

A marine MT array for imaging the magmatic systems beneath near-shore volcanoes (Whakaari and Tūhua) in New Zealand

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SUMMARY

As part of a New Zealand government funded Endeavour Research Program called "Beneath the Waves: Preparedness and Resilience to New Zealand's Nearshore Volcano Hazards" 183 marine MT measurements have been made across the Bay of Plenty, with arrays of data centered around Whakaari – White Island, and Tūhua – Mayor Island. These nearshore volcanoes pose a risk to coastal communities in the Bay of Plenty and surrounding region (including Auckland, New Zealand's largest city) through ashfall and/or volcano-induced-tsunami. However, they are not well understood and the tragic events at Whakaari in December 2019 highlight the need to better understand the risk and potential hazard posed by NZ's near-shore volcanoes.

Over four separate voyages during 2023 and 2024, marine MT data were acquired around Whakaari and Tūhua to image their underlying magmatic systems. Resistivity models of these MT data will be used, in combination with other data, to develop conceptual models of these volcanoes that can be used to inform decision making during periods of unrest.

Initial phase tensor analysis of the marine MT data indicate that areas of high conductance occur at short periods beneath and south of Whakaari, the latter consistent with the location of the submarine Calypso Geothermal Field. At longer periods, an area of high conductance is indicated northwest of Whakaari near Te Paepae o Aotea (Volkner Rocks), which is thought to be the remnants of an older volcano.

Keywords: Marine MT, Volcano, Hazards
