

Volcanic Impact Study Group (VISG*) update



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* VISG is a subcommittee of the Auckland Lifeline Group

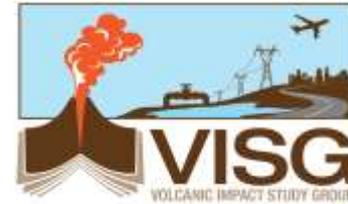


VISG Objectives

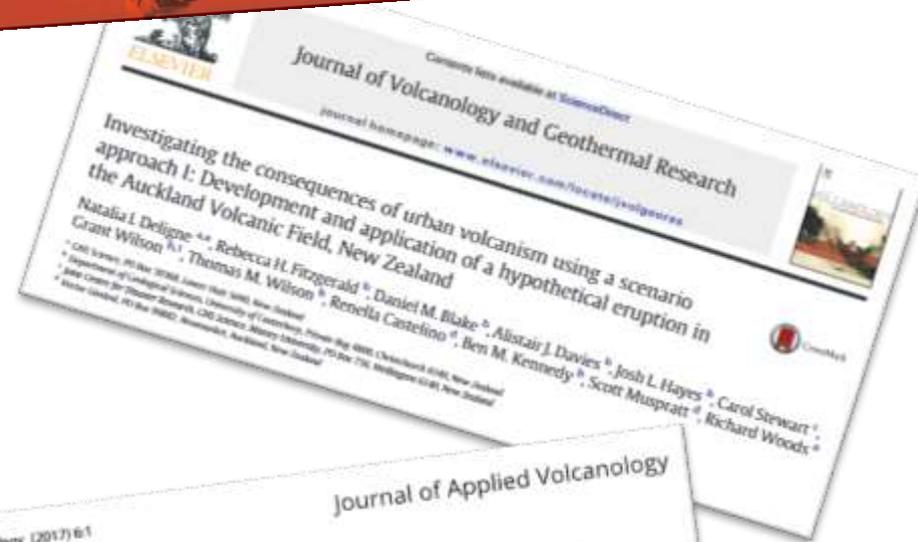
- To **collate and advocate existing knowledge** about the impacts of volcanic hazards (e.g., volcanic ash) on, and mitigation measures for, **lifeline infrastructure**.
- To **facilitate and support research** on the impacts of volcanic hazards on lifeline infrastructure and the development of appropriate mitigation measures.
- To provide a **vehicle for two-way exchange** of relevant research information between the research and lifeline infrastructure community.
- To **facilitate reconnaissance investigations**, and/or advocate lifeline representation on reconnaissance investigations, to active volcanic areas where this would add to our knowledge about volcanic impacts on infrastructure.
- To provide a **national focal point** for volcanic impacts work on lifeline infrastructure.

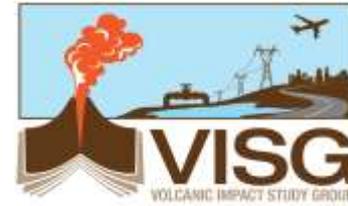
Charter at <http://www.aelg.org.nz/volcanic-impacts/about-visg/>

Presentation overview



- VISG newsletter feature stories
- Highlights
- International engagement
- Upcoming for 2018





December 2016

- Experiments to investigate disruption on transportation networks by volcanic ashfall (Daniel Blake, UC)

March 2017

- Volcanic ashfall impacts to diesel generators – results from the lab (George Williams & Tom Wilson, UC)

June 2017

- Development of a method to sense and sample airborne volcanic ash (Adrian Weller, NZ Defence Technology Agency)

September 2017

- Preparing for a lava flow inundation: how utilities in Pāhoa, Hawai'i responded to a lava flow forecast (Sophia Tsang, UofA)

