Issue 1

The School of Environment annual magazine
A RETROSPECTIVE OF 2016's ACHIEVEMENTS

April 2017

ENVoices

In this issue

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

SCIENCE
SCHOOL OF ENVIRONMENT

ENVoices

School of Environment Magazine 2017

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If you are a School of Environment graduate and have a story to tell about your experiences or achievements, or would simply like to re-establish contact, please get in touch.

We also welcome feedback and suggestions about this publication. If there's something you would like to see in the next issue, don't hesitate to contact us.

ENVoices is available electronically at www.env.auckland.ac.nz/envoices
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Cover page photo: The Science Centre

I am delighted to introduce the new School of Environment magazine which highlights our major achievements during 2016. We are an innovative amalgam of disciplinary and interdisciplinary research and teaching programmes spanning the Geographical, Earth and Environmental Sciences. These programmes have a shared focus on the natural and human contexts and conditions of the world we live in. Our staff and students are grappling with fundamental questions of national and global significance.

Over the past year, the school has continued to build its performance and impact in research and teaching. Notably all our programmes are ranked in the top 150 in the QS World University rankings*, with Geography ranked 38th in the world. These rankings underscore the international standing of our programmes.

The school continued to add to an impressive research record in 2016, obtaining more than $15 million in research income, which reflects the multi-disciplinary and societally relevant nature of our research. The school is now a major contributor across six of New Zealand's National Science Challenges, an investment worth more than NZ$10 million over the next four years. We have also built on our research successes in the pre-eminent Marsden Fund with four new Marsden grants awarded in 2016, a total of eight within the school. Importantly our staff have converted their grant successes into productive outputs by publishing an estimated 160 peer-reviewed publications in 2016.

The school sustains a large student body, 890 Equivalent Full-Time Students (EFTs) and delivered up to 100 high quality courses in 2016, as evidenced by excellent student evaluations. We continue to support an exciting programme of learning through experience by field teaching at both undergraduate and graduate levels. Moving beyond the traditional lecture room, we give students the opportunity to engage in real-world learning at field sites throughout New Zealand and international destinations. In 2016, staff continued the critical work of re-examining our curriculum with new initiatives approved for the postgraduate Environmental Science programme. Such work is pivotal to ensuring our teaching programmes are research informed and meet the expectation of our students.

To support our growth in research and teaching performance, we have developed an ambitious strategy to transform our research infrastructure to become nationally distinctive over the next three years. Major achievements in the past year include the delivery of a new $1.1million ITRAX instrument – to support our research strengths in environmental change. The ITRAX represents a nationally unique analytical capacity in the Earth and Environmental Sciences. For more information about the ITRAX instrument, please head to our Location and Facilities section on pages 2 and 3.

Perhaps the most significant transformation for the school is the occupation of new facilities in the Science Centre. The move finally united all disciplines into one space and we now offer new and innovative teaching and research facilities for our students and researchers. With this major investment in the school's future, and continued focus on our research and teaching strategies, I am confident our academic programmes will continue to flourish in 2017.

PROFESSOR PAUL KENCH
Head, School of Environment

**science.auckland.ac.nz/excellence*

It's all in a day's work for our researchers and 2016 turned out to be a busy year.

Where in the world can our intrepid researchers be found?

Marshall Islands: *Tracking historic storms over thousands of years to better understand climate change impacts in atoll settings.*

Philippines: *Participatory mapping and community-based disaster risk reduction training for communities and local governments.*

Canada: *Mapping massive retrogressive thaw slumps in the Northwest Territories to find links between climatic drivers and landscape evolution in permafrost terrain.*

Costa Rica: *Measuring dissolved organic carbon in soil solution to assess the effects of leaf cutter ants on forest biogeochemistry in a tropical rainforest.*

Our global reach

The School of Environment is proud of the strong connections it has in the Asia-Pacific region, due to New Zealand's location within the South Pacific. The research undertaken by the school is as diverse as the far-flung regions that our team travel to around the world.

Alongside fieldwork, an outcome of our research includes presenting at and attending conferences, workshops and developing teaching programmes that keep us at the forefront of the international scientific community.

Antarctica: *Testing the use of seismic data to remotely measure the ice crystal alignments and ice temperature in ice sheets and glaciers.*

Putting our roots down

First-class facilities and a brand-new location for the School of Environment.

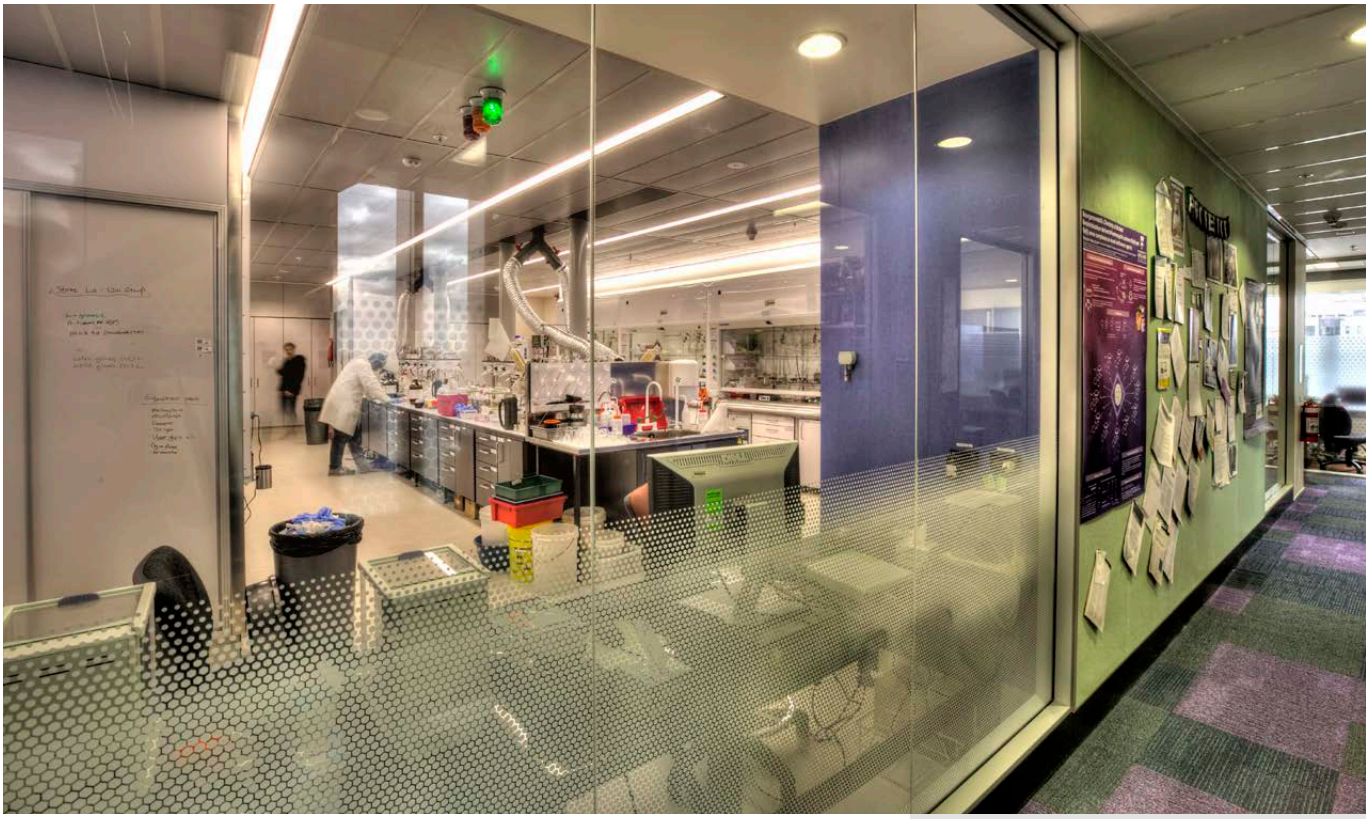
Over the years, studying the geography, earth and environmental sciences would have seen you come under the umbrella of the Department of Geology, or you could have belonged to the School of Geography and Environmental Science. In recent times, Earth Sciences, Environmental Management, Environmental Science and Geography – the four programmes that now make up the school – have amalgamated to become the School of Environment.

In 2016, the school moved to its new premises at the Science Centre, the Faculty of Science's brand-new flagship building, a connected state-of-the-art facility for students and staff. Due for its official opening mid-2017, the school's administration area (shared with the School of Chemical Sciences) can be found on Level 6, where a shared common area sits below a giant upper atrium that extends through four levels of glass laboratories and break-out spaces to a skylight above.

Well-resourced for research in a wide range of field and laboratory settings, the Science Centre is home to both wet and dry laboratories. However, students who carry out research have access to over 20 specialised laboratories with equipment in such diverse domains as cartogeographics, climate, coastal and river hydrodynamics, dendrochronology, document analysis, ecology and environmental monitoring, geochemistry, geophysics, ontology and sedimentology.

The school's commitment to developing technical capacity across its disciplines as new instrument technologies emerge and new research frontiers evolve is evident with the purchase of the ITRAX core scanner* – an instrument for analysis of sediment cores, drill cores and other flat samples.

In addition, the school has a full range of XRD, XRF and mass spectrometry equipment for undertaking geochemical sample preparation and analysis of rock samples and sediments. Our chemistry labs employ a full suite of spectral analysers, including an Elementa Vario-EL chemical analyser and a Picarro Greenhouse Gas Analyser; while our computing and geocomputational labs are equipped with the latest software tools in Geographic Information Systems (GIS), remote sensing and digital photogrammetry.



