

Looking into Ngauruhoe volcano; - can we use muons to get a density profile

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Ngauruhoe (2287 m high) was New Zealand's most active volcano for over a century until 1975, when after a series of Vulcanian eruptions, it became quiescent. It is a steep conical volcano, which had an open vent about 200 metres deep in late 1973, which has since filled up. It is important in considering the hazard of future eruptions, and in interpreting any possible eruption precursors, to know whether its former vent is blocked by solid lava or just soft fill material.

Muon tomography offers a method to measure the density within the upper part of the volcano, and can potentially answer this question. Based on measurements of the deep open vent that existed in late 1973, and using the current topography, we calculated the effect on the muon attenuation profile of a density anomaly in the old vent region. This showed that if a film type muon detector could be installed at a suitable location high on the slopes of Ngauruhoe, it would be able to detect whether there is a significant density difference associated with the old vent.

Work has continued on trying to find a suitable location to install the detectors. Difficulties include the steep topography, as well as getting permission to use an area of importance to both outdoor enthusiasts and the indigenous population. Possible sites have been identified on the less visited southern side, and will be investigated next summer. The trade-off between a lower site which can see deeper into the volcano versus a higher site with less attenuation can only be decided once the characteristics of the detector film are known.

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