VISG NEWSLETTER
VOLCANIC IMPACT STUDY GROUP

ISSUE NO.19 MARCH 2020

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VISG COORDINATOR'S NOTE

Natalia Deligne, GNS Science

9 December 2019 will become a significant date in Aotearoa New Zealand's history, joining 24 December 1953 (Tangiwai disaster) and 10 June 1886 (Mt Tarawera eruption) as days marked by **major tragedy at our volcanoes**. Most of us will vividly remember how we learned of the deadly eruption at **Whakaari/White Island**.

This is the first VISG newsletter since the Whakaari/White Island eruption. Although the eruption did not affect lifeline infrastructure – the focus of VISG – we feel it is important to acknowledge the eruption in this newsletter. Rather than having a research spotlight, the VISG team has put together a piece providing thoughts and observations, now close to three months after the deadly eruption.

This newsletter also contains the usual other features. In particular, I want to draw your attention to ***Upcoming Events*** – while on the other side of the world, the Cities on Volcanoes conference in Greece (23–27 May) will focus on the volcanoes and those who live near to or on them. It would be great to have a strong New Zealand presence there, both to share our many experiences and also to learn from and get inspired by others. We will report back in future VISG newsletters and events.

NEWS

The **New Zealand Volcano Science Advisory Panel** (NZVSAP) met in February 2020. NZVSAP facilitates provision of authoritative, trans-disciplinary volcanic science advice integrated across agencies during a crisis and leads collaborative planning and coordination for multi-agency science research response during volcanic events. It has Health, Agriculture and Lifelines sub-groups that provide technical volcanic-hazard-specific advice and research as needed during unrest and eruptions. These sub-groups are also tasked with contingency planning for the way that this advice and research activity will occur during a crisis.

In February, VISG member Carol Stewart, accompanied by Jane Rovins, both of Massey University, **visited Vanuatu to learn lessons from the large-scale forced migrations** of the whole population of Ambae Island due to **volcanic activity in 2017–2018**. The team spent most of their time on the island of Santo, where many Ambae residents evacuated unofficially and have established 'second homes', and carried out semi-structured interviews based on the United Nations Guiding Principles on research on internally-displaced people. The purpose of this work is to inform policy advice and provide recommendations to Aotearoa New Zealand agencies for more effective overseas aid in the future.

Many Ambae evacuees have established 'second homes', such as this one in Bombua village, Santo, and are establishing crops for food supplies. Photo credit: Carol Stewart.

'Manaro St', Santo. Ambae evacuees living on Santo have named their new location after Ambae's volcano, Manaro Voui. Photo credit: Carol Stewart.

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WHAKAARI / WHITE ISLAND

by the VISG team

At the centre of any discussion or reflection of Whakaari are those directly affected by the eruption and their families and whānau. We hold them in our thoughts.

The core focus of VISG is the impacts of volcanic eruptions on critical infrastructure and services and, as such, our focus tends to be on the impacts of volcanic ashfall. Ash has the largest footprint of all the volcanic hazards, impacting areas up to hundreds of kilometres from the volcano. While neither ash nor infrastructure disruption was a factor at Whakaari, members of the VISG team were directly involved in the response. Here, we offer initial perspectives, in full recognition that in the months and years to come, following debriefs and investigations, there will be greater clarity.

When did we learn of the eruption? What was our reaction?

Our awareness of the eruption ranged from a couple of minutes to a few hours, and we all knew right away that there was a high likelihood of people being on the island at the time: Whakaari is a popular tourist destination and it was a beautiful day. Initial reactions include dread, hope beyond hope that no one was on the island, and resolve to serve New Zealand with all our attention in the minutes, hours and days to come.

How did we contribute?

We served as part of the GeoNet volcano monitoring team, as liaisons and subject matter experts providing information to inform difficult decisions, as volcanologists providing information to the public and media and as members of the New Zealand Volcano Science Advisory Panel (NZVSAP); several of us played multiple roles.

How did research feed into the response?

Research fed into the response in several ways.

Our understanding of volcanic processes and the system specifically at Whakaari is underpinned by research. This knowledge, combined with real-time data from GeoNet instruments, allowed the volcano monitoring team to provide high-quality advice on the status of and likely further activity at Whakaari. This advice informed the recovery operations in the days after the eruption.

Whakaari/White Island in June 2019, as viewed on a GeoNet monitoring gas flux flight. Photo credit: Karen Britten, GNS Science.

We also drew on research of the health impacts of volcanic hazards to provide expert advice in support of those on the front line of the medical response and also in support of the Police as they planned recovery operations. VISG members also drew on their expertise to provide a preliminary risk assessment of seafood contamination to the Ministry of Primary Industries.

Can this happen again?

Fatalities and/or serious injury can happen when people are exposed to volcanic hazards, in particular to pyroclastic density currents (as appears to have been the case at Whakaari), ballistics and other near-source volcanic hazards. Lessons that emerge from this tragic experience will contribute to saving lives in the future.

Final thoughts

Lessening the harm of future volcanic eruptions will involve learning from this tragedy. We will work together in this endeavour.

