

CONTENTS

VISG Co-ordinator's Note _____	1	Global Eruption Roundup _____	3
News _____	1	Media Coverage _____	3
Research Spotlight _____	2	Upcoming Events _____	3
Research Highlights _____	2	Contact _____	3

VISG CO-ORDINATOR'S NOTE

by Natalia Deligne

Over the past 20 years, VISG researchers have gone overseas to learn from volcanic eruptions around the world; these impact trips have provided a wealth of information concerning volcanic impacts and mitigation and management strategies. These trips allow us to use the experience gained elsewhere to better prepare New Zealand. I hope you will be able to **join us for the annual VISG seminar** the morning of 11 December in Auckland (see section Upcoming Events for logistical information) where VISG researchers will share findings from our three recent impact trips to Indonesia (2014 Kelut eruption), Japan (2014 Ontake eruption) and Hawaii (ongoing Kīlauea eruption).

The seminar will also touch on how volcanologists and other natural hazard scientists use information obtained in the field and in the lab to quantify impacts in the form of vulnerability and fragility functions, and how you can then use this information to better prepare for local and distant volcanic eruptions.

See you at this year's VISG seminar!

NEWS

VISG researchers, in conjunction with the Economics of Resilient Infrastructure (ERI) and Determining Volcanic Risk for Auckland (DEVORA) research programmes, **completed a scenario concerning the hypothetical eruption of "Mt Ruamoko" in Auckland.** The scenario examines the consequences of an Auckland eruption on critical infrastructure due to direct damage, evacuation zones and site access, and possible mitigation measures. The research team thank the many members of the Auckland Lifeline Group who were generous with their time and expertise as the scenario was developed. The final report will be freely available, and there will opportunities in the next couple of months to discuss research findings. This scenario will be used as input to ERI's Measuring the Economics of Resilient Infrastructure Tool (MERIT), which quantifies the economic implications of vulnerabilities to infrastructure failure from both natural hazards and infrastructure-only events.

The University of Canterbury, GNS Science, US Geological Survey and University of Bristol (UK) volcanic ash impacts researchers are working on a **standardised framework for the storage of volcanic ashfall impact data.** This will likely be housed on GNS Science's Oracle database engine as part of the Volcano Database (VOD) Nationally Significant Database, which is backed up and maintained in the long term. It will benefit a wide range of New Zealand and international risk management programmes, including Riskscape, Global Volcano Model, and national requirements for quantitative impacts data to drive risk management under the UN Sendai Framework for Disaster Risk Reduction 2015-2030. The database is being developed around existing impact data, a lot of which has been collected by New Zealand researchers within VISG, and goals for future digital field data collection. It will be aligned to international impact data schemas such as UN-ISDR's DesInventar and EM-DAT, UN-IRDR's DATA Project, and GFDRR's Open Data for Resilience.

VISG researcher Carol Stewart spent three days at Durham University in October working with Dr Claire Horwell (Director of the International Volcanic Health Hazards Network) and PhD student Ines Tomasek. The work program included analysing results from **an interlaboratory comparison of methods used to assess hazards of volcanic ashfall** and preparation of this work for publication. Carol also gave a lunchtime talk to the volcanology group on the New Zealand approach to managing health impacts of volcanic eruptions.



RESEARCH SPOTLIGHT

Ash impacts on roads: lessons from Kagoshima, Japan

By Daniel Blake, PhD Candidate, University of Canterbury

Sakurajima volcano in Japan is presently one of the world's most active volcanoes. The most recent activity at Sakurajima started in 1955, and as of early June, there were over 630 eruptions since the start of 2015! Consequently, city authorities for the local city of Kagoshima are arguably the most experienced in the world for how to manage frequent ashfall events.

In June 2015 I had the opportunity to visit Kagoshima to learn about how the city authorities deal with frequent volcanic ashfall on the city's roads from nearby Sakurajima volcano. Motivation for this visit was to see whether the findings from my experiments in the University of Canterbury's Volcanic Ash Testing Laboratory (VAT Lab) to quantify the impacts of volcanic ash on roads reflect reality. To date, I have investigated skid resistance on ash-covered road and airfield surfaces, and how easily road markings become obscured by ash. I am now commencing tests of visibility through airborne volcanic ash.

Kagoshima City Office staff told me that just 1 mm of volcanic ash accumulation is enough to make road surfaces slippery. They also implied that ash of more recent eruptions (from the Showa crater of Sakurajima) appears to be less slippery than that of older eruptions (from the Minami-daki crater), probably due to the smaller particle size associated with these recent eruptions. Both of these findings from the field align well with my lab results.

