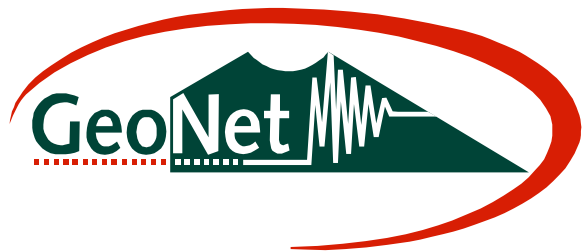


The New Zealand Volcano Problem Communications

5th NZ Aviation Meteorology Symposium

Brad Scott



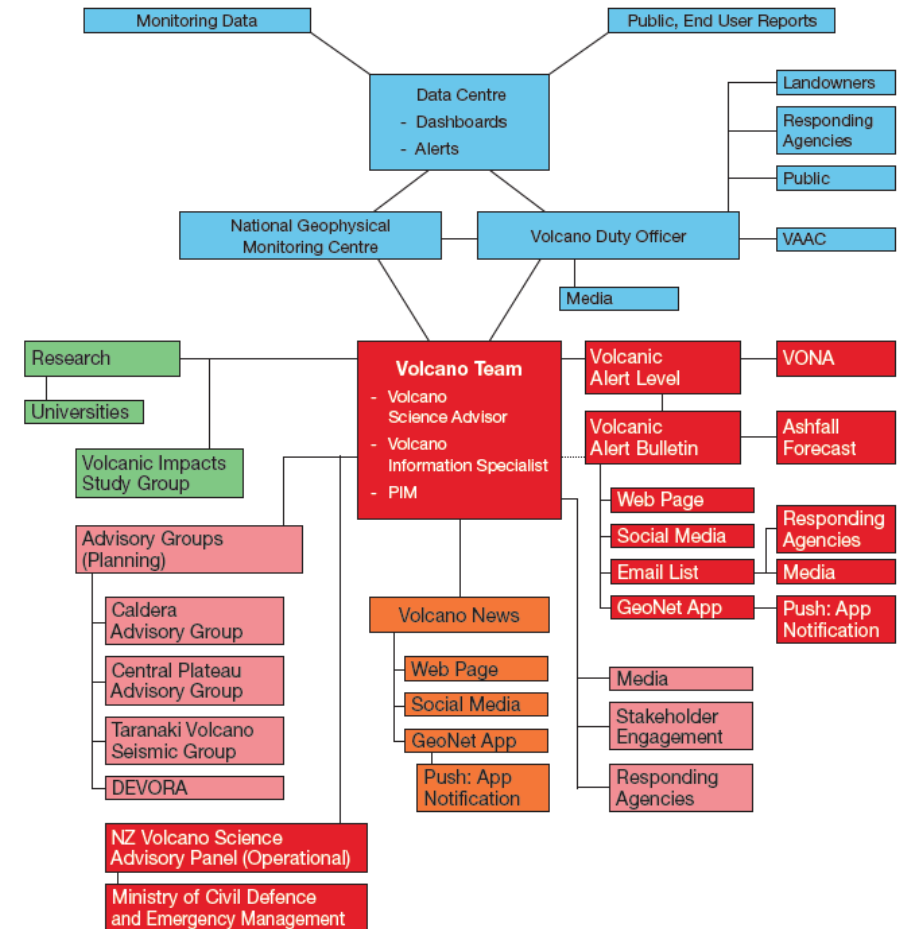
The ~~Volcano Problem~~ Challenge

Based on 40+ years experience

Developed a Communications Framework

- No sustained eruptions in 25 years
- 8 single event eruptions
 - Whakaari/White Island
 - Ruapehu
 - Te Maari
 - Raoul Island