RESEARCH HIGHLIGHTS

Journal

Assessment of leachable elements in volcanic ashfall: a review and evaluation of a standardized protocol for ash hazard characterization

VISG researcher Carol Stewart (Massey University) and colleagues from New Zealand, the USA, the UK, Belgium and Mexico published a paper in the Journal of Volcanology and Geothermal Research

Carol led an international project to develop a standardised protocol for ash leachate analysis; the project included an inter-laboratory comparison study to evaluate the protocol's effectiveness and reproducibility in different labs. Ash leachate analysis provides key data during an eruption response to understand likely effects of ash on human and animal health, drinking water supplies, crops, soils and surface runoff.

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Journal

Developing a suite of multi-hazard volcanic eruption scenarios using an interdisciplinary approach

Recently graduated VISG PhD student Josh Hayes (formerly University of Canterbury, now at Nanyang Technological University Singapore) and colleagues from the University of Canterbury, the University of Auckland and GNS Science published a paper in the Journal of Volcanology and Geothermal Research

Josh and co-authors published a paper describing the process of developing the new suite of DEVORA eruption scenarios, involving the integration of multiple methodologies and disciplines. For more on the DEVORA scenarios, see the VISG newsletter for November 2019 (Issue 14).

GNS Science Report

Preparing for a sustained volcanic degassing episode in Auckland

VISG researcher Carol Stewart (Massey University) and colleagues from Auckland Council, the University of Auckland, GNS Science, the University of Canterbury and Belgium

This report considers issues arising from volcanic gas emissions in the event of an Auckland Volcanic Field (AVF) eruption. It reviews volcanic gases' hazards and impacts and details three recent eruption case studies. Carol and co-authors describe current relevant air pollutant monitoring arrangements in Auckland and estimate credible sulfur dioxide fluxes for an AVF eruption. The report also identifies key issues and knowledge gaps and provides recommendations on how these might be addressed.

GLOBAL ERUPTION ROUNDUP

by Nicole Allen, University of Canterbury

December last year brought to New Zealand a sombre reminder of the volcanic risks that our country faces. Sadly, other eruptions elsewhere around the world also led to negative impacts this quarter.

Whakaari/White Island, New Zealand

A short-lived eruption occurred at Whakaari/White Island on 9 December 2019. 47 people were on the island at the time of the eruption, 21 people lost their lives and many are still recovering from the physical injuries they suffered. The volcano had been in a state of moderate to heightened unrest (Volcanic Alert Level 2) for three weeks prior to the eruption. The eruption prompted GeoNet to initially raise the Volcanic Alert Level to 4 (moderate volcanic eruption), which is the default VAL if there is little information apart from eruption detection. The VAL was lowered to VAL 3 (minor eruption) later that day, then lowered to 2 (heightened unrest) on 12 December 2019 after no further eruptions occurred. At time of writing in late February 2020, the volcano remains at an elevated state of unrest (VAL 2) and continues to be monitored by GeoNet.

Taal, Philippines

A phreatic eruption of Taal Volcano occurred in the early afternoon of 12 January 2020 after 10 months of increased seismic activity. The Philippine Institute of Volcanology and Seismology (PHIVOLCS) raised the volcano's alert level to 2 (on a scale of 0 to 5; the Philippines follows a different volcano alert level system to New Zealand), which indicates that the volcano is in a stage of moderate unrest. The volcanic alert level was further raised to 4 later in the day when the eruption produced a tephra column that rose 10–15km into the air. A total evacuation was called, encompassing the volcanic island as well as the area within a 14km radius from the crater lake. By the morning of 13 January, the eruption had transitioned to a magmatic phase with lava fountaining up to 500m high, which continued on 14 January. Eruptive activity has since decreased, with plumes of steam being released from the volcano since 15 January, and the volcano alert level being decreased to 3 on 26 January and 2 on 14 February.

By 26 January, over 130,000 people were sheltering in evacuation centres with a further 170,000 people evacuated elsewhere. As of 17 February, the National Disaster Risk Reduction and Management Council of the Philippines (NDRRMC) reported over 6,000 people in evacuation centres and 195,000 evacuated elsewhere. The NDRRMC also reported that 584,795 people in four provinces around the volcano have been affected by the eruption.

The eruption of Taal, as seen from a plane. Image credit: Adisidis, licenced under CC BY-SA 4.0.

Tephra from the eruption and intermittent rainfall has caused devastating impacts to livestock and crop production.

Agricultural damage is estimated to be over ₱3.215 billion (NZ$99 million), with fisheries and high value crops (coffee, pineapple, banana, coconut, etc.) suffering the highest impacts. Many people who live within the evacuation zone make their living off the land or by fishing in the lake surrounding the volcano. The majority of these affected residents are uninsured, but the Philippines Department of Agriculture has promised assistance by providing seedlings, livestock medication and farm machinery.

Pineapple farm impacted by tephra from the eruption of Taal. Image credit: Philippine Department of Agriculture.

UPCOMING EVENTS

Early bird registration for **Cities on Volcanoes 11** – held in Heraklion, Crete, from 23–27 May 2020 – closes on 9 March 2020. There are several pre- and post-conference workshops that are relevant to volcanic eruption response and management. For more information, visit https://pcoconvin.eventsair.com/volcanoes11.

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