Tephra Seismites Research Group Newsletter #2 (June 2022)

TephraSeismites

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato
Te Aka Mātuatua - School of Science


Ngāroto - photo by F. van Schie

The Tephra Seismites group is researching past earthquake activity on hidden faults in the Hamilton Basin through studies of tephra (volcanic ash) liquefaction in local peat lakes. Please visit www.tephra-seismites.com for an overview of the project and to read Newsletter #1 (June 2021).

Over the past year the team has made progress on fieldwork, lab analyses and testing, and data interpretation, with a particular highlight being our second successful lake coring campaign in March 2022. In this newsletter we detail some of these project advances, and feature the work of our PhD and masterate students.

Rotoroa (Hamilton Lake) study

We are using two methods to study variation in liquefaction features within Rotoroa. First, masters' student Richard Melchert worked with colleagues Dr Andrew Lorrey and John-Mark Woolley (NIWA Auckland) to image the lakebed and sediments using ground-penetrating radar (GPR).

In this technique, radio waves are sent towards the ground, and when they hit an object, they bounce back modified by this interaction. The return signal can show changes between sediment layers under the lakebed surface, helping us to map them.


Coring at Rotoroa: Richard (left), Dr Marcus Vandergoes (left), Henry Gard (back).

Richard, Dr Lorrey & the GPR unit (out of view on canoe floor) set off to image Rotoroa lakebed.

The team also collected multiple cores from across the lake, with Dr Marcus Vandergoes and Henry Gard (GNS Science) providing coring expertise. After CT scanning to image their 3D structures, Richard has opened and described the cores.

With the increased spatial coverage across the lake, these cores reveal information about past sediment input to Rotoroa. They also contain a number of the injectites on which our study is centered.

Many thanks to Ngāti Wairere and Hamilton City Council for permissions; Nic Ross and Hamilton Radiology for CT scanning; and NIWA and GNS Science colleagues.

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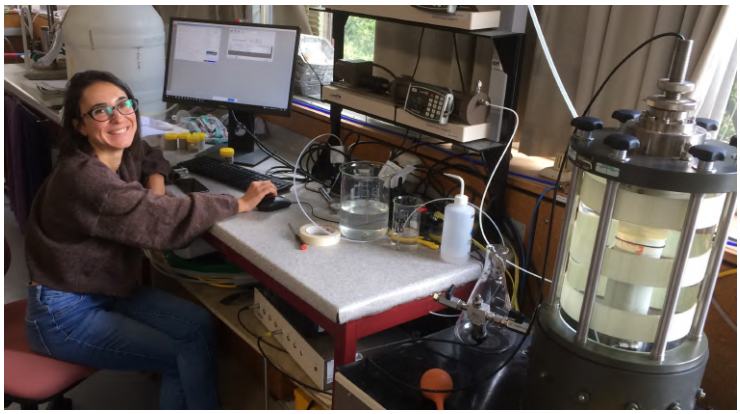
Triaxial testing

PhD student Jordanka Chaneva has been testing tephra samples to better understand their geotechnical properties. These are the properties that may enable their liquefaction during earthquake shaking. By connecting her data to observations of cores taken from our field sites, we aim to understand the intensity of earthquakes that caused the tephras to liquefy.

Jordanka presented some results from her work at the 7th International Young Geotechnical Engineers Conference in Sydney in April, and her paper is available to read online here.



Jordanka conducting triaxial tests. The triaxial apparatus (on the right) puts controlled stress on our tephra samples so we can study their response. This helps us relate the liquefaction within the tephras to past earthquakes.

Conducting a GPR survey near Te Puninga Fault: Josh (left) and Genevieve Coffey (GNS Science). Photo: Pilar Villamor.

Te Puninga Fault

MSc student Josh Hughes, with Dr Pilar Villamor (GNS Science), is continuing his work on a related project jointly supported by EQC, to establish the timing of past earthquakes on Te Puninga Fault near Morrinsville.

Josh's work involves field and lab research to date tephra layers uncovered in last year's trenches, use GPR on land with a GNS Science team, and interpret how the fault scarp interacts with landscape features such as streams, terraces and gullies.

More information about the project and its supporters is available through the EQC website here.

Future plans and additional acknowledgements

We have one final coring campaign planned in Waipā. Our thanks to Ngā Iwi Toopu O Waipā, as well as the Department of Conservation and Waipā District Council for access and permits. We also thank Ngāti Wairere, Hamilton City Council, landowners, and all others who have supported our fieldwork so far, with nine lakes cored over two field campaigns.

We plan to hold a half-day meeting later this year with talks and a chance to see lake cores and lab equipment. If interested in attending, please contact tehnuka.ilanko@waikato.ac.nz to ensure you receive the details when they are sent out closer to the time.

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