

CONTENTS

VISG co-ordinator's note	1	Global Eruption Roundup	5
News	1	Media Coverage	6
Research Spotlight	2	Upcoming Events	6
Research Highlights	4	Contact	6

VISG CO-ORDINATOR'S NOTE



*Natalia Deligne,
GNS Science*

I hope you had a lovely summer.

A lot has happened in the last quarter, including the launch of the **National Geohazards Monitoring Centre** (see **News**), which will greatly improve the speed with which hazards information will be available during a natural hazard event, including volcanic eruptions. As a GeoNet volcano duty officer, I'm grateful to the dedicated Geohazards Analysts who man the centre 24/7 and who will provide incredibly valuable and appreciate support during a volcanic crisis. Together, we will continue serve New Zealand to the best of our abilities – now enhanced.

This quarter's **Research Spotlight** is by **Danielle Charlton**, a new postdoc at the University of Auckland who is dedicated to making volcanic

hazards maps more effective for the end-user. Danielle is keen to work with the broader New Zealand volcanic crisis response community – I encourage you to reach out to her if you are interested in being involved. I personally look forward to using the findings of her research!

Finally, I would like to acknowledge the service of **Darren D'Cruz**, who designed the VISG ash posters (versions 2 and 3), the VISG logo, and the VISG newsletters - for years he has been making VISG products visually interesting and attractive. We wish him all the best on his future endeavours. I look forward to working with new members of the GNS Communications team, in particular **Katy Kelly** who has updated the look and feel of this newsletter.

NEWS

A joint **DEVORA and Auckland Emergency Management (AEM) workshop on Auckland Volcanic Field (AVF) crisis management decision-making** in December 2018 brought together AEM, MCDEM, emergency services and transportation agencies, and researchers from the Universities of Auckland and Canterbury and GNS Science. The highlight of the workshop was an eruption simulation exercise aimed to understand current decision-making processes and required intelligence in an AVF eruption context. Findings will inform ongoing PhD projects aimed at developing tools to assist with science-based AVF crisis management.

The **2018 Volcano Short Course**, held in Rotorua in December 2018, was a great success. The two-day course (including a one-day field trip) was attended by staff from emergency management groups, city and district councils, lifelines, museums, the military, and the private sector.

The VISG poster **Advice for Operators of Generators and HVAC Systems** is out for ALG review and will be finalised once feedback has been incorporated. This is the 6th updated poster in the VISG lifeline ash impact poster series. The remaining posters are currently being updated.

The **National Geohazards Monitoring Centre (NGMC)**, located at the GNS Science campus in Lower Hutt, went live in December 2018. The NGMC monitors earthquakes, volcanoes, tsunamis and landslides and is manned 24/7. A backup facility



Geohazard analysts in the National Geohazards Monitoring Centre, GeoNet, Avalon campus. Photo credit: GNS Science / Margaret Low.

RESEARCH SPOTLIGHT

Towards a more effective New Zealand volcanic map framework



*Danielle Charlton,
University of Auckland*

When was the last time you used a map? To locate a coffee shop, whilst driving, or perhaps during the summer holidays? Maps are something we often take for granted, and we use them more often than we may realise. We may not notice when maps are poorly designed. Usually, a bad map is inconvenient or frustrating at worst. However, when maps are used to convey critical information during a crisis, for example during a volcanic event, their content, format and design is crucial for keeping people safe. Keeping people safe and suitably informed drives me as a volcanic hazard map researcher.

My journey towards user-centred maps

Over the last decade, I have worked on many different mapping projects, both within the volcano research community and for my local flood risk authority in the UK. My early experience involved science-heavy maps designed with little or no consultation with end-users. Through my experiences, and broader evolving perceptions of scientists and academic researchers, I have learned that effective maps are created through a group effort. Sometimes, more than one map may be required to cater to everyone's needs. I now consider mapmakers to be facilitators, listening to the needs and preferences of those involved, and then translating these experiences into an effective map. My work is also guided by results from behavioural and communication research.