There is often an increase in accident rate during ashfall, particularly on roads around Sakurajima volcano itself, perhaps because the ash particles are coarser nearer to the volcano and the road surfaces become more slippery as lab tests suggest, but perhaps also because the roads are windier. Interestingly, the City Office officials said that it was very difficult to drive when ash depths exceeded 1-2 cm and that most roads would be closed to vehicles for any depths greater than 2 cm. These depths were slightly less than expected after researching other eruptions worldwide but it highlights the importance of decisions made by authorities for road network functionality.



Vehicles driving in low visibility caused by volcanic ash in Kagoshima City (photo courtesy of Kagoshima City Office).

Another impact that drivers in the city often face is the reduction in visibility from ash particles suspended in the air, sometimes to just 20 meters or so. Apparently, low visibility can be worse during ash that has remobilised from the ground (when vehicles drive over ash and stir it up) than from the initial ashfall from the eruption. Although lower speed limits are not implemented in ashy conditions, drivers usually slow down as a precaution and turn on their headlights.



Road markings become hidden by very small amounts of ash, making it difficult to drive and reducing road safety (photo courtesy of Kagoshima City Office).

The importance of road markings should not be underestimated. In Kagoshima, road marking coverage is identified as an important issue as only small amounts of ash falling on roads is enough to cause markings to be obscured; my lab findings show that just 0.3-0.5 mm of ash accumulation is enough to hide markings from drivers. When road markings are covered, it becomes more difficult to drive, especially to stay in the correct place on the road or to see pedestrian crossings. This has the effect of reducing road safety.

My visit to Kagoshima confirmed my laboratory findings, and also provides insights for how to manage volcanic ash. This visit was funded by the Mason Trust Fund of the Department of Geological Sciences, University of Canterbury, with support from DEVORA and EQC.

RESEARCH HIGHLIGHTS

University of Canterbury student Josh Hayes published a paper in Journal of Volcanology and Geothermal Research entitled **Tephra fall clean-up in urban environments**. This paper reviewed tephra clean-up operations from a variety of volcanic eruptions spanning over 50 years, and found that tephra clean-up operations are expensive, time consuming, and resource intensive. This study highlights the advantage of effective planning for tephra clean-up operations; for his PhD Josh will build on this work to explore syn-and-post eruption volcanic debris management and recovery for Auckland.

Sam Hampton (University of Canterbury) published a paper in Journal of Volcanology and Geothermal Research entitled **Volcanic ashfall accumulation and loading on gutters and pitched roofs from laboratory empirical experiments: Implications for risk assessment**. This study enables the estimation of ash accumulation and thus the load and collapse thresholds for roof and gutters at different roof pitches.

GLOBAL ERUPTION ROUNDUP

By Josh Hayes

Although there are currently over 19 volcanoes erupting throughout the world, it has been a reasonably quiet few months for volcanic eruptions that have caused societal impacts.

Mount Aso – Kyushu, Japan

Mount Aso erupted with little or no warning on Monday 14 September in an eruption similar to the 2012 eruption of Te Maari. The eruption reportedly sent an ash column 2,000 m into the air and collapsed into several pyroclastic flows. Reports indicate that tourists near the volcano were safely evacuated. Over 20 flights were reported to have been cancelled due to the eruption.

Cotopaxi volcano – Ecuador

In late August a number of eruptions occurred which resulted ashfall in a number of areas surrounding the volcano. Ash was reported to have fallen on many roads and highways leading the Ministry of Transport and Public Work to issue a caution for drivers to keep speeds below 30 km/hr. Activity at the volcano continues with the most likely scenario being that it will continue to produce small emissions and explosions.

Mount Sinabung – Sumatra, Indonesia

Mount Sinabung has been erupting since 2013, with explosions and pyroclastic flows continuing and over the last few days have become much stronger than over the last few months. Thousands were previously evacuated from areas around the volcano and the ongoing activity presents a great challenge to the impacted communities.

Mount Rinjani - Lombok, Indonesia

Small ash plumes from Mount Rinjani on the island of Lombok, Indonesia have caused flight cancellations into and out of Bali's Denpasar Airport. So far 16 flights have been cancelled and the situation will be monitored to determine if further cancellations are required.

MEDIA COVERAGE

In September GNS Science, in collaboration with DOC, produced a video about the lahar warning system at Ruapehu and social science research on its effectiveness, available at <https://www.youtube.com/watch?v=B832VwOoUWE>.

UPCOMING EVENTS

The **8th Annual DEVORA Forum** will be on **12 November** from 9:30 – 4:30 at the University of Auckland. Please RSVP by 9 November to Elaine Smid (e.smid@auckland.ac.nz). The forum will feature all the latest research concerning the Auckland Volcanic Field and volcanic impacts.

The **Annual VISG Seminar** will be on **11 December** from 10:00 – 12:00 at the University of Auckland Law School at 1-10 Short Street, Building 810, Room 332. This is event is free but please RSVP to Natalia Deligne (N.Deligne@gns.cri.nz), preferably by 7 December.



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

