

TECTONIC CONTROLS ON VOLCANISM AND ACTIVE EPITHERMAL GOLD MINERALISATION IN THE TAUPO VOLCANIC ZONE, NEW ZEALAND.

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Despite extensive exploration for geothermal energy, the structural architecture of the Taupo Volcanic Zone is poorly understood. It has been generally believed that the Taupo Volcanic Zone comprises a relatively simple series of north-easterly trending normal faults and associated graben developed in response to back-arc extension during the last 2.1 Ma. A number of calderas and rhyolite dome fields have also been recognized and the extensive Holocene ashflow volcanism of the Taupo Volcanic Zone has been described in detail.

High resolution SPOT satellite imagery shows that in addition to the young north-easterly fault array a series of north striking lineaments of regional extent transect the Taupo Volcanic Zone . Assuming these northerly lineaments to be faults, the structural pattern they define suggests that the Taupo Volcanic Zone developed initially as a subsidence basin between the diverging right slip Hauraki Rift in the west and the Kaingaroa Fault - North Island Shear Belt in the east. A number of internal fault geometries are possible; one of these suggests that the location of the major rhyolite dome fields is controlled by divergent splays such as the Paeroa Fault which were reactivated or were developed *subsequently* along the fault array.

Hydrothermal activity occurs throughout the Taupo Volcanic Zone in response to the regional high heat flow, however the geochemistry of individual systems reflect a spatial control. The high gas, precious metal depositing systems are colinear and sub-parallel to the south-eastern margin of the Taupo Volcanic Zone. These systems are believed to be located on structures which penetrate deep below the volcanic basement and which may also localise andesite magmatism. Rotation of fault bound blocks developed within the original basin leads to dilation of earlier structures, linkage of fluid reservoirs and focussing of hydrothermal upflow and may, in equivalent older terranes, be responsible for the development of spectacular 'bonanza' gold vein deposits.

Recognition of the tectonic controls on magmatism and hydrothermal activity in an active volcanic belt provides a basis for evaluating controls on precious and base metal mineralisation in older volcanic terranes such as the Drummond Basin, N.E. Queensland, the 'Walker Lane' , Nevada and the well known VMS districts, and in turn provides a basis for defining deep exploration plays for high grade deposits.