

## Greywacke fracture mapping as an analogue for supercritical geothermal host rocks

We seek a highly motivated student to investigate fracture networks in outcropping basement rocks representative of those in the Tāupo Volcanic Zone that potentially host supercritical geothermal resources. This project will provide an analogue for research that quantifies the hydrological and mechanical properties of the crust at depth.

Research will involve mapping fractures in a quarry outcrop near Whakatane. Basement rocks are composed of a range of faulted and unfaulted greywacke and argillite. Mapping will consist of unmanned aerial vehicle (UAV) photogrammetry and manual fracture measurements (scanline, window sampling). The fracture network derived from the outcrop will be used to develop a statistical framework for modeling fracture geometries and their permeability characteristics. This study will be used as a baseline to compare with drillhole data acquired in a nearby geothermal field, so the student will learn geothermal development techniques with application to industry.

This project is part of the “Geothermal: Next Generation” programme that aims to identify Aotearoa New Zealand’s supercritical resource, and characterise their fundamentally unique chemical and fluid-dynamic properties. We hypothesise that New Zealand geothermal systems exist at a greater distance from molten rock (i.e., closer to the Earth’s surface) where they have deep (>6 km) supercritical roots above shear zones or shallow intrusions that are connected to deep crustal magma reservoirs.

“Geothermal: Next Generation” is funded by the New Zealand government Endeavour fund. The student will work with Cécile Massiot (GNS Science), Sarah Milicich (GNS Science), Carolyn Boulton (VUW) and Tim Little (VUW). A proportion of the data analysis and interpretation will occur at GNS Science, Avalon (Lower Hutt).



*Fractured and veined greywacke at Whakatane heads (picture taken by Sarah Milich)*

To apply, or for more information, please send a CV, academic transcripts, and contact information for two referees to Carolyn Boulton ([carolyn.boulton@vuw.ac.nz](mailto:carolyn.boulton@vuw.ac.nz)) and Cécile Massiot ([c.massiot@gns.cri.nz](mailto:c.massiot@gns.cri.nz)).

### **Positions Available**

One or a combination of the following:

- 3<sup>rd</sup> year’s summer project (2020-2021) to conduct field work (potential for a summer scholarship for 3 months with field costs covered)
- Honours or MSc thesis support towards costs of fees and stipend