The geophysics, hydrodynamics and survey field equipment includes a fleet of DJI Inspire drones, PulseEkko and GSSI ground-penetrating radar, a WASSP multi-beam sounder, and ADCP flow monitoring equipment. Detailed topographic surveys can be carried out with a Leica laser scanner, Trimble RTK R10 GPS, and flow, tides, and weather can be monitored and logged using a wide range of equipment. An array of field vehicles and boats, monitoring equipment and specialised tools is also available.

As the School of Environment becomes acclimatised to its new space, cutting-edge software, hardware tools and the close proximity to colleagues from each programme, the multi-disciplinary environment of the Science Centre provides equal opportunity for cross-collaboration with other departments and schools – watch this space.

**ITRAX Core Scanner* ►

The new ITRAX Core Scanner is a laboratory instrument developed for measurement of the variation of density and chemical element composition along sediment and soil cores, rock cores, wood samples, speleothems, corals and so on. The instrument analyses flat samples as well as cores or split cores. With the combination of optical imaging, high-resolution radiographic density imaging and highly sensitive XRF analysis, very detailed structural variations are recorded together with the chemical basis for these variations. The resolution capacity (20 micrometre resolution) and analytical quality (sensitivity for most elements from Al to U) often makes it possible to follow variations on single lamina level. The ITRAX XRF data also provide useful information on textural grading, bioturbation, identification of geochemically distinctive marker beds and sampling-related disturbance. The development of non-destructive X-ray fluorescence (XRF) instruments that scan flat sections to obtain high-resolution geochemical profiles has been a major technical advance for the study of a range of archives and significantly, is the only instrument of its type in New Zealand. It complements and extends the capability of our existing conventional XRF and laser ablation ICP-MS instruments thereby extending the range of research opportunities in fast developing fields, such as climate change research using lake and marine sediment cores, speleothems and tree-ring time-series.

Between a rock and a good place

Professor Kathy Campbell's recent, prestigious election as a Fellow of the Royal Society of New Zealand is the culmination of a lifetime's passion for geology, and a strong drive to communicate her love and understanding of science to the world.

When not on field trips with her students, or working on the backside of the Andes in Patagonia and elsewhere around the world, Professor Kathy Campbell can be found situated on the fourth floor of the new Science building. It is perhaps fitting to see that the view from her office is none other than Auckland's premier volcano, Rangitoto Island, rising languidly from the sea.

Not surprisingly for a geologist, Kathy's office is full of rocks, some of which are billions of years old. But what makes many of these rocks more than a bit special, is the stringy or bumpy looking matter threaded within the rock itself. These are fossil microbes trapped in minerals that may hold the key to knowing if there was ever life on Mars, and maybe even solve the question about how life began on Earth.

Kathy's own beginnings growing up in California ignited a fascination with geology from the many family trips to national parks up and down the west coast. "It was a dream," says Kathy of the tectonically active margin of the western USA.

"I was surrounded by stunning geology from the Golden Gate to the Grand Canyon – you can't help but notice the spectacular rocks out there so beautifully exposed."

At a very early age, Kathy immersed herself in National Geographic magazine, which is how the science-minded child made the connection between her precocious interest in rocks, minerals and fossils, with research.

"I remember reading an article about coral reefs and I was very aware what research was and that this is what I wanted to do when I grew up."

Initially not straying far from home, Kathy attended the University of California at Santa Cruz. Struggling to decide whether to pursue geology, a fellow student from a completely different discipline gave Kathy advice that has seen her right ever since.

"He said to me, 'Why would you let a little maths and physics get in the way of what you really want to do?' So I majored in Earth Science, then after graduation did a bit of environmental management work, but ultimately decided to return to academia and I've never looked back."

An incredibly clear career trajectory is the result of Kathy's all-consuming confidence in her subject and commitment to research. While completing a masters at the University of Washington in Seattle, Kathy saw an opportunity to learn more about the organisms she'd been studying as fossils by auditing an undergraduate zoology course.

"I attended all the labs and classes except the exam, and during one class the professor showed us a slide of an odd clam found offshore of Oregon at some natural gas seeps. He told us that the clams don't have a gut but grow large because they contain bacterial symbionts that live off the chemicals exuding from the seafloor hydrocarbon seeps." As a result, Kathy had a revelation.

"I'd been finding some enigmatic fossil clusters of the same clam out in the field, and so in that moment in the classroom, seeing that specially adapted living clam, the penny dropped and I realised I'd discovered one of the first marine methane seeps to be recognised in the geological record," says Kathy. "A chemo-synthesis-based paleocommunity – thriving in extreme conditions."

It was while Kathy worked on her PhD at the University of Southern California in Los Angeles that her life-changing, science-epiphany with the clams and their microbes saw her exchange contact details with a NASA scientist who had heard of her research. This "lucky break" saw Kathy work at NASA as a post-doc, researching the fossil microbes and minerals of methane seeps. At NASA she was introduced to hot springs at Yellowstone, another kind of extreme environment. And it is her work with hot springs that brought Kathy to New Zealand.

Much has happened between then and now. Kathy is celebrating 20 years in New Zealand in July. She has become a world renowned specialist in extreme environments, using them to help search for life on other planets. This work includes being part of an international team vetting possible landing sites for the NASA Mars 2020 mission. The team recently pitched a proposal to return to Columbia Hills to look for fossil biosignatures, a place where the Spirit rover found signs of ancient hot springs that need further study. In February, their site was chosen in the 'Final 3', to be whittled down to only one in 2018.

"I can still go and work on 'this little rock' and tell you more about it," says Kathy. "But what has happened as I have become a more mature scientist and professor is that I can now sit back and take a broader look at the implications and applications of my work. There are a lot more people interested now because the research is no longer just about describing one place or another, but looking at what it means in the big picture. Does it help us find life on Mars, the origin of life, or track the deposition of gold in the 'plumbing' of an old hot spring?"

Kathy sampling 9,000 year old silica-rich hot spring deposits at Mangatete, Taupo Volcanic Zone, New Zealand. Photo: Bryan Drake.

Alongside Kathy's recent election as a Fellow of the Royal Society of New Zealand, joining a select group of scientists who hold this honour, she was the recipient of two Marsden awards. One Marsden was for her work on hot springs and the other for her work on hydrocarbon seeps. Kathy is currently working on exciting projects with colleagues such as geophysicist Ingo Pecher, researching frozen methane gas deposits in the seabed off the East Coast of New Zealand. She is also working with Associate Professor Julie Rowland to see how to use hot springs to find gold in the Coromandel.

Kathy cites the overall importance of mentoring and collaboration in the science community as being the linchpin towards progressing with research and training the next generation to critically observe the natural world.

Children in New Zealand's schools need to know that the search for extra-terrestrial and early life is not just for people in Europe or the USA and that they can learn about and contribute to this field too.

"Luckily as a junior scientist, I had senior geologists who took me under their wing and helped me get publications and my teaching going, and got me started on the work with the hot springs," she says. "We work so hard on our individual careers but research is not possible without collaboration with our students, colleagues and all the support from our families."

Nowadays, Kathy has also turned her hand to outreach in the community and one of her shared initiatives is Spaceward Bound for Youth, the first project of the New Zealand Astrobiology Network Trust, which she helped set up in 2016. The Spaceward Bound programme brings school teachers and students together with New Zealand and NASA scientists to learn about how research is done in the field of astrobiology. Funded by MBIE's Unlocking Curious Minds project and partnered with local trust Te Tauma-ta o Ngāti Whakaue, Kathy and the team worked with 20 Māori children (8-16 years old) to explore Rotorua environs for Mars and early life analogue studies. "The kids got stuck right into it," recalls Kathy, "and their final presentations were all about phreatomagmatic eruptions* and habitable environments on Mars."

Kathy and her partner Andrea Alfaro, a professor of Marine Ecology and Aquaculture at AUT, are raising their daughter Ella to embrace the sciences – not difficult to do when it is her parents' bread and butter. Even though she loves to surf and play water polo, Kathy is proud to point out that Ella is also good at science because she is "surrounded by it."

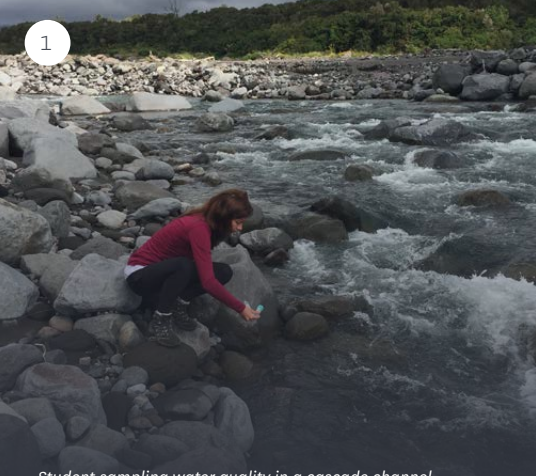
"Children in New Zealand's schools need to know that the search for extra-terrestrial and early life is not just for people in Europe or the USA and that they can learn about and contribute to this field too.

"It's thrilling for me that my topic is very conducive to getting kids excited about science. Our lineage ultimately goes all the way back to those earliest microbes. The first appreciable oxygen on the planet came from ancient microbes!

Understanding our place in the world, where we come from, and how long it takes for geological processes to produce the resources we need – these things are important to give us some perspective. We are all stewards of this world and it's not just about exploiting it but also about being responsible to this and future generations," she says.

"If we don't care for our planet a bit more now and in the future, then we may wind up having to move to the Moon, or Mars!"

*An explosive water-magma interaction. Large amounts of steam and magmatic gases are emitted.



