# Geochemistry of lavas from the Kaiapo tuff cone, Taupo Volcanic Zone, New Zealand: lava heterogeneity within a single edifice

N. J. MARTIN[1], A. M. SNELL[1], T. O. ROONEY[1]* AND C. D. DEERING[2].

[1]Michigan State University, E. Lansing, MI 48823, USA
*(correspondence: rooneyt@msu.edu)
[2]Michigan Tech University, Houghton, MI 49931, USA

The Taupo Volcanic Zone (TVZ) in New Zealand is one of earth's most productive silicic volcanic centers. Key to understanding variations in the volumetrically dominant silicic system are small-scale basaltic eruptions that occur throughout the TVZ. Regional-scale patterns in basalt chemistry have revealed broad differences in primary magmas derived from the mantle wedge [1], however smaller-scale heterogeneity has not been explored. The Kaiapo tuff cone is a phreatomagmatic deposit located in the southern TVZ lying on the eastern side of the Kaiapo Fault [2]. Basaltic bombs collected from this magmatic center exhibit petrographic heterogeneity typified by significant variations in the degree of crystallinity, which is inconsistent with a simple monogenetic origin for these lavas. Lavas analyzed extended over a limited range of MgO from ~6.5-7.5 wt. % and divide into two distinct groups on the basis of titanium content. The high-Ti group contains samples with high Ti, Na, Zr, Nb, Nd, and Ce, while the low-Ti group contains samples with elevated Al and Ca. Mantle normalized incompatible trace element diagrams reveal that for almost all elements, the high-Ti group exhibits incompatible trace element enrichment, overlapping with the low-Ti group only in Sr. The broad patterns of high-field strength element depletion and large-ion lithophile element enrichment in the Kaiapo tuff cone lavas are consistent with an origin from a fluid fluxed mantle wedge, similar to other basalts in the TVZ. The Kaiapo tuff cone lies within the TVZ's CW-2 segment, where variation in basalt geochemistry has been recognized in terms of two distinct primitive lava groups. Uniquely, the two lava groups discovered at the Kaiapo tuff cone correlate with the end members identified in the CW-2 segment. Our findings reveal the potentially heterogeneous compositions of lavas in 'monogenetic' cones within the TVZ and highlight the need for multiple analyses to constrain the full range of geochemical variation in this region.

[1] Rooney & Deering (2014) *Geology* **42**, 3-6 [2] Brown *et al* (1994) *N. Zealand J. of Geol. & Geophys* **37**, 113-126