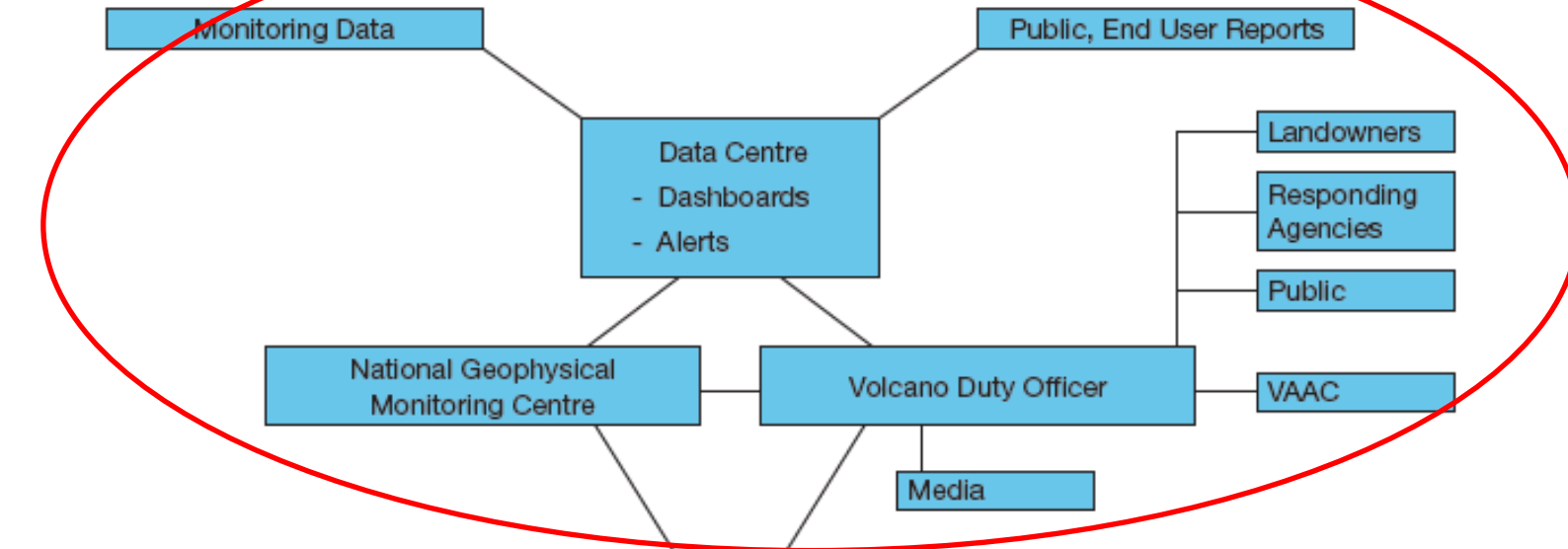
Volcano Communications: New Zealand '12 Active Volcanoes'



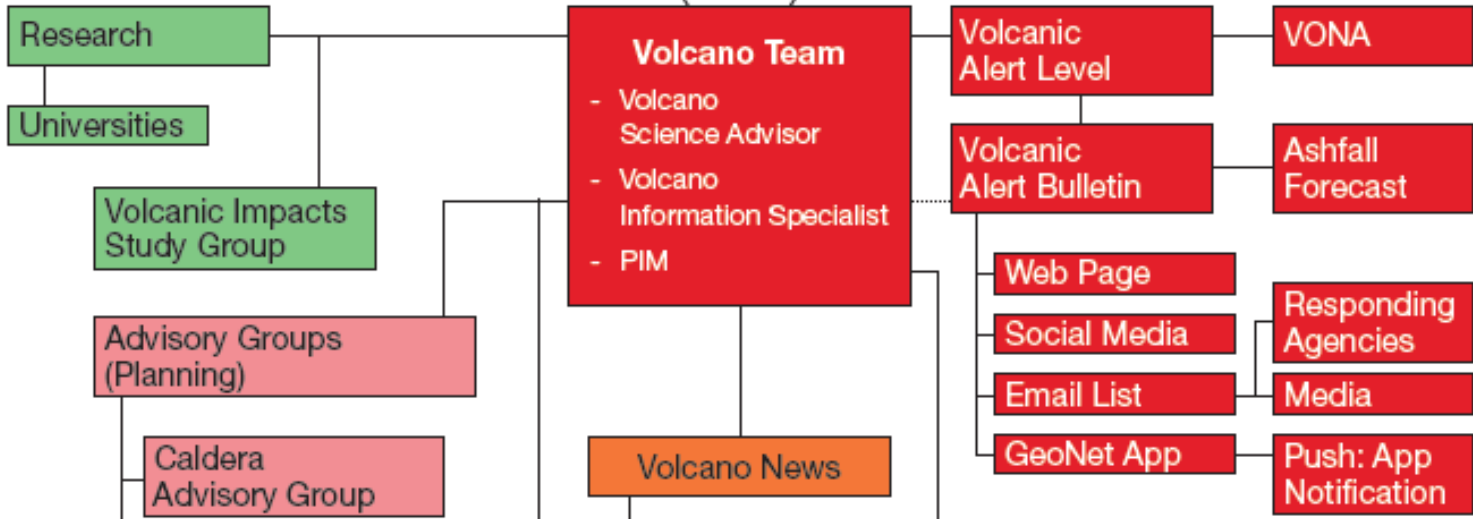
Contact: Brad Scott
Volcano Information Specialist
b.scott@gns.cri.nz
Nico Fournier
Volcanology Team Leader
n.fournier@gns.cri.nz