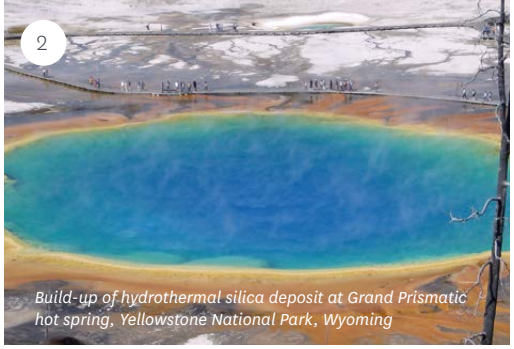
Student sampling water quality in a cascade channel

Research themes

We strive to excel in research, teaching and learning that enhances understanding and applications relating to society, place, earth systems and environment, especially in New Zealand and the Asia-Pacific region. The research and teaching interests of the school fall into the following broad themes.*

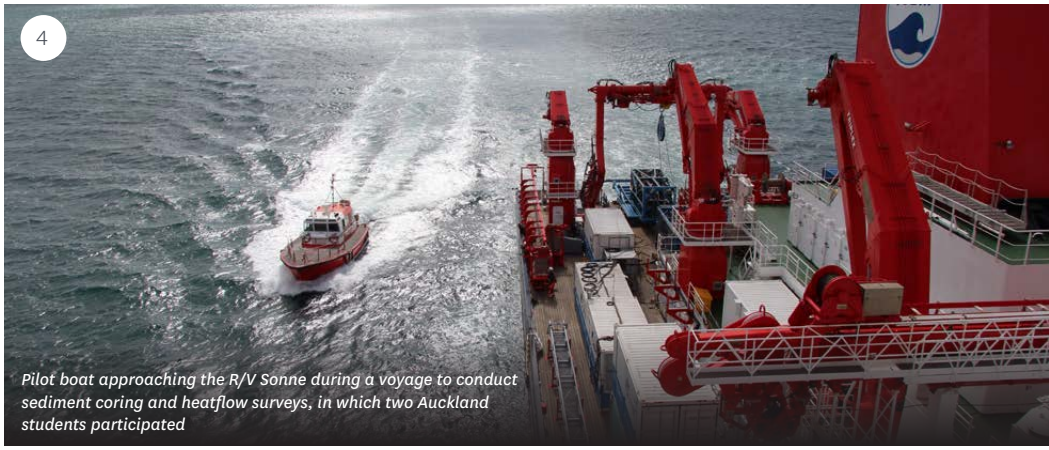
1. Coasts and Rivers
2. Environmental Change
3. Hazards and Disasters
4. Marine Geosciences
5. Our Changing Forests
6. Pacific Futures
7. Political Ecologies and Environmental Justice
8. Population, Mobilities and Wellbeing
9. Stratigraphy, Tectonics and Natural Resources
10. Urban Environments and Ecosystems
11. Urban spaces/ social lives
12. Volcanology, Geochemistry, Petrology

***science.auckland.ac.nz/environment-research-themes**



Build-up of hydrothermal silica deposit at Grand Prismatic hot spring, Yellowstone National Park, Wyoming

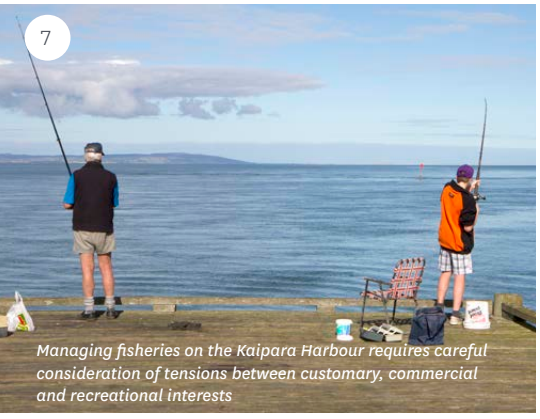
Setting up of recorders for thermal Infrared cameras monitoring ongoing volcanic activity at Yasur volcano, Vanuatu



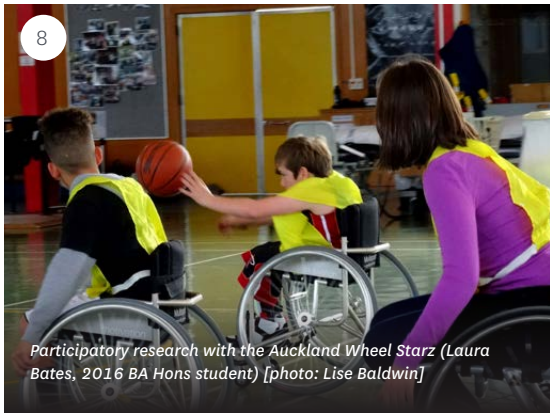
Pilot boat approaching the R/V Sonne during a voyage to conduct sediment coring and heatflow surveys, in which two Auckland students participated

Collecting litterfall and throughfall in a stand of kauri affected by kauri dieback, Waitakere Ranges, New Zealand

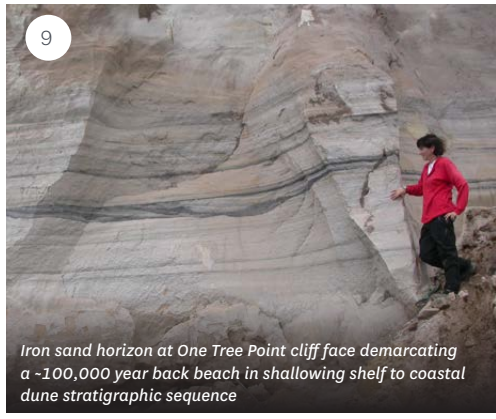
Sea level rise will have a profound impact on low-lying islands in the Pacific



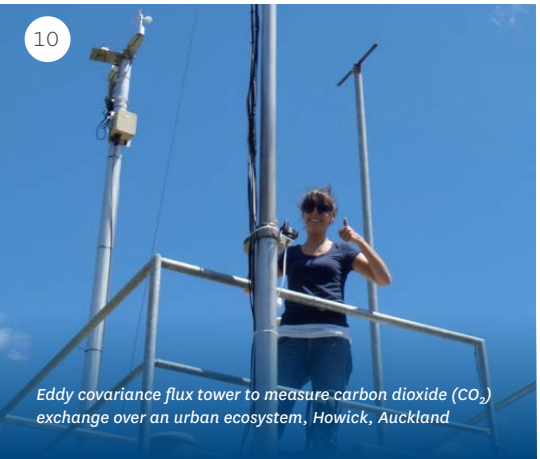
Managing fisheries on the Kaipara Harbour requires careful consideration of tensions between customary, commercial and recreational interests



Participatory research with the Auckland Wheel Starz (Laura Bates, 2016 BA Hons student) [photo: Lise Baldwin]

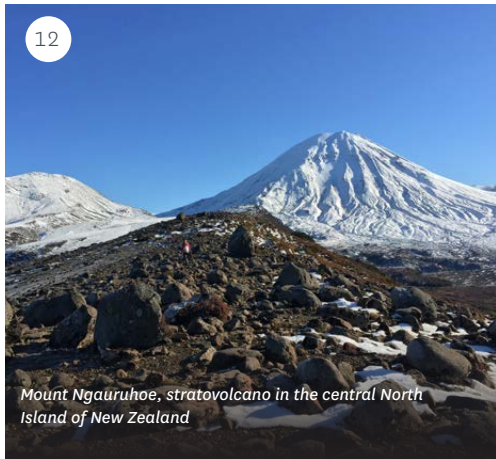


Iron sand horizon at One Tree Point cliff face demarcating a ~100,000 year back beach in shallowing shelf to coastal dune stratigraphic sequence



Eddy covariance flux tower to measure carbon dioxide (CO_2) exchange over an urban ecosystem, Howick, Auckland

Surveying Development Plans at Hobsonville Point (Simon Opit, PhD student with Karen Witten, Massey, and Simon Kingham, Canterbury) [Photo: Robin Kearns]



Mount Ngauruhoe, stratovolcano in the central North Island of New Zealand

Research highlights

Researchers from the School of Environment are engaged in a wide variety of ground-breaking work. Our research prowess has been recognised with the following awards and funding.

Marsden Fund Grants 2016

Welfare capital and the new welfare state: A comparative study of privately financed welfare services in the Anglophone world

Principal Investigator: Dr Tom Baker

Did you know that banks, pension funds, and philanthropic organisations are now investing in public welfare services? With the help of government, flows of private investment – or 'welfare capital' – are increasingly important to funding decisions, service provision, and the lives of service users. Dr Tom Baker (lecturer in Human Geography) was recently awarded a grant by the Marsden Fund to investigate the effect of welfare capital on welfare politics, policy, and practice across five countries. As part of the project he'll be interviewing philanthropists, investment managers, public servants, and politicians in New Zealand, Australia, Britain, Canada, and the United States.

Melt inclusions as a 'window' through the crust: What drives the most productive region of silicic volcanism on Earth?

Principal Investigator, Dr Simon Barker

The Taupo Volcanic Zone (TVZ) is globally unique in the intensity of its magmatic-volcanic-geothermal flux. However, the causes of this are not yet understood, as primary magmas (basalts) are extensively modified in the TVZ during ascent to the surface, overprinting the geochemical features required to infer conditions under which they formed. Our novel study addresses this issue by applying forensic geochemical techniques to glassy melt inclusions trapped within olivine crystals, separated from volcanic rocks throughout the TVZ, including large volume ignimbrites ranging in age from 0 to 350 ka. These melt inclusions will provide a unique 'window' into mantle processes driving volcanism in the TVZ through time and space, and constrain the driving force(s) behind its extreme, globally unique heat flow and eruptive rate.

