Magmatic evolution and distribution in the Taupo Volcanic Zone, New Zealand

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Evaluation of a large bulk-rock and mineral database of rhyolite from the Taupo Volcanic Zone (TVZ) provides important constraints on the evolution and distribution of these magmas through time and space. A range of compositions are observed and characterized by distinct differences in FeO*/MgO ratios, ASI, Ba/La, Y, and MREE. These differences reflect changes in the fH_2O, fO_2, P-T conditions in a 'hot zone' source region at the crust-mantle interface where these evolved melts are generated by fractionation/melting of successively emplaced basaltic magmas/plutons. Systematic variations in Y and MREE are consistent with variable proportions of amph/opx in the source, which reflect changes in P-T. A strong correlation between Ba/La and FeO*/MgO suggests fH_2O and fO_2 are also important in controlling the melt compositions.

The distribution of rhyolite magma compositions and melt production through time are governed by the central TVZ rift axis. Hydrous, more buoyant evolved-melts are generated at the lower crust-mantle interface directly below the central rift axis where the crust is thinnest. Subsequent melts are produced in a progressively higher P-T regime and are anhydrous. The duration and rate of melt production within these cycles are governed by the flux of H_2O released from the subducting slab, however, the distribution is governed by extension along the central rift axis.

Controls on As abundance in soils and sediments in Hawai`i

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Although arsenic has been widely studied worldwide owing to its potential toxicity, fewer data exist for subtropical volcanic island settings. Several studies carried out in Hawai'i over the past decade examined trace elements in soils and sediments and produced a body of data, previously unavailable.

Our study was motivated by the fact that disagreement exists about the magnitude of natural background levels of As in Hawai'i and the consequent difficulty in defining "high concentrations". We have determined that soils and sediments contain trace natural concentrations of As of less than 20 ppm. Human activities, however, in particular the use of arsenical pesticides, have enriched certain soils and sediments, and As levels can reach several orders of magnitude above background [1, 3]. Arsenic-contaminated soils exist on large tracts of former sugar cane lands, where Cutler *et al*. [3] measured up to 1000 ppm As. Soil contamination has also been reported on other islands.

This presentation examines both the natural and anthropogenic controls on As distribution and occurrence in Hawaii soils and sediments and attempts to elucidate individual sources of this element. To date it appears that, in addition to the use crop pesticide, other anthropogenic sources of As in Hawaii include termiticides and certain fertilizers. Because the high topography and high rainfall (gradients) characteristic of Hawaii engender strong runoff and transport of materials, the distribution of As has been significantly altered through storm flow into selected water bodies.

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