the future."

Her research has been funded by the Earthquake Commission (EQC) and Auckland Council through DEVORA, and GNS Science. "The whole point of my work is to provide an improved understanding of the threat posed by Auckland's volcanoes to both people and critical infrastructure. It's designed to assist in the development of better management practices for evacuations, and to help local authorities work out how best to mitigate the damage to assets like roads, power lines and buildings."

Jenni is currently working for GNS Science and will conduct further research on Auckland's volcanic field. She then would like to apply the skills developed during her PhD research to the ancient super-eruption of Taupo by examining its far-flung ash deposits to unravel some if its long-held secrets.

"I've been so lucky to study at Victoria," says Jenni. "The geochemistry facilities here are excellent—I had everything I needed to do all my work right on campus, which is amazing."

Provided by Victoria University of Wellington

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