Towards a more effective New Zealand volcanic map framework

To date, production of New Zealand volcanic hazard maps has occurred on an as-needed basis, done by different researchers using a variety of approaches. Volcanic hazard maps usually show the types of hazards that may occur during future eruptions and identify areas of potential impact. The most recent such New Zealand map was developed rather rapidly during the 2012 Te

Maari eruption at Tongariro volcano. This map needed to provide emergency information directly related to the activity unfolding at the Te Maari vents. Those involved found it complex and taxing to develop an audience-focused hazard map under the stress and time pressures of the crisis.

If we take a step back, this is neither surprising nor unique: researchers have found that the speed and challenges associated with volcanic crises means that there are often limited available resources for creating and revising maps during volcanic unrest and eruptions. Our recent experience demonstrates the need for a tested, yet flexible framework which allows for the rapid creation of situation-specific maps during a crisis, as well as effective maps used for long term emergency preparedness. This is the focus of my research for the next 3 years.

In January, I moved to New Zealand to be part of a new interdisciplinary research project at the University of Auckland, working in collaboration with GNS Science. The project combines map design and cartography research with lessons from both New Zealand and international experiences. The goal is to develop, test and implement a New Zealand-specific operational framework for volcanic crisis map development. I'm leading this effort with Jan Lindsay, Mary-Anne Thompson, and Michael Martin



Volcanologists from around the world discussing how volcanic hazard maps can be improved and made more useful at a workshop in Portland, Oregon, USA in 2017. Volcanic hazard maps communicate the types of hazard that may occur during future eruptions and identify the areas of potential impact. Photo credit: Danielle Charlton

(University of Auckland) and Graham Leonard (GNS Science). A key part of our project is to work with stakeholders, including risk managers, communicators, and scientists, to co-produce a framework that works for New Zealand. We will consider three case study volcanoes as we do so, still to be determined (lobbying for a specific volcano welcomed, especially if you are ready to help us out).

My first steps are to, with my team, with stakeholders and my team, draft a preliminary multi-agency framework for volcanic map development, which I will test at the three volcanoes. The intention of this framework is to guide and support to the production of new maps in times of unrest and response.

The framework will provide an evidence-based foundation for developing maps. I will also examine how we can embrace different kinds of maps, such as paper-based vs interactive maps. I will evaluate the draft framework and maps through table-top exercises, interviews and focus groups with stakeholders to determine whether they are fit for purpose.

- D. Charlton



Danielle spent the last four years investigating how scientists and emergency managers best work together to use maps to communicate hazard at one of the most dangerous volcanoes in the world, Campi Flegrei, situated underneath Naples, Italy. Naples and Auckland are 2 of the 10 cities in the world with over 1 million people living within 5 km of a volcano. Photo credit: Danielle Charlton.

I want to work with you: **GETTING INVOLVED**

What excites me about creating maps is the fantastic opportunity they provide for different disciplines and communities of practices to come together to create richer and more meaningful maps. I look forward to learning from the experiences of those in New Zealand who communicate hazard, risk, and similar information during a crisis, as well from the creative arts and social science communities. Contact us now!



danielle.charlton@auckland.ac.nz



RESEARCH HIGHLIGHTS



Josh Hayes, University of Canterbury

GNS Science Report

Impacts of the 2015 eruption of Calbuco volcano on Chilean infrastructure, utilities, agriculture, and health.

PhD student Josh Hayes (University of Canterbury) and colleagues from New Zealand, Chile, Bermuda, the USA and the UK

This report presents findings from a two-week volcano impact assessment trip in November/December 2016 (see VISG Newsletter 6), and will be free to download from the GNS Science Publications website.



Journal

Timber-framed building damage from tephra fall and lahar: 2015 Calbuco eruption, Chile.

PhD student Josh Hayes (University of Canterbury) and colleagues from New Zealand, Singapore, and Chile published a paper in the Journal of Volcanology and Geothermal Research

This paper uses Chilean government damage assessment of residential properties following the 2015 Calbuco eruption to further understanding volcanic impacts and damage timber-framed buildings.



Workers clearing tephra from roadside canal following the 2105 Calbuco eruption. Photo credit: Municipalidad Puerto Varas.