Opening nature's vaults: Speleothem archives of volcanic eruptions

Principal Investigator: Professor Joel Baker

Some of our planet's most abrupt and extreme episodes of environmental change resulted from volcanic eruptions. But beyond the historic record, the timing and impacts of eruptions remain speculative and controversial. We will identify chemical fingerprints of eruptions in layers of secondary calcite (speleothems) formed from drip waters in New Zealand caves and, in the same archive, will geochemically quantify post-eruption environmental changes. This will provide new insights into the nature, magnitude, timing and duration of global change caused by prehistoric (super) eruptions from the most active region of Quaternary volcanism on Earth.

Does rapid evolutionary adaptation to temperature heat up the role of consumer body size in ecosystems?

Principal Investigator: Dr Kevin Simon

How will rapid evolution of animals influence the ecological outcome of climate change? We're trying to answer that question by looking at populations of mosquitofish that have recently invaded and evolved in geothermal springs in New Zealand and California, USA. Our work will help us better understand the outcomes of future climate change and the effects of invasive species in freshwater ecosystems. The work is a collaboration between researchers at the University of Auckland and the University of California, Santa Cruz and the University of Maine in the USA.

Mosquitofish in a geothermal desert spring in Owens Valley, California, USA

Best paper prize

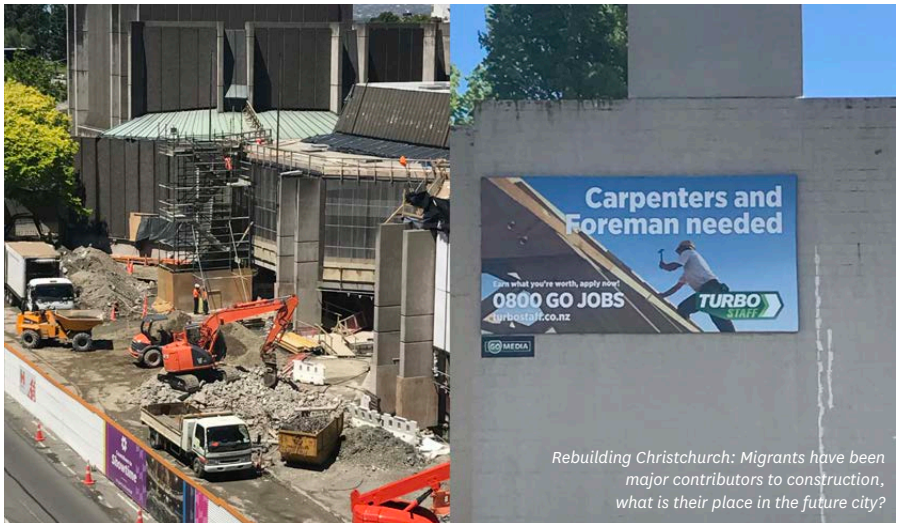
Dr Agnieszka Leszczynski, lecturer in the School of Environment, has been awarded the 2016 *Progress in Human Geography* Best Paper Prize for her 2015 paper entitled Spatial Media/tion.

Agnieszka's paper is about how critical interventions empirically engage and theorise technology-society-space relations as always already mediated, i.e. the outcomes of processes and the coming together of digital technologies, people and spaces. She is the co-recipient of the 2016 award with Brett Christophers, professor at Uppsala University, who completed his PhD in Geography at the University of Auckland.

Progress in Human Geography is the #1 ranked journal in human geography. The prize is awarded annually to an early-career researcher with the best paper published in *Progress* in the preceding year.

MBIE: National Science Challenges

The National Science Challenges are an ambitious new mechanism for driving science to meet acute needs in New Zealand's society. They attempt to change the way some of New Zealand science is focused by building the best teams of collaborative researchers across organisations and disciplines. Eleven areas of science were framed around specific questions facing New Zealand, derived through public consultation and an expert panel commissioned by MBIE and led by Sir Peter Gluckman and a host of national and international scientists. Our researchers are involved in and lead numerous programme areas across six of the 11 National Science Challenges (Ageing Well; Building Better Homes, Towns and Cities; New Zealand's Biological Heritage; Resilience to Nature's Challenges; Sustainable Seas; The Deep South). We also currently lead the Resilience Challenge; the Challenge Director is Professor Shane Cronin of our Earth Science group.



Rebuilding Christchurch: Migrants have been major contributors to construction, what is their place in the future city?

Rutherford Discovery Fellowship

Nation and migration: Population mobilities, desires and state practices in 21st century New Zealand

Key people involved: Dr Francis Collins, Dr Wardlow Friesen and Associate Professor Nick Lewis, alongside Associate Professor Alan Gamlen (University of Adelaide) and Professor Richard Bedford (University of Waikato)

Dr Francis Collins leads this research programme that is re-examining the ways in which migration is articulated into national and transnational life in 21st century New Zealand through a particular focus on patterns of circular and temporary mobility. The programme includes three studies that address the changing patterns of migration into New Zealand, the trans-Tasman mobility of New Zealanders, and the role of migration in governmental enactments of national futures.

The first study examines the mobility patterns and desires of new temporary migrants in three regional employment sectors that are commonly viewed as critical to national futures: trade workers in the Canterbury rebuild; dairy workers in Waikato; and nurses in the Auckland public health system. The second project mirrors the first in exploring mobility patterns and desires of both native and naturalised trans-Tasman migrants in the urban agglomerations of Sydney, Brisbane and Perth. The final project builds on these migrant understandings of nation and future to explore the governmental approach to different modes of migration in to, out of and through New Zealand focusing particularly on how migration is enlisted in visions for national future, the significance of diaspora and the political projects that seek to work on these populations.

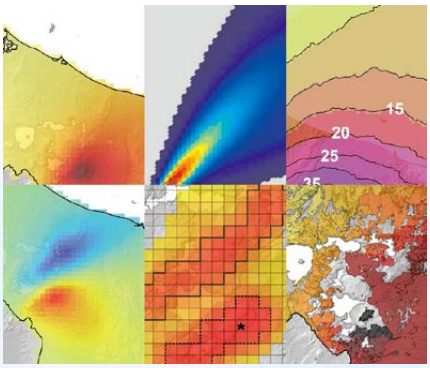
EQC Postdoctoral Fellowship

Building a better hazard map: A collaborative, evidence-backed, user-optimised crisis hazard map design

Key people involved: Dr Mary Anne Thompson, Associate Professor Jan Lindsay, Dr Christof Lutteroth (Computer Science), Associate Professor Paul Corballis (Psychology), Dr Graham Leonard (GNS Science), Dr Eliza Calder (University of Edinburgh) and Adjunct Professor Anne Bostrom (University of Washington)

Funded by the DEVORA Project and the Earthquake Commission, this research programme investigates how people read, interpret, and construct knowledge from volcanic hazard maps in order to better understand how hazard maps can be designed to communicate in a way that is clear and relevant to non-specialists.

The project involves collaborative, theory-based development of hazard maps, followed by a series of eye-gaze tracking experiments and surveys to explore how people read the maps.



The DEVORA project: Determining Volcanic Risk in Auckland

Key people involved: Associate Professor Jan Lindsay, Professor Shane Cronin, Dr Michael Rowe, Associate Professor Paul Augustinus, Dr Jennifer Eccles, Associate Professor Phil Shane, Dr Tracy Howe, Dr Mary Anne Thompson and Dr Kate Kenedi.

DEVORA is a multi-agency, multi-disciplinary collaborative research programme aiming to improve the volcanic hazard outlook and risk assessment for Auckland, New Zealand. Funded by the University of Auckland, Earthquake Commission, Auckland Council and GNS Science, DEVORA's overall goals are to increase knowledge around geological and volcanic hazard. To achieve this, the project is currently aiding the expansion of a GNS/NIWA tool called Riskscape to include volcanic hazards. The tool can be used to compare and examine the impacts and economic effects of natural hazard events in New Zealand. Other desired outcomes from DEVORA include educating the public about volcanic processes and translating research findings into resources that can be used by policymakers to formulate risk mitigation and public communication strategies.

Members of the DEVORA project conducting research out in the field (Rangitoto Island in the background)

Tairua by drone

Results inform the development of real crisis hazard maps and graphics by providing advice regarding how they can be designed in a way that is clear and useful to a diverse group of people. The trans-disciplinary project includes researchers from geology, communication, cognitive psychology, and computer science, as well as stakeholders from emergency management groups and national parks.

Natural Hazards Research Platform

Climate change impacts on weather-related hazards (four years)

Principal Investigator:
Associate Professor Giovanni Coco

In collaboration with researchers from University of Waikato, NIWA, Scripps Institute of Oceanography (USA), Universidad de Cantabria (Spain), University of Florida (USA), and the University of New South Wales (Australia), this project creates a set of fine-scale projections of nearshore wave and surge conditions spanning the next 100 years using state-of-the-art modelling approaches. Wave and surge projections are used to assess the impact of coastal erosion and inundation, and the implications for risk and vulnerability. Researchers from the school are involved in all aspects of the project, from modelling future wave climates, regularly surveying beaches using Unmanned Aerial Vehicles to engaging with local government stakeholders and partners.

MBIE Catalyst Fund

Physically modelling reef island response to sea level rise

Professor Paul Kench, Dr Murray Ford and PhD student Megan Tuck were awarded a Catalyst Seed Grant from MBIE to model reef island response to the rising sea level due to climatic changes. The collaboration between researchers at the University of Auckland and Plymouth University in the UK provides the opportunity to physically model the response of islands to rising sea level, in a state-of-the-art wave basin. The Coastal Ocean and Sediment Transport (COAST) laboratory at Plymouth houses a large wave basin where hydrodynamic conditions (i.e. waves, currents and sea level) are down-scaled to replicate real-world conditions. The COAST facilities are being used to construct and test the response of scale models of coral reef and atoll island systems to changing boundary conditions.