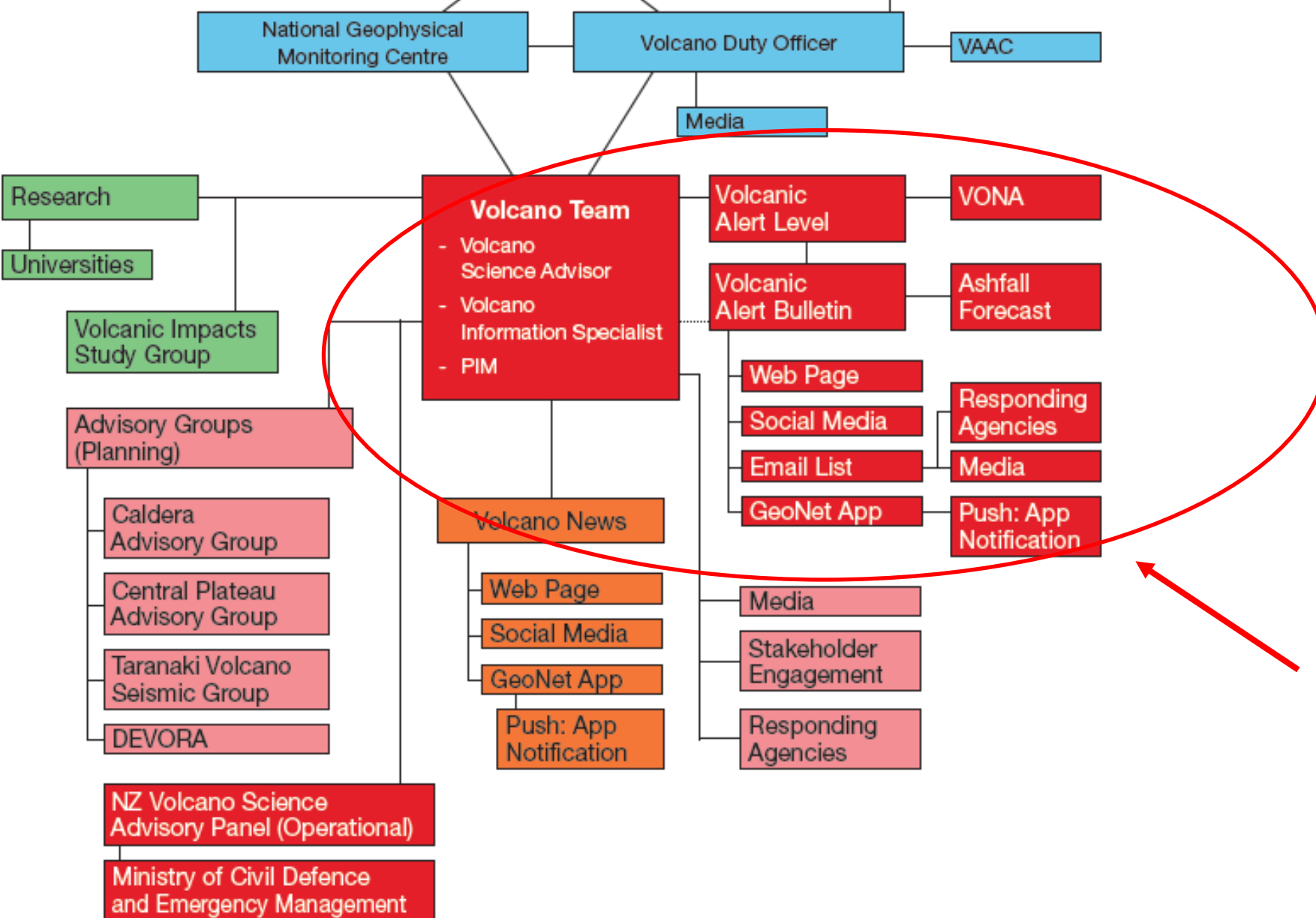
Volcano Communications: New Zealand

'12 Active Volcanoes'



← Data in





Information out ...

NZ Volcanic Alert Level System (VAL 2014)

- One system for all of NZ's volcanoes
- Based on currently occurring phenomena
- Indicative hazards
- Two levels of unrest
- Simple wording
- Included sources of further information

New Zealand Volcanic Alert Level System		
Volcanic Alert Level	Volcanic Activity	Most Likely Hazards
Eruption	5	Major volcanic eruption
	4	Moderate volcanic eruption
	3	Minor volcanic eruption
Unrest	2	Moderate to heightened volcanic unrest
	1	Minor volcanic unrest
	0	No volcanic unrest
<p>An eruption may occur at any level, and levels may not move in sequence as activity can change rapidly.</p> <p>Eruption hazards depend on the volcano and eruption style, and may include explosions, ballistics (flying rocks), pyroclastic density currents (fast moving hot ash clouds), lava flows, lava domes, landslides, ash, volcanic gases, lightning, lahars (mudflows), tsunamis, and/or earthquakes.</p> <p>Volcanic unrest hazards occur on and near the volcano, and may include steam eruptions, volcanic gases, earthquakes, landslides, uplift, subsidence, changes to hot springs, and/or lahars (mudflows).</p> <p>Volcanic environment hazards may include hydrothermal activity, earthquakes, landslides, volcanic gases, and/or lahars (mudflows).</p> <p>*Ash, lava flow, and lahar (mudflow) hazards may impact areas distant from the volcano.</p>		
<p>This system applies to all of New Zealand's volcanoes. The Volcanic Alert Level is set by GNS Science, based on the level of volcanic activity. For more information, see geonet.org.nz/volcano for alert levels and current volcanic activity, gns.cri.nz/volcano for volcanic hazards, and getthru.govt.nz for what to do before, during and after volcanic activity. Version 3.0, 2014.</p>		

Communication products

- An Alert Level system +
- Volcano Alert Bulletins
- VONA
- Ash fall