New Zealand Andesites: Priming the lithosphere for a supervolcano.

J.A. GAMBLE[1] R.C. PRICE[2] AND I.E.M. SMITH[3]

[1] National University of Ireland, University College Cork, Ireland; j.gamble@ucc.ie.
[2] Science & Engineering, University of Waikato, New Zealand; r.price@waikato.ac.nz.
[3] Department of Geology, University of Auckland, New Zealand; ie.smithauckland.ac.nz

In Taupo Volcanic Zone (TVZ), one of the most frequently active rhyolitic magmatic systems on the planet, the cycle of volcanism is related to subduction, regional tectonics and time. Oblique subduction of the Pacific Plate induces progressive rifting of the North Island lithosphere and SW propagation of volcanism. In this scenario, the seismic swarms identified to the SW of the present day TVZ near Wanganui could be an indication of a precursory process that thermally conditions the lithosphere prior to the onset rhyolitic magmatism. In central TVZ lithics in ignimbrites, regional magnetics, gravity and geothermal drilling testify to the existence of andesite and basalt under a blanket of ignimbrite. Peripheral to TVZ, eroded andesite edifices infer more extensive distribution. Basalts and andesites are vital components of the processes that lead to rhyolitic volcanism, priming magma chambers for eruption on time-scales << 1Ma.

Mt Ruapehu, at the SW extremity of TVZ, extends back at least 250 ka and is a useful case study. We suggest that the present ~25 year eruptive cycle is the normal "background state" of the volcano and that superimposed on this activity were periods when magma flux exceeded background rates by several orders of magnitude. We have shown that Ruapehu andesites are in reality aggregates of crystals and melts generated by polybaric mixing – mingling events in the lithosphere. Occult in many of these andesites are traces of rhyolitic melts that are chemically indistinguishable from rhyolites in the major caldera centres. Moreover, the overlap of Sr, Nd and Pb isotopes for basalt, andesite and rhyolite support a link that we can trace from lower to upper crust.