PhD student Megan Tuck

Students (L-R) Rima Browne, Holly McMillan and Charlotte Coker and Dr Murray Ford drew the attention of local media in Gisborne during the GEOG 330 field trip in September 2016. The arrival of a significant storm with six metre waves and 100 km/hr winds drew curious looks from locals as the hardy students studied sediment transport during the storm. The local newspaper, The Gisborne Herald, came down to the beach in the heart of the storm to interview staff and students about their work, featuring it online and in print.

Photo: Paul Rickard, Gisborne Herald.

Professor Shane Cronin

Associate Professor Phil Shane

Media darlings

We're passionate and prolific science communicators. We understand the importance of making our research accessible to a wide audience, and we utilise all arms of the media to do this.

Keep an eye on the *New Zealand Herald* as well as regional newspapers, stuff.co.nz, and listen out for our appearances on radio and television. We even made our 2016 documentary debut, when Professor Shane Cronin and Associate Professor Phil Shane appeared in Prime's *Beneath New Zealand*. Shane and Phil were featured out in the field, presenting their expert analysis of New Zealand's volcanic activity directly to the audience.

Connect with our researchers on Twitter....

In the School of Environment we embrace the use of social media. Many of our academics and researchers tweet up a storm on Twitter, or maintain Facebook pages with an active and engaged community. If you'd like to connect with us, check out who's who below.

@ENVUoA
School of Environment

@HazardHubUoA
Hazard Hub

@MarineGeoNZ
Marine Geoscience NZ

@tom_a_baker
Dr Tom Baker

@stonehistorian (also on Facebook)
Professor Kathy Campbell

@cocoltrane
Associate Professor Giovanni Coco

@Moving_Futures
Dr Francis Collins

@scronin70
Professor Shane Cronin

@mfordNZ
Dr Murray Ford

@jcgaillard_uoa
Associate Professor JC Gaillard

@agaleszczynski
Dr Agnieszka Leszczynski

@GeoJanUoA
Associate Professor Jan Marie Lindsay

@mcrowerocks Michael Rowe
Senior Lecturer Dr Michael Rowe

@TectonoFluids
Associate Professor Julie Rowland

@emmajeanryan
Dr Emma Ryan

@NZSeds
Dr Lorna Strachan

@lena_weissert
Dr Lena Weissert

www.facebook.com/env.uoa

Research Distinction Awards

The School of Environment hosted its annual Research Distinction Awards evening in October 2016. After an official welcome from Head of School Professor Paul Kench, the Chair of the Research Committee Associate Professor Jan Lindsay provided a brief overview of our research year. This was followed by the awards ceremony, with prizes awarded for outstanding publications and theses, as well as a new Research Communication award. The prize-giving was peppered with presentations from some of our winners, who gave short overviews of their award-winning research publications.

Back row (L-R): Head of School; Professor Paul Kench, Dr Luitgard Schwendenmann, Georgia Miskell, Professor Kathy Campbell, Dr Tom Baker, Alan Cheung, Associate Professor Phil Shane, Associate Professor Jan Lindsay.

Front row: Dr Eddie Beetham, Agnieszka Leszczynski, Alisha Coote, Dr Tara Coleman, Dr Mary Anne Thompson

Earth Science Research Award

Awarded to the author or authors of an outstanding contribution to Earth Sciences published in the past calendar year

2016 recipient – Professor Kathy Campbell: Geyserite in hot-spring siliceous sinter: Window on Earth's hottest terrestrial paleo environment and its extreme life. **Earth-Science Reviews**

Environmental Science Research Award

Awarded to the author or authors of an outstanding contribution to Environmental Science published in the past calendar year.

2016 recipient – Dr Luitgard Schwendenmann: Tree water uptake in a tropical plantation varying in tree diversity: Interspecific differences, seasonal shifts and complementarity. **Ecohydrology**

Geography Research Award

Awarded to the author or authors of an outstanding contribution to Geography published in the past calendar year.

2016 recipient – Agnieszka Leszczynski: Spatial media/tion. **Progress in Human Geography**

Early Career Research Award

Awarded to a new staff member who has made significant progress towards establishing a research programme since joining the school.

2016 recipient – Dr Tom Baker: Since his appointment in 2015, Dr Baker has established a clear research trajectory in the area of policy and urban research. He has embarked on an international study of the nature of 'social investment' welfare policies and was awarded a prestigious Marsden grant in 2016. These research initiatives involve collaborations with leading scholars in urban and policy geographies. These collaborations have led to a recent lead-author paper in the *Annals of the American Association of Geographers* on the mobility of tax increment financing that includes senior scholars in Canada, the UK and USA.

At the University of Auckland Tom has also taken leadership in establishing an Urban Research Forum with early-career scholars in urban planning.

Research Communication Award (new in 2016)

Awarded to a staff member who shows an interest and aptitude for communication and public engagement related to their own research, or other research carried out in the school.

2016 recipient – Associate Professor Phil Shane: For a concerted and proactive effort in communicating a piece of research from field work to publication, namely the Rangitoto drilling project funded by the New Zealand Earthquake Commission. The work represents a joint effort with his team, including MSc student Tamzin Linnell, but Phil was the one who spearheaded efforts for the project to have wide media coverage.

Postgraduate Student Research Awards

Awarded to the postgraduate student authors of three outstanding publications, in any discipline, in the past calendar year.

2016 recipients –

Dr Mary Anne Thompson: The influence of probabilistic volcanic hazard map properties on hazard communication. **Journal of Applied Volcanology**

Georgia Miskell: A novel approach in quantifying the effect of urban design features on local-scale air pollution in central urban areas. **Environmental Science and Technology**

Dr Tara Coleman: The role of blue spaces in experiencing place, aging and wellbeing: Insights from Waiheke Island, New Zealand. **Health & Place**

Honours thesis award

Awarded for an outstanding honours thesis completed and examined since 1 January of the previous year.

2016 recipient – Alisha Coote: Thesis titled 'Plagioclase as a recorder for magmatic processes at Mount Ngauruhoe'.

MSc thesis award

Awarded for an outstanding masters thesis completed and examined since 1 January of the previous year.

2016 joint recipients –

Cheng Yii Sim: Thesis titled 'Seismic data analysis on ways to monitor rock-CO_2 reactions and fluid substitution in sandstones, Pohokura Field, New Zealand'.

Marina Schofield: Thesis titled 'Geochemical footprints and structural localisation of ore-grade Au mineralisation: Insights from the Karangahake deposit, New Zealand'.

Anya Leenman: Thesis titled 'Deciphering historic change in tributary-junction fans in response to catchment-wide sedimentary disturbance'.

PhD thesis award

Awarded for an outstanding PhD thesis completed and examined since 1 January of the previous year.

2016 joint recipients –

Melody Runge: Improving probabilistic hazard forecasts in volcanic fields: Application to Harrat Rahat, Kingdom of Saudi Arabia.

Alan Cheung: Spatial and temporal topological analysis of landscape structure using graph theory.

Eddie Beetham: Field and numerical investigations of wave transformation and inundation on atoll islands.

Launch of a new annual Distinguished Lecture Series

The School of Environment launched a new, discipline-based, annual lecture series in 2016. Named after the founding professors of Earth Science, Environmental Science and Geography at the University of Auckland, the lecture series will bring leading researchers to Auckland to showcase their discipline areas.

Earth Sciences: From ocean to cloud – using oceanography to keep the Internet running.

The Earth Science lecture is named after John Arthur Bartrum, the first Professor of Geology at Auckland University College from 1927-1949. His contribution to New Zealand geology was recognised by the New Zealand Institute (later the Royal Society of New Zealand) which awarded him a fellowship in 1928, the Hutton Memorial Medal in 1932, and the Hector Memorial Medal and Prize in 1939. He was also a fellow of the Geological Society of London (1928) and of America (1929).

Inaugural Bartrum Lecture 2016 (top): Professor John Arthur Bartrum; (bottom) Professor Lionel Carter.

Lionel Carter, professor of Marine Geology at the Antarctic Research Centre at Victoria University of Wellington, delivered the Inaugural Bartrum Lecture in Earth Science in August 2016. Professor Carter's fascinating address focused on the protection of the global submarine telecommunication network that underpins international communications.

Trained in geology and oceanography at the universities of Auckland and British Columbia, Canada, Professor Carter has undertaken research in the North Atlantic, Pacific and Southern oceans, and he led New Zealand contributions to major international projects.

The expertise he gained from marine geology and oceanography research has allowed Professor Carter to apply his knowledge to ocean engineering projects, in particular the protection of the global submarine telecommunication network that predicates the Internet.

Whenever we send an email, view a movie or make an online purchase, there's a 95% chance that our internet activity will travel by submarine fibre-optic cable. In the financial world alone, just one major banking organisation has daily transactions of approximately US$3.9 trillion that spin around the global network of cables at the speed of light.

The social and economic importance of these cables cannot be overstated. Their protection is even more crucial. Ever since the first, fully operational international cable was laid across the North Atlantic Ocean 150 years ago, marine geology has helped to identify safe passages for these cables, and that contribution has continued to grow with the rapid expansion of internet communications.

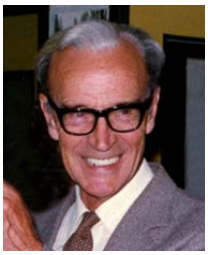
Nowadays, cable routes are planned with precision, guided by the latest understanding of the marine environment; in particular, the physical and biological processes that affect this critical infrastructure.

Professor Carter presented the latest research in the world of subsea cables in an insightful lecture, making the challenges of an abyssal, dynamic ocean accessible to those from a non-technical background.

For more information on Professor Carter and his research, visit his website, http://thiniceclimate.org/lionel-carter

Geography: Turning the university inside out?

