Earth Science

Virtual Reality in Rotorua's Hot Springs

New Zealand's hot springs are world famous and visited by many tourists. They and their extremophile microbes are also important as analogues in the search for the earliest life on Earth and possible past life on Mars. Given that these are environmentally sensitive sites, a new push is underway to map key locations in three dimensions to create virtual field site maps and field trips using drone and laser scanning technology. The resultant 3D models created will be used for research study, promoting science tourism and developing virtual field trips for many end-users (e.g. NZ Schools, online astrobiology courses, government organisations, etc.). The Research Experience Award student would utilise collected data for a pilot study to construct 3D models of selected hot spring areas. Training and access to computing would be provided by the School of Environment and the Centre for eResearch.

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Sea Ice Borehole Seismology

In November-December 2016 a hot water drilling rig, side corer and borehole seismometer installation will be tested near on the sea ice near Ross Island, Antarctica ahead of the major cross well tomography experiment in the 2017/18 field season calibrating the seismic characteristics of ice temperature and deformation fabrics in the Ross Ice Sheet. A student can participate in Semester 2 seismic instrument testing ahead of the planned fieldwork and preliminary data analysis in summer semester 2017.

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Global database on volcanic hazard maps

Student to assist with collating and analysing of volcanic hazard map data for a global database on volcanic hazard maps.

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Reconstructing the Evolution of Te Karo Bay / Sailor's Grave Epithermal System

Te Karo Bay is a 3 km stretch of coastline on the east coast of the Coromandel Peninsula that exhibits hydrothermal alteration including epithermal style quartz veins. This study would involve students participating in detailed lithological mapping of the volcanic geology of the coast as well as structural mapping and textural analysis of the exposed quartz veins over two 5-day periods, selected to take advantage of low tide windows. This mapping will help develop an understanding of: the controls on vein types and fractures, the orientation of the stress field during vein development, the inter-relationship of the fault-vein arrays and their relative timing in order to gain an overall understanding of the evolution of the epithermal system exposed in cross section. The results will be developed into a manuscript for submission to New Zealand Journal of Geology and Geophysics, with follow up tasks (figure preparation, writing) distributed according to ongoing interest and ability. It is anticipated that all contributing students will be acknowledged in the list of authors. This project will be led by JR with field and lab costs supported by her Mineral Exploration Models research grant. Her PhD students Ayrton Hamilton and Engda Bahiru will provide guidance and quality control.

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Developing a field methodology to detect breaking wave impacts and cliff response

The work would involve fieldwork at a study site at coastal cliffs in Taranaki. We would be using wave pressure sensors to measure the waves, seismometers to detect cliff shaking, and video recording of the wave impacts. The fieldwork will likely be taking place over Summer in February 2017

Project with PhD Student Catriona Thompson (Supervisor: Mark Dickson)

Drivers in Variation in the Eruptive and Magmatic Processes of a Persistently Active Volcano, Yasur, Vanuatu

The work that the student would do would involve accompanying me to Yasur volcano in Vanuatu where I am observing a number of volcanic phenomenon including thermal imaging of explosions, measuring gas flux and deploying seismic stations. The student would serve as a field hand - helping to carry gear, setting up and maintaining the equipment, and observing the volcanic activity (which is very frequent). Yasur is on Tanna Island, a sub-tropical, sunny, rural, pacific island environment. My fieldwork will run from late-August through to mid-November, 2016. The student would have to come for a week sometime during this period.

Project with PhD Student Ben Simons (Supervisors: Shane Cronin, Jennifer Eccles)

Characterising Mantle Sources in the Auckland Volcanic Field

Field work in Auckland (Puketutu and/or the island of Motukorea) to collect ash and lapilli. Laboratory work would involve cleaning tephra samples, sieving, and picking out olivines for geochemical analysis to understand what is melting underneath Auckland to produce its volcanoes. Fieldwork will take place over 2 days, as soon as weather, personnel schedules, and permits allow. Motukorea fieldwork is currently planned for 26 July, with a rain date of 27 July. Puketutu fieldwork will take place over 1 day between 28 July and 24 August. Labwork will be on-going and can be done in a several day period or intermittently throughout the semester.

Project with PhD Student Elaine Smid (Supervisor: Jan Lindsay)

Mapping Fossilised Hot Spring Deposits of the Coromandel Peninsula

The Coromandel Peninsula contains over fifteen fossilised hot spring deposits, known as siliceous sinters, formed in a volcanic arc of Mio-Pliocene age due to previous geothermal activity. This project will analyse the preserved textures within two of the most extensive deposits to reconstruct their paleoenvironments. By comparing outcrop samples at the macro-scale to samples from active hot springs of the Taupo Volcanic Zone housed within University collections, it will be possible to map out the temperature gradient from hot vent areas to plant-rich distal apron marshes, and the determine the chemistry of the geothermal fluid that formed the deposit. The Research Experience Award student(s) would be involved in completing fieldwork with the PhD student including traveling to the sites via forestry roads and locating well-preserved textures within the deposits using GPS locators, learning field mapping techniques and collecting hand samples for further analysis.