To receive newsletters, email: N.Deligne@gns.cri.nz

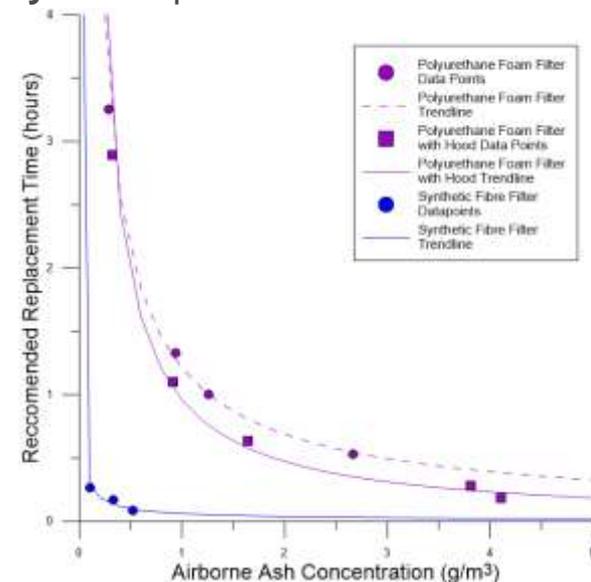
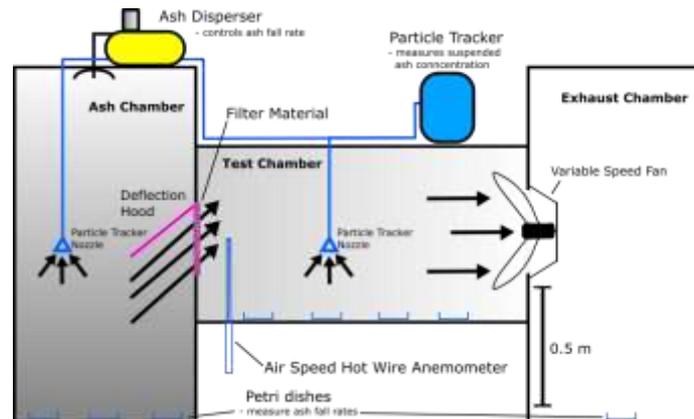
Highlights (I)

ALG-funded experimental study on volcanic ashfall impacts to diesel generators – for more see *March 2017 VISG newsletter*

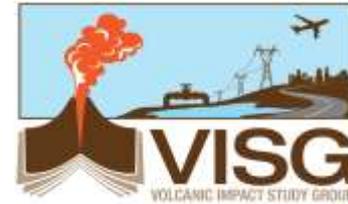
- **Case study in Bariloche, Argentina:**
 - Eruption → flashover on national grid → ~ 10 days power disruption in Bariloche
 - 5 MW emergency power generation facility had ash clog air intakes within 12 hours of eruption → generator engine suffocation & overheating
- **Filter performance testing: study recommendations**
 - Plan for replacing filters at much higher frequency during ashfall events
 - Even exposure to low ash concentrations may require **hourly** filter replacement
 - Ensure access to a large stock of filters
 - Develop filter monitoring & replacement procedures
 - Ensure sufficient resources available (e.g. maintenance staff)



Stock of filters at Bariloche generator farm



Highlights (II)



Ballistic cannon experiments to quantify building vulnerability to multiple volcanic hazards



Bare slab

- 4.3 kg rock
- 40 m/s (145 km/h)
- 3500 J impact

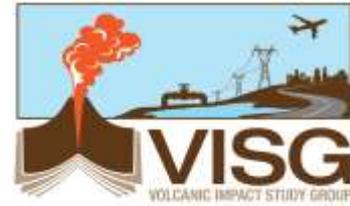


Bare slab underside

- 4.3 kg rock
- 40 m/s (145 km/h)
- 6300 J impact
- 9 m/s shrapnel

Published in Williams et al. (2017) JVGR

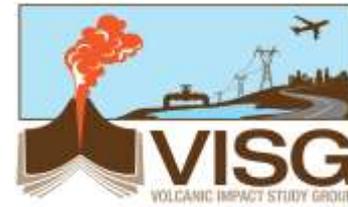
Highlights (III)



