



Petrology confirms medium-term seismic precursor of 1995 Ruapehu eruption.

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The first eruption of the 1995-96 eruptive episode of Ruapehu volcano had only a few hours of immediate seismic precursors, but between twelve and six months earlier there had been a series of swarms of tectonic earthquakes about 15-20 km west of the volcano, which had coincided with periods of high lake temperatures and small eruptions in Crater Lake. Although this activity was unusual, in fact it included the four months with the highest number of Magnitude 3+ events near Ruapehu in at least the last 40 years, it was not obvious why there would be a connection between the activity some distance from the volcano and the later eruption.

Recently, Kilgour et al (2014) used diffusion chronometry to try and identify the timescales of magma mixing before Ruapehu eruptions, by looking at the outermost rims of pyroxene crystals within scoria clasts. This included an analysis of samples from the 1995 and 1996 eruptions which gave approximate dates for magma mixing events that preceded the 1995 eruptions. Nearly half of the 1995 samples had mixing dates in the November 1994 – April 1995 period, which included the period of strong seismicity, indicating that magma was mixing under Ruapehu about that time. In other words, we have rather belated confirmation that the late-1994 to early-1995 period was when the magma that would be erupted in late 1995 was first disturbed.

A very recent paper by White & McCausland (2016), mentions this Ruapehu activity as one of a number of cases in which seismicity a significant distance from a volcano has occurred before an eruption. This has encouraged us to look at modelling possible connections between faults and magma, looking at the options of either moving magma producing seismicity on nearby faults, or stress changes linked to the seismicity enabling magma to start moving.