Project with PhD Student Ayrton Hamilton (Supervisor: Kathy Campbell)

Research into science communication and outreach by developing a volcano-related demonstration

As part of the DEVORA (DEtermining VOlcanic Risk in Auckland) project, University of Auckland students and staff run science outreach days. We teach visitors the science behind volcanoes by showing them rocks and experiments. This year a major event is the Auckland Heritage Festival (AHF),

for which we need a new experiment to teach volcanological research. The Research Experience student will find/adapt a fun and educational volcano-related experiment that we can do at the AHF, prepare the equipment/materials needed to perform the experiment, train others, and participate in the AHF day (8 October 2016). The student will need to understand the scientific significance of the experiment and be able to explain it to curious non-specialists. To excel at this project, you need to: Enjoy playing/talking with children, want to get people excited about science, investigate how to make the science behind volcanoes accessible to non-scientists while keeping the science accurate. This project focuses on communicating scientific research, a skill which will help the student in any science-related career.

Project with PhD Student Catherine Kenedi (Supervisor Jan Lindsey)

Science communication of natural hazard research

Goal of the project is to write and publish (online) a summary of a scientific paper and a blog about the research topic of the paper to introduce non-specialists to a topic of natural hazard science. We have recently established the Hazard Hub @ University of Auckland, a group to bring together UoA natural hazard researchers and increase our profile internationally. One way to draw attention to our science is by making it accessible to non-specialists through summaries and blogs. The Research Experience student will summarize a publication written by a UoA natural hazard researcher and write a blog about the broader scientific field behind the publication. The summary and blog will be published on the Hazard Hub website. This Research Experience is hugely valuable to the student, both because of deepening her/his understanding of a branch of natural hazard science and in developing writing skills in science communication. Science communication is both a field that could be a career and also a critical skill set if the student goes on to work as a scientist.

Project with PhD Student Catherine Kenedi (Supervisor Jan Lindsey)

Environmental Science

Local scale air quality monitoring

The student(s) will join a team of PhD and post-doctoral researchers studying personal exposure to air pollution in Auckland. Research will involve collecting air quality data using personal samplers and deploying fixed monitors within the central business district.

Jenny Salmond | email: j.salmond@auckland.ac.nz |
http://www.env.auckland.ac.nz/people/j-salmond

Brown haze in Auckland

This research project will assist with the interpretation and classification of photographs of brown haze to try and identify underlying causal factors. Timing is flexible and analysis is laboratory based.

Jenny Salmond | email: j.salmond@auckland.ac.nz |
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Kauri dieback - Throughfall and soil water characteristics (1 or 2 weeks)

While water is passing through the forest canopy the nutrient and carbon concentration/composition changes. In this project we will investigate the spectral properties (as a measure of dissolved organic carbon quality) of throughfall and soil water under healthy and “sick” (due to kauri dieback) kauri trees. The student will help with the water collection in the Waitakere Ranges and chemical analysis using a spectrophotometer and nutrient analyser.

Required skills: Basic understanding of ecosystem processes (e.g. completed ENVSCI 201 or equivalent), enjoyment of outdoor work, interest in laboratory work.

Luitgard Schwendenmann | email: l.schwendenmann@auckland.ac.nz | https://unidirectory.auckland.ac.nz/profile/l-schwendenmann

Urban forests and parklands – Effect of management on carbon pools and fluxes (1 or 2 weeks)

Urban parkland and forests play an important role in the urban cycle. In this study we will investigate the carbon pools and fluxes of these ecosystems across Auckland. We will also investigate the effect of management (irrigation, fertilization, etc). This project includes field and lab work. The student will learn how to use state of the art equipment (infrared gas analyser, temperature/moisture probes, elemental carbon/nitrogen analyser) in carbon science.
Required skills: Basic understanding of ecosystem processes (e.g. completed ENVSCI 201 or equivalent), enjoyment of outdoor work, interest in laboratory work.

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Water Sensitive City

This two week research experience is suitable for a stage 4 student familiar with the literature on Water Sensitive Cities. It will provide experience with structured review of policy documents seeking support for Auckland to become water sensitive. The research will explore a core problem with the literature; its discussion of water sensitive lacks clear a framework for the concept and that indeterminacy makes it difficult to argue that prescriptions be embedded in policy.

Sam Trowsdale | email: s.trowsdale@auckland.ac.nz | http://www.env.auckland.ac.nz/people/s-trowsdale

Carbon and nitrogen stocks in mangrove sediments

Mangroves provide numerous ecosystem services including carbon storage and sequestration. The mangrove area in the Auckland region is expanding which will modify the amount of carbon stored in mangrove trees and the sediment. The objective of this project is to quantify the amount of carbon (and nitrogen) stored in mangrove sediments in the Auckland region. The research activities include sample preparation, elemental analysis (carbon and nitrogen), data entry, and other related activities. The students will also be shown how to collect samples in the field. The project is suitable for two week experience.

Project with PhD Student Suyadi (Supervisors: Luitgard Schwendenman; Jay Gao, Carolyn Lundquist)

Morphometric analysis of *Gambusia affinis*

Morphometrics is the study of shape; you will photograph specimens of the freshwater invasive fish *Gambusia affinis* from 21 populations across New Zealand.These images will be used to determine if fish have evolved different morphology's within contemporary time (<100 years) in New Zealand.

