

# Imaging crustal seismic attenuation, central Taupo Volcanic Zone, New Zealand

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## 1. GNS Science

Since 2009 we have deployed broadband and short-period seismometers across a 90 km by 55 km area in the central Taupo Volcanic Zone, New Zealand, encompassing part of the Okataina Volcanic Centre and the Kapenga (Ngakuru) graben, as well as more than 8 hydrothermal systems, including Rotokawa, Wairakei, Mokai, Ohaaki, Waikite, Waimangu, Rotomahana, and Rotorua. Seismic acquisition was carried out using rolling arrays occupying more than 60 sites, with an average spacing of 6-7 km.

We have now undertaken event detection and location analysis for c.900 earthquakes using the seismic data, inverting arrival times to derive 3-D volumes for  $V_p$  and  $V_p/V_s$ , and using spectral data from the best earthquakes to derive a 3-D volume for  $Q_p$  (1/attenuation). Our path coverage and density is good between 2 kms and 8 kms depth, as visualised using calculated raypath density tensors, and as confirmed by synthetic modelling. We find low  $Q_p$  ( $Q_p < 200$ ) anomalies in the 3D volume have a strong association with low resistivity anomalies highlighted from magnetotelluric data collected in the same region, as well as with seismicity swarms; we link these features to partial melt and the effect of volatiles in the mid- and upper crust

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