The Geography lecture is named after Professor Kenneth Brailey Cumberland. A former head of the University of Auckland's Department of Geography, Professor Cumberland was renowned for his ground-breaking 1981 documentary series *Landmarks*, presenting his view of the story of New Zealand. He also assisted with Auckland's development planning, wrote extensively on soil erosion and produced 13 editions of an Australasian school atlas.



Inaugural Cumberland Lecture 2016 (L-R): Professor Kenneth Brailey Cumberland; Professor Wendy Larner.

The inaugural Cumberland lecture was delivered by Professor Wendy Larner, whose expertise sits in the fields of globalisation, governance and gender. Her research has been recognised with a range of scholarships and awards, including a Fulbright Senior Fellowship, Fellow of the New Zealand Geographical Society, Fellow of the Royal Society of New Zealand, and Fellow of the Academy of Social Sciences (UK).

Professor Larner's thought-provoking lecture covered the notion of the 'neoliberal university', and referred to the impact of the commercialisation of academic knowledge on research, university missions, and the boundaries of public universities. She also drew attention to the processes of marketisation, the ever increasing encroachment of 'audit culture', and the rise of competitive academic subjectivities.

With humour and insightful analysis, Professor Larner skilfully unpacked the character of evolving practices within contemporary universities. She discussed the emergence of new knowledge forms, explored the implications of new types of value-generating labour, and examined the gendered nature of new roles and practices. She concluded by asking what these changes mean for academic spaces and subjectivities.

For more information about Professor Larner's research and publications, visit www.bristol.ac.uk/geography/people/wendy-j-larner or http://sustainablecities.org.nz/members/wendy-larner

Volunteers plant trees as part of ecological restoration project

Our research students

Florence Reynolds

Bachelor of Science (Honours)

"After working on a short volunteer conservation project in New Zealand with a group of American students, and my own experience of participating in a school building project in Nepal, I was curious to focus my honours dissertation on the topic of nature construction in international conservation volunteer tourism.

"Volunteer tourism is a fascinating practice that allows exploration of human-society relationships. It blurs the lines between holiday and nature conservation, commercialisation of nature and altruistic aid, and provides an opportunity to undertake CV-building and experience a 'life-changing' encounter with alterity. My findings suggested a similarly complex and contradictory discourse that attempted to sell 'authenticity' of experience through a commodified nature marketplace.

"An important part of my dissertation was the investigation into the content on the volunteer organisation websites. Often, content was accessible without the need for ethics approval.

Volunteer tourism is a fascinating practice that allows exploration of human-society relationships. It blurs the lines between holiday and nature conservation, commercialisation of nature, and altruistic aid and provides an opportunity to undertake CV-building and experience a 'life-changing' encounter with alterity.

"Throughout my analysis I was a little shocked as to how predictable websites were. They fell into two broad categories, and were either science-based volunteering I labelled 'rational awe' or volunteering with cute animals I labelled 'anthropomorphic intimacy.' In rational awe, the way to know nature is through science and confronting danger. Rational awe websites feature images of big cats staring through the computer screen, or 15 men wrestling a rhino in chains and scientists kneeling over anesthetised animals. On the other hand, anthropomorphic intimacy portrays humans as caregivers to cute baby animals that require feeding and cuddling with the "purrs and squeaks of satisfaction being your reward."

Conservation volunteers

"Although taking contradictory views of animals and nature, both types of experience focus on the individual benefits and unique experience of being a volunteer. These three distinct themes may be catering to certain demands in the marketplace of commodified nature.

"Overall, my research reveals tensions between differing relationships between humans and nature, and ultimately suggests that nature in international conservation volunteer tourism websites is portrayed as requiring human intervention in order to become more 'natural', itself a contradiction. On a personal level, the research has made me want to know more."

Alexandre Safran

Alexandre Safran

Master of Science Environmental Science

"I have always had an interest in environmental science and more specifically, the recovery processes around mining activities. When I completed my Bachelor of Science in Environmental Science in 2015 I knew then that I wanted to do further research to focus on freshwater systems and acid mine drainage.

"So, in 2016 I began my masters thesis under the supervision of Dr Kevin Simon at the University of Auckland. For my research, which is entitled 'Bio-accumulation and toxicity of metals on fish and invertebrates affected by acid mine drainage from the Tui Mine', I am focusing on the impacts that acid mine drainage from the Tui Mine has had on the surrounding ecosystem. For this, my research is split into two parts.

"Firstly, five metal elements were found at dangerously elevated concentrations across all sites: aluminium, copper, lead, zinc and cadmium. For the first part of my research, I am investigating whether these elevated levels could explain the disturbed distribution patterns of invertebrates across the sites. In order to achieve this, I am performing acute toxicity tests on three invertebrate species: *Deleatidium spp*. (mayflies), *Ortopsyche spp*. (caddisflies) and *Zelandoperla spp*. (stoneflies). These organisms were used for the tests because of their availability and sensitivity to contaminants.

"In the laboratory, the bugs are individually placed in tubes, filled with different concentrations of each metal. They are observed for 96 hours in a temperature controlled environment. At the end of the test, I am able to record the LC50 (the lethal concentration required to kill 50% of the test population) of each taxa to each metal. These observations help me better understand the toxicity of each metal.

"It is interesting to note that some local iwi in the area wish to know whether it is safe for them to fish for eels, and this makes the second part of my research particularly interesting and useful. I am studying the bio-accumulation of metals in fish and invertebrates that have been exposed to leaching from the Tui Mine. I have collected fish tissue samples and an abundant amount of invertebrates from the different sampling sites, and processed these samples through the ICP MS machine (inductively coupled plasma mass spectrometry). This process is capable of detecting which metals are present in the samples, as well as the concentrations of each element.

"I finished my research in March 2017. This thesis has been an amazing experience. My supervisor and the University have been incredibly supportive and kind to me, and I am grateful to everybody that has helped me along the way."

Ben Simons

PhD Geology

"I am working toward a PhD in Geology after completing an MSc in Earth Sciences at the University of Waikato. My research is focused on Yasur volcano, a small scoria cone located on Tanna Island at the southern end of the Vanuatu Archipelago. Yasur is a persistently active volcano and one of only a handful on Earth. It exists in a near-continuous state of eruption, with activity consisting of small Strombolian-style eruptions occurring almost every minute from a number of vents. It is believed that this activity has persisted without significant pause over the last 1,500 years.

"My research seeks to understand the controls on the processes that help to sustain such remarkably consistent activity over time. I hope to bring together an understanding of the deep internal dynamics (magmatic processes) with shallow-level processes (such as eruption dynamics) to build a unified model of the factors that control explosive eruption behaviour.

"The main body of my research saw me spend a three-month period of uninterrupted monitoring at Yasur. During this time I implemented a suite of equipment and data collection methods. This included the recording of eruptions with thermal and standard video cameras, measuring daily gas flux, deploying an array of seismometers, as well as periodic ash and rainfall collection. While working in Vanuatu I was living very near to the base of Yasur. This close proximity allowed me to access the volcano almost every day.

I spent four to five hours on Yasur, during which time I conducted observations and set up and maintained various monitoring devices.

"Conducting fieldwork in such a remote and rural place brought with it many challenges. Maintaining and charging equipment was difficult, and any breakages or failures would take several weeks to replace. Learning to repair and adapt was one of the most important aspects of fieldwork. Despite these challenges it was an adventure, and very rewarding. I encourage those pursuing a career in geology to seriously consider volcanology.

"I will spend the remainder of my PhD making sense of the data that I have collected, which involves archiving, processing and analysing my data, then finally writing up my findings. I am expected to complete my PhD in 2018."

Ben Simons working on Yasur volcano

OUR ALUMNI
Where are they now?

Jamie Haultain
DairyNZ Consulting Officer, South Auckland

I graduated in 2009 with a BSc in Geography specialising in Environmental Science. Days after finishing, I landed a job as a dairy farm assistant. In June 2010 I started working for DairyNZ in Hamilton as a science intern, undertaking research on dairy farms. This role morphed into a postgraduate student position, where I studied extramurally for my masters in Agricultural Science with DairyNZ and Massey University.

Since graduating from the MAgriSci programme in 2014, I have worked as a consulting officer with DairyNZ for the wider South Auckland region. Part of my role entails running discussion groups for the dairy farmers, with each group meeting seven times per year to discuss seasonal issues. Beyond this, I have a lot of individual contact with farmers, offering advice and answering farming questions, which means I need to keep up to date with the very latest research results, health and safety laws, council environmental regulations, the animal welfare code, and more.

My time at the University of Auckland was very enjoyable. It allowed me to find my true passion and what I was good at. I started out with a desire to become a meterologist, then a volcanologist, before settling on Geography and Environmental Science. As I come from a rural upbringing, I also wanted to get back to my roots after three years in the big city.

Jamie Haultain

Andrea Cave

Andrea Cave
Environmental Manager, GBCWinstone, Auckland

I graduated with a Master of Arts in Geography from the University of Auckland in 2003. My thesis was entitled 'The effectiveness of care groups as a mechanism for environmental education', and I was supervised by Dr Brad Coombes. I have since completed a Postgraduate Diploma in Business from the University of Auckland.

When I graduated from the University my first 'real job' was working for what was then the North Shore City Council. This was a great foot in the door, and allowed me to see 'planning' and 'environmental management' come off the pages of university text books and into the field.

My work there was varied and included after-hours pollution response. I left the Council to travel, and I ended up working for several councils in the UK in environmental roles. This was a great opportunity and allowed me to travel throughout Europe on breaks between work contracts.

When I returned from the UK I applied for an Environmental Coordinator role at Winstone Aggregates. I was lucky enough to be offered this job and I have been with the company ever since. No day is ever the same in my job. My tasks and projects involve resources consents, policy planning, sustainability reporting, environmental management systems, community sponsorship, monitoring and reporting, environmental audits, stakeholder relations, environmental training and best practice, as well as working with iwi and local communities.