Project with PhD Student Emma Moffett (Supervisors: Kevin Simon, George Perry)

Field survey of *Gambusia affinis* for life history

We will survey *Gambusia affinis* from geothermal and ambient streams. Fish will then be weighted and dissected for life history traits (embryo size, mass, and stage) in the laboratory.

Project with PhD Student Emma Moffett (Supervisors: Kevin Simon, George Perry)

Stream ecological health across geothermal and ambient streams in New Zealand

Macroinvertebrates are commonly collected and identified to gauge stream health by all regional councils and consultancies across New Zealand. We will help students learn to identify macroinvertebrates and processes these in the laboratory. This work can be completed throughout S2.

Project with Emma Moffett (Supervisors: Kevin Simon, George Perry)

Geography

Making profit while reducing homelessness? A study of homelessness programs funded using Social Impact Bonds in Dublin and London

New methods of welfare financing are putting investors at the centre of social service provision. People experiencing homelessness, in particular, are thought to be well suited to privately financed social services—which use a financing mechanism known as a Social Impact Bond—and many countries have implemented such programs in recent years. These new developments mean that decisions about whether or not social services are provided increasingly hinge on the possibility for profit. The recent and rapid international growth of privately financed social services raises questions about public control, service quality, and who benefits most from welfare but, to date, these issues remain poorly understood. To address these knowledge gaps, this Research Experience Award project will examine privately financed social services for homeless populations in Dublin and London. The awardee will be responsible for collecting secondary data, analysing media coverage and reports, and producing brief summaries on case study programs in Dublin and London. At the conclusion of the two-week project, the awardee(s) will have enhanced their qualitative research and writing skills, and developed knowledge of new directions in social policy.

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New Times for Migration: trades workers in the Canterbury rebuild

We invite applications for a student to join us to undertake, transcribe and analyse biographical interviews with people holding work visas and employed as trades workers in the Canterbury rebuild. The research forms part of a Rutherford Discovery Fellowship entitled *Nation and Migration: population mobilities, desires and state practices in 21st century New Zealand*. This Research Experience will provide excellent opportunities to develop qualitative research skills and to gain an understanding of contemporary migration processes in New Zealand.

Francis Collins | email: f.collins@auckland.ac.nz |
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New Times for Migration: nurses in the Auckland-based health sector

We invite applications for a student to join us to undertake, transcribe and analyse biographical interviews with people holding work visas and employed as nurses in the Auckland-based health sector. The research forms part of a Rutherford Discovery Fellowship entitled *Nation and Migration: population mobilities, desires and state practices in 21st century New Zealand*. This Research Experience will provide excellent opportunities to develop qualitative research skills and to gain an understanding of contemporary migration processes in New Zealand.

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Scoping the Camp: A Literature Search & Preliminary Review

Having undertaken empirical research on aspects of camping practice and regulation in New Zealand over the last seven years (campground closures, freedom camping, urban campground users) Robin Kearns (with collaborator Damian Collins, University of Alberta) is now turning attention to theorising 'the camp'. During Damian's February visit to Auckland, he and Robin sketched out a planned paper to be submitted to *Progress in Human Geography* that will critically appraise the various nuances of 'the camp' – from discretionary leisure spaces through work camps and homeless camps to sites of detention and asylum. It is literature pertaining to the last of these dimensions of 'the camp' that we are least familiar with. As such, we propose to involve a talented human geography student to assist with:

- Searching via key words for articles and other sources
- Compiling a file by subtheme.
- Undertaking some preliminary review through constructing an annotated bibliography

Supervision: Via email & SKYPE, by Robin Kearns & Damian Collins
Duration: Two weeks, ideally before the end of November, 2016

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Market-making in New Zealand education

Over the last fifteen years, the penetration of market relations into public education has begun to alter the experience of learners and educators, the nature of knowledge produced, and the structure of education provision. The New Zealand Productivity Commission is currently developing recommendations for widespread reform of higher education. They promise to further privatise public education in New Zealand. Yet researchers haven't even kept a track of the markets now created, the enterprises involved, the 'things' they sell or the educational relations that are now marketised, let alone measure the impacts. This project aims to build a database of marketised activities in public education. It is part of a wider international study of market making in public universities. The project will use two methods of data generation: (1) 'following' the public education of two hypothetical students from pre-school to graduation from tertiary graduation (one through university and one through an Institute of Technology) and documenting the moments and forms of their encounters with marketised products and experiences; and (2) mapping the marketised relations within which one school, one university and one institute of technology are enmeshed. Both of these methods will initially involve collecting and categorising data via web searches. There are potentially two short-term research apprenticeships here for students.

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Exploring the geographies of elite private education in New Zealand

This project involves searching school websites and other media (newspapers, magazines) to collect material (e.g. advertisements, billboards, prospectus', school mission statements…) which can be used to help develop an account of the situated geographies of private education in New Zealand.

Project with PhD Student Hayley Sparks (Supervisors: Francis Collins; Robin Kearns)