



Volcano-tectonic interactions in a rhyolite domain: the Taupo volcanic zone, New Zealand

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Paleoseismic data suggest partial coupling between large crustal faults in the Taupo Rift and nearby (<20 km distance) large volume (> 5 km³) rhyolite eruptions in the Taupo Volcanic Zone, New Zealand. The Paeroa and Ngapouri-Rotomahana faults form the eastern margin of the Taupo Rift (the modern tectonic structure embedded within the Taupo Volcanic Zone). Trenches excavated on these faults at 2-20 km outside the margin of the Okataina rhyolite caldera provide information on apparent volcano-tectonic interactions during the past c. 16 cal kyr. The 1314±12 AD Kaharoa Tephra was erupted from Okataina caldera, and a series of hydrothermal eruption craters formed to the southwest of the caldera at about the same time. Many of these explosion craters lie along, or close to, the Ngapouri-Rotomahana fault. Five trenches excavated across the fault reveal displacement events having various associations with volcanic activity in Okataina caldera and the hydrothermal eruptions. These include; a close temporal association with the 1314±12 AD Kaharoa eruption (inferred to have been triggered by an arrested basaltic dike intrusion); secondary faulting triggered at sites close to the caldera during the 1886 AD eruption; and surface rupture of the fault immediately prior to an eruption from the caldera at c. 9.5 cal ka. In contrast, probable whole-fault rupture, without any association with volcanism at Okataina caldera, occurred at c. 1600±200 AD, c. 980-1162 AD, and c. 180-300 AD. On the nearby Paeroa fault, data from seven trenches document three multi-strand fault rupture events that occurred when Okataina caldera was erupting at 13.8 and 9.5 cal ka, and four major fault ruptures that occurred without any temporal association with volcanism.