Looking back, a degree in Geography exposed me to a broad area of knowledge for which I am grateful, but it is probably the 'way of thinking' and approach to work that I mostly took away. At the time I had a very focused and committed supervisor who had extremely high standards, and for that I am very grateful as I have continued to work with this approach in my career.

OUR ALUMNI
Where are they now?

Karen Sky (nee Lindsay)
Environmental Services Leader,
Pattle Delamore Partners Ltd, Auckland

I received a BSc in Biological Sciences and an MSc with honours in Environmental Science in 2004. My masters thesis was entitled 'The sustainability of natural area tourism: A case study of Tiritiri Matangi Island' and I was supervised by Professor John Craig.

After I completed my thesis I went travelling, then volunteered in the Galapagos Islands for a month before returning to Auckland. My first jobs were in the public sector, for the North Shore City Council and then the Auckland Regional Council, working in the compliance monitoring, pollution response, and stormwater consenting teams.

In 2007 I moved into an environmental scientist role at New Zealand-owned environmental consultancy Pattle Delamore Partners (PDP). My current role at PDP is Environmental Services Leader.

Over the last nine years I've undertaken and managed a range of diverse and interesting projects, mainly related to stream and coastal ecology, and the assessment of the environmental effects of discharges and other activities. I've also acted as a technical specialist to regulatory authorities including councils, the Environmental Protection Authority (EPA) and Ministry for the Environment (MfE) to assist with Resource Management Act processes, including consent processing and compliance.

Some of my favourite projects at PDP involved macroinvertebrate sampling and flow gauging in a pristine waterway at Tekapo; translocating 271 native shortfin eels to safety from a pond in Auckland which was about to be filled in for housing; foreshore benthic monitoring at Auckland Airport over four years to assess the effects of large-scale mangrove removal; and working with the residents and various stakeholders in Te Anau and Manapouri during a peer review process following an appeal of the wastewater discharge consent for the Te Anau Wastewater Treatment Plant.

My masters has been invaluable in terms of giving me the broad skills needed to work in the environmental field in New Zealand, and also in terms of the networks I made while at the University – at PDP I work alongside two of my fellow Environmental Science masters graduates and I am still in contact with many others who work the environmental field in New Zealand.

Karen Sky

Supriyati Andreastuti

Supriyati Andreastuti, Manager, Mitigation of Landslides Division, Centre for Volcanology and Geological Hazard Mitigation (CVGHM), Indonesia

In 2000 I graduated with a PhD in Geology from what was the Department of Geology at the University of Auckland. My PhD thesis was entitled 'Stratigraphy and geochemistry of Merapi Volcano, Central Java, Indonesia: Implications for the assessment of volcanic hazards' and I was supervised by Associate Professor Ian Smith, Associate Professor Brent Alloway and Dr Peter Ballance.

After graduating I returned to the Volcano Technology Research Centre (VTRC) in Yogyakarta, which is part of the Centre for Volcanology and Geological Hazard Mitigation (CVGHM), where I had been working prior to my studies in New Zealand. I remained in Yogyakarta for eight years before transferring to the CVGHM office in Bandung.

In my work I evaluate the hazard potential of geological phenomena, including volcanic eruptions, earthquakes, tsunami and landslides. In doing this evaluation we undertake hazard modelling, photogrammetry and prepare risk maps. I'm also involved in outreach and education of communities and government officials, including simulations, formulation of contingency plans and evacuation drills. Preparation of policy, regulation and strategy related to disaster mitigation plans has also become part of my work.

My role has primarily involved evaluation of volcano hazards and preparedness. In July 2016 I was given the responsibility of leading the Mitigation of Landslide Division in CVGHM. As a result, my current work is related to quick response and investigation of landslide events, as well as mitigation, monitoring and research. We also provide monthly landslide forecasts to local governments in Indonesia.

I have fond memories of New Zealand as a quiet place, and remember well that whenever I had the chance to go to the field, there were always sheep and bulls accompanying me when observing outcrops!

Having a field day

Field teaching plays a key role within our undergraduate and postgraduate programmes. Every year countless courses within the school include field trips, ranging from short, local excursions to residential experiences across New Zealand and internationally.

All of our Geography and Earth Sciences undergraduate students must participate in a residential field course during their degree. These courses typically involve supervised research experiences in different locations around the North Island of New Zealand.

In 2016 our core Human Geography field course, GEOG 315, took place in Northland. Students travelled to Whangarei to undertake research on a range of social, economic and environmental issues.

GEOG and EARTHSCI 330 ventured into new territory in 2016, with the course moving from Ohiwa (in the Eastern Bay of Plenty) to Gisborne. With its rapidly eroding hill slopes, Gisborne experiences high levels of sediment delivery to a large catchment, which makes it a globally unique area. Students undertook supervised research along the full length of the catchment, from the world famous Tarndale slip to the beaches and rock platforms around Gisborne.

EARTHSCI 301: Advanced Geological Skills and Methods – Port Waikato and Taupo Volcanic Zone

Written by Earth Sciences student Alex Davidson

A chance to solidify University friendships whilst mapping igneous and sedimentary landscapes? That's what the EARTHSCI 301 field trip is all about.

Invaluable to anyone considering a future in geological mapping, and run as a field mapping exercise sandwiched by two residential field studies, EARTHSCI 301 provides the solid foundation necessary to analyse and interpret landscapes.

The first week-long residential saw students studying the sedimentary facies present in the Port Waikato region. Budding geologists honed their field techniques in the first part of the week, while they got to grips with the morphology of the study site. Individual excursions to Waikato South Head, Waikawau Valley and Ngatutara Cove developed the skills the students needed to undertake a three-day project to map the Huriwai Valley.

Trip two was to the Taupo Volcanic Zone, where students learnt to identify and interpret geological features from the many outcrops and deposits in the region.

These visual observations allowed students to create a stratovolcanic facies model of Ruapehu, in order to summarise the types of deposits characteristic of proximal, medial and distal ring planes of the volcanic centre. Finally, students participated in an independent mapping exercise of the Mangatepopo Valley in order to analyse the eruption sequences that have formed this unique landscape.

A top-ographical time was had by all!

EARTHSCI 301 students examining volcanic deposits from Ruapehu volcano on Highway 4 near Raurimu

Measuring wave processes on coral reefs during postgraduate field trip to Huvadhu Atoll, Maldives

Postgraduate field trip to the Maldives

Written by Dr Eddie Beetham

More used to its status as a luxurious couples holiday destination, the Maldives proved the perfect field trip location for a group of 12 postgraduate students in February 2016.

Professor Paul Kench led the lucky students, who were treated to 10 days of field work, seminars and in-field lectures, in their stay at the Small Island Research Station on Fares-Maathoda Island on the southern rim of Huvadhu Atoll.

The field trip group was the first to visit the new research station in one of the world's most pristine coral reef ecosystems and, rather than kicking back with a cocktail, the students undertook surveys of reef ecology in order to provide a baseline understanding of coral cover and carbonate production.

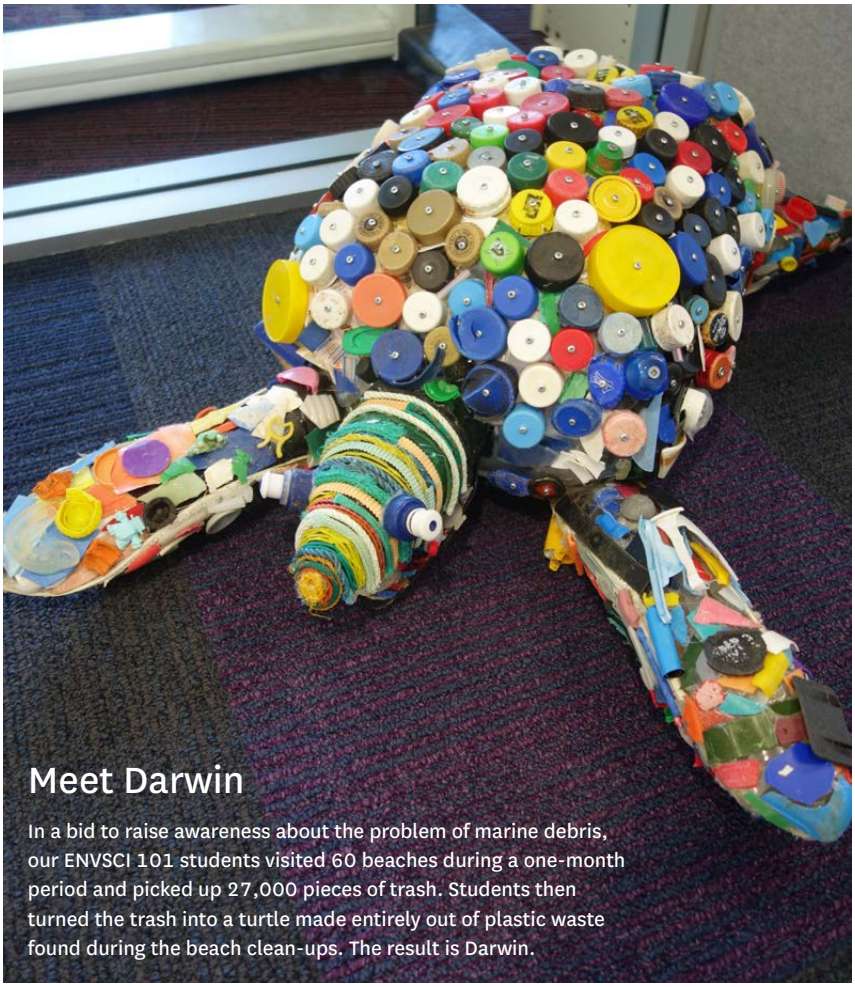
Students were also tasked with measuring reef and island topography, and compared the morphology of islands on the atoll rim to islands on inner atoll lagoon platforms.