GLOBAL ERUPTION ROUNDUP

Over the past few months, most global volcanic activity are eruptions that have been ongoing for years. The deadliest volcanic event in the past three months occurred right before Christmas in Indonesia when a large landslide comprising of a considerable portion of the Anak Krakatau volcanic edifice (a 'sector collapse') triggered a tsunami. A second concurrent Indonesian eruption at Agung volcano highlighted how transient populations, such as tourists, can both help the economy and hinder emergency responses. Finally, a recent eruption in Papua New Guinea has complicated crises response as Manam Island's communications tower was destroyed by volcanic activity.



*Sophia Tsang,
University of Auckland*



Krakatau, Indonesia

On 22 December 2018, a large landslide comprising of a considerable portion of the Anak Krakatau volcanic edifice (a suspected 'sector collapse') in Indonesia created a local tsunami impacting the nearby islands of Java and Sumatra. There was a 2 km exclusion zone around the volcano in place, but the tsunami extended markedly further: the wave devastated areas up to 60 km away. Because the generation mechanism of the tsunami was a landslide rather than an earthquake, the tsunami warning system was not triggered. The death toll of was at least 430 people. Additionally, nearly 1500 people have been reportedly injured, with 40,000 displaced. Since volcanic activity continued after the sector collapse event, air traffic controllers began re-routing flights to avoid the area in case of an explosive eruption. Local emergency management authorities also recommended locals wear masks and goggles when outside if tephra is present.

Mt. Agung, Indonesia

In late December, Mt. Agung in Indonesia erupted a small tephra plume. The plume was over 700 m above the summit but did not affect flights. It prompted local officials to request that tourists stay at least 4 km away from Agung's crater. This request highlights the increasing trend of tourists to visit erupting volcanoes. Although some volcanoes, like the 1983 to 2018 eruption at Kilauea in Hawai'i (USA), erupt primarily lava flows, meaning tourists can approach volcanic products with minimal risk, many eruptions pose larger risks. Tourists arriving to see eruptions can boost or stress economies and emergency services. Here are a few articles that highlight some issues with volcano tourism:

- <https://www.stuff.co.nz/travel/news/109612156/tourists-flock-to-erupting-volcanoes-putting-pressure-on-emergency-services>
- <https://www.bbc.com/news/education-46621304>



Manam volcano as viewed several years ago. Photo credit: Wally Johnson/Australia Bureau of Mineral Resources.

Manam, Papua New Guinea

Manam, a volcano on Manam Island in Papua New Guinea, has been intermittently erupting since 2004. Thus, most of the population has been living in temporary care centres on mainland Papua New Guinea for years. The government estimates that ~5000 people remain on Manam Island, primarily children. Due to remoteness and isolation, it can be difficult warning Manam Island residents of potential eruptions. This endeavour became more difficult when the island's communications tower was destroyed in late January 2019 by heightened volcanic activity which included earthquakes, tephra, and a lava flow. Residents who have been contacted have been warned to stay out of valleys, which could funnel pyroclastic density currents. - S. Tsang

MEDIA COVERAGE

North and South Magazine considered **The worst natural disaster risks facing New Zealand** in January 2019. Amongst other disaster risks, the piece featured an Auckland eruption. Several VIGS and DEVORA researchers were interviewed for the piece, available at <https://www.noted.co.nz/planet/new-zealand-natural-disaster-risks/>.

The new **Lava Lab** at the University of Canterbury, led by **Dr. Ben Kennedy**, was showcased by both **Stuff** (<https://www.stuff.co.nz/science/109265756/christchurch-lava-lab-could-help-prepare-for-auckland-eruption>) and **TVNZ** (https://www.tvnz.co.nz/one-news/new-zealand/canterbury-university-scientists-create-lava-after-melting-volcanic-rock?variant=tb_v_1)

UPCOMING EVENTS

Save the Date! The **2019 DEVORA Research Forum** will take place between 20 – 22 November 2019 at the University of Auckland. Details to be confirmed over the coming months and provided in further editions of the VISG newsletter.

DEVORA 

CONTACT

Dr. Natalia Irma Deligne
Volcanic Hazard and Risk Modeller
GNS Science - Te Pu Ao
PO Box 30368
Lower Hutt 5040
New Zealand

Email: N.Deligne@gns.cri.nz
Tel: +64 4 570 4129
Fax: +64 4 570 4600