- **Josh Hayes (UC PhD):** Developing suite of hypothetical Auckland eruptions
- **Sophia Tsang (UofA PhD):** Investigating lava flow impacts
 - 2 month trip to Hawai'i to learn from 2014 Pahoia crises (see September 2017 VISG newsletter)
 - Recent trip to University of Syracuse for molten lava experiments to study consequences for buried infrastructure
- **Zoe Juniper (UC MS):** Consequences of Taranaki unrest / eruption on petroleum sector
- **New PhD students**



Highlights (IV)

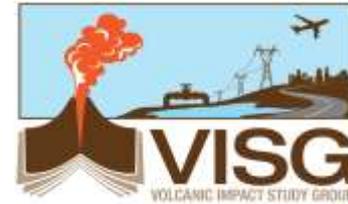


Select publications

- **Auckland Volcanic Field hypothetical eruption scenario**
 - Investigating the consequences of urban volcanism using a scenario approach I: Development and application of a hypothetical eruption in the Auckland Volcanic Field, New Zealand (Deligne et al. 2017)
 - Investigating the consequences of urban volcanism using a scenario approach II: Insights into transportation network damage and functionality (Blake et al. 2017a)
- **A model to assess tephra clean-up requirements in urban environments (Hayes et al. 2017)**
- **Fragility functions tying severity of volcanic hazard(s) to impact**
 - Framework for developing volcanic fragility and vulnerability functions for critical infrastructure (G Wilson et al. 2017)
 - Improving volcanic ash fragility functions through laboratory studies: example of surface transportation networks (Blake et al. 2017b)
- **Impact of volcanic ash on road and airfield surface skid resistance (Blake et al. 2017c)**
- **Buildings vs. ballistics: Quantifying the vulnerability of buildings to volcanic ballistic impacts using field studies and pneumatic cannon experiments (Williams et al. 2017)**

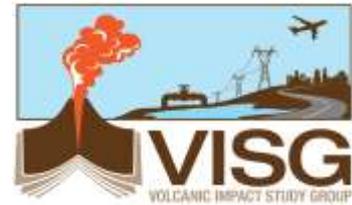


International engagement



- **Calbuco eruption (Chile) impact assessment trip**
 - 2 week investigation interviewing emergency responders, critical infrastructure managers, agriculture and health officials, community groups, and others
 - VISG researchers joined by colleagues from Chile, Argentina, USGS (USA), University of Cambridge (UK), and Bermuda
 - Report being finalised
- **MANY presentations at international conferences (in particular, 2 major volcanology conferences in Chile and USA), and also UK, USA, and Belgium**
- **Natalia Deligne (GNS) and Tom Wilson (UC) voted to join executive committee for IAVCEI Cities and Volcanoes Commission**

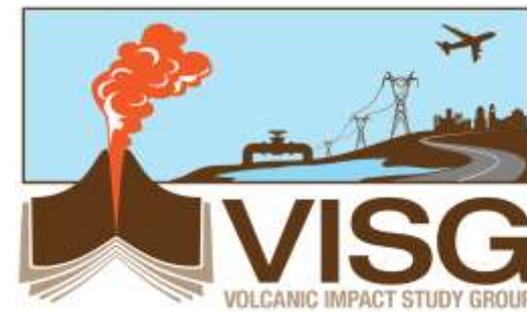




Upcoming for 2018

- **Updating / improving volcanic ash impact poster series**
 - Funded by ALG
- **Brand new purpose-built Volcanic Ash Testing laboratory at the University of Canterbury**
 - Exciting possibilities for future research
- **Working with international partners on data collected following 2015 Calbuco eruption**
- **Continuing & new PhD & Masters projects on volcanic impacts to buildings, agriculture, petroleum sector, Auckland; lava flow impacts; volcanic debris clean up; and more**
- **Cities on Volcanoes 10 conference, September 2018, Naples, Italy**

Final thoughts



- **A lot happening in VISG space**
 - Exciting time for NZ volcanic impacts research, despite the lack of recent mainland eruptions
- **World-class team – involved in numerous international projects**

Encourage you to:

- **Subscribe to our quarterly newsletter (only 4 emails a year!)**
- **Contact VISG with research questions / ideas**

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