The trip provided an unforgettable opportunity for students to experience and learn about coral reef systems in a unique location.

The holiday on Huvadhu Atoll may be over, but the honeymoon is definitely not!

Postgraduate students on Huvadhu Atoll, Maldives

In the community



Meet Darwin

In a bid to raise awareness about the problem of marine debris, our ENVSCI 101 students visited 60 beaches during a one-month period and picked up 27,000 pieces of trash. Students then turned the trash into a turtle made entirely out of plastic waste found during the beach clean-ups. The result is Darwin.

Outreach with DEVORA

The Auckland Heritage Festival event, Shaking and Popping in New Zealand, and Upper Harbour Primary School science-themed school fair, Discovery Day, were a real success in 2016, thanks to the School of Environment's long-standing work with the outreach group DEVORA (DEtermining VOlcanic Risk in Auckland), alongside newcomers AUGA (Auckland University Geoscience Association) and QuakeCore, who also participated.

Both events attracted several hundred people who enjoyed demonstrations by the volunteers that explain how volcanoes work and the damage that a volcanic eruption can do.

Children and their families were entertained by fun and dynamic presentations, including lava flows made out of yeast, hydrogen peroxide, dish soap, and red food colouring that created an exothermic reaction, giving children the opportunity to feel the warm, soft and bubbly 'lava.'
A real crowd-pleaser was the explosive eruption made from a combination of Diet Coke and Mentos confectionery, while the 'exploded' water trick involving water, a capped film canister and alka-seltzer was a show-stopper among many interactive displays at the fun community events.

Our DEVORA outreach group also participated in a snail mail letter exchange with second and third-grade American students curious about volcanoes, and our volunteers visited schools to give talks about volcanoes.

www.devora.org.nz/contact-us

Annual teacher field trip

For many years the School of Environment has run an annual field trip for secondary teachers. The day contributes to teachers' professional and curricula development by providing valuable access to our research staff in a relaxed environment that provides plenty of opportunity for networking.

While a variety of subjects have been showcased over the years, coastal geography and geology topics often dominate the event's themes and provide an excellent landscape for an interdisciplinary field trip. In 2016, we combined a volcanic field trip led by Barry O'Connor and Nick Richards to the Auckland Domain with laboratory 'skills-sessions' at the City Campus that showcased the new Science Centre and its facilities.

While the event typically attracts around 50 teachers from schools across Auckland, trips to both Muriwai and Omaha have seen numbers rise to nearly 100. The coastal environments are field sites used by geography teachers in both the NCEA and Cambridge curricula, including physics teachers who use the locations to study wave dynamics.

Over the years these annual end-of-year field trips have become an invaluable way to network and promote the school's disciplines. Alongside providing teachers with useful teaching resources, the field trip introduces teachers to recent advancements in knowledge and expertise shared by our team at the School of Environment.

Secondary school teachers discussing coastal processes at Muriwai beach

Spaceward Bound participants scale Mt Tarawera, Rotorua (above and below)

Spaceward Bound New Zealand

In association with Spaceward Bound New Zealand, the MBIE-funded Unlocking Curious Minds project, a dynamic educational outreach event, saw 20 secondary school students attend an exclusive astrobiology field trip in Rotorua in November 2016.

Organised by the University of Auckland and the New Zealand Astrobiology Network (NZAN), the project which is partnered with local trust Te Taumata o Ngāti Whakaue, aims to teach students about New Zealand's unique geologic features and explore questions related to life's origins and existence in extreme environments.

The students enjoyed the novel, hands-on approach to learning by attending lectures and building field test sensors while exploring Mangatete and Tarawera for a Mars simulation. The five-day expedition included a Marae open day and was attended by Professor Kathy Campbell and Dr Mike Rowe from the School of Environment, NASA scientist Jen Blank, and the NZAN team.

Spaceward Bound New Zealand also brings together high school teachers with New Zealand and NASA scientists to show them how research is carried out in the fields of astronomy and astrobiology, to help create resources for the new earth and space sciences curriculum.

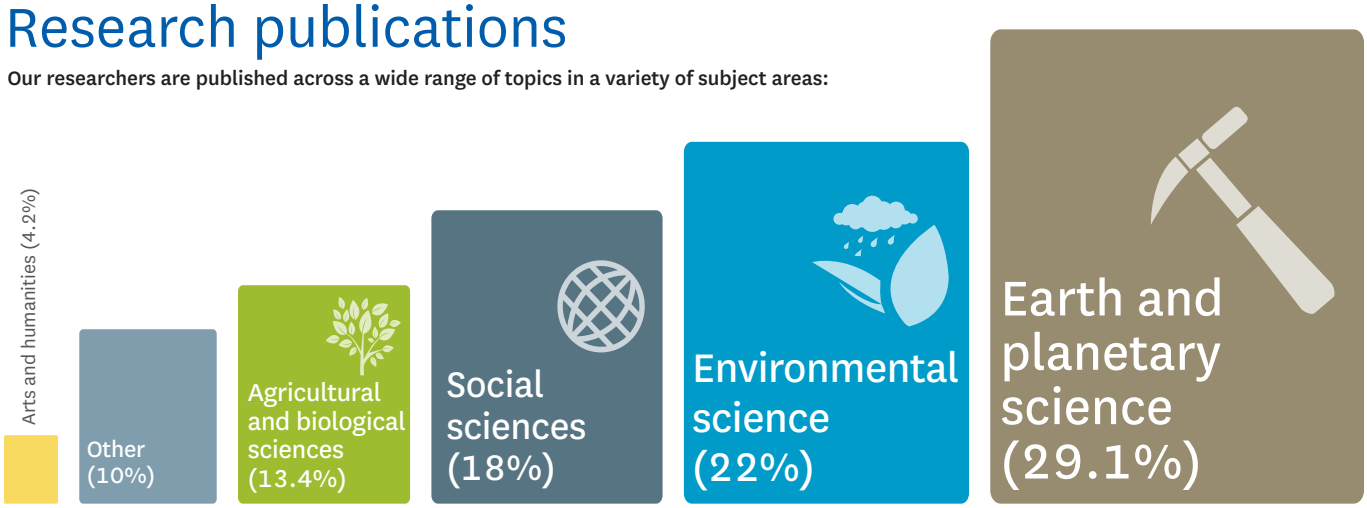
Professor Kathy Campbell sees Spaceward Bound and its partnership with the University as integral to the growth and understanding of science in New Zealand and the world.

"It is our teachers who teach the kids who come to University, who will then solve the great environmental problems of our times and unlock the mysteries of the universe," says Kathy.

SCHOOL OF ENVIRONMENT 2016 KEY STATISTICS

Research publications

Our researchers are published across a wide range of topics in a variety of subject areas:

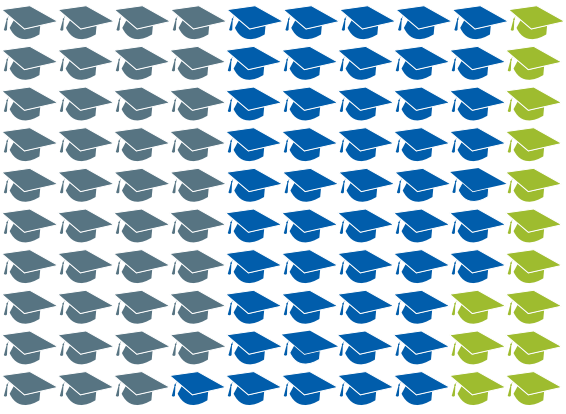


Our Staff and students

5177 enrolments in 2016

2195 Stage I | 1564 Stage II | 1418 Stage III

Postgraduate degree completions 2016



37 honours | 45 masters | 12 PhD

64 Academic staff

53 undergraduate courses

43 postgraduate courses

Our research staff by discipline

Earth Science: Geology and Geophysics

Ludmila (Mila) Adam
Paul Augustinus
Joel Baker
Simon Barker
Melissa Bowen
Martin Brook
Kathleen Campbell
Shane Cronin
Jennifer Eccles
Catherine (Kate) Lewis Kenedi
Jan Lindsay
Christian Montanaro
Ingo Pecher
Michael Rowe
Julie Rowland
Phil Shane
Lorna Strachan
Mary Anne Thompson
Manuela Tost

Earth Science: Physical Geography

Melissa Bowen
Gary Brierley
Eddie Beetham
Giovanni Coco
Chris de Freitas
Mark Dickson
Murray Ford
Anthony Fowler
Jao Gao
Paul Kench
Susan Owen
Emma Ryan
Jenny Salmond
Sam Trowsdale
Jon Tunnicliffe

Environmental Science

Gretel Boswijk
Giovanni Coco
Anthony Fowler
George Perry
Jenny Salmond
Luitgard Schwendenmann
Kevin Simon
Sam Trowsdale
Janet Wilmshurst

GIS, Remote Sensing and Modelling

Giovanni Coco
Murray Ford
Jao Gao
Agnieszka Leszczynski
George Perry
Jon Tunnicliffe

Human Geography and Environmental Management

Tom Baker
Ann Bartos
Francis Collins
Brad Coombes
Karen Fisher
Ward Friesen
JC Gaillard
Jao Gao
Robin Kearns
Richard Le Heron
Agnieszka Leszczynski
Nicolas Lewis
Marie McEntee
Laurence Murphy
Susan Owen
Meg Parsons
Mary Anne Thompson
Hong-Key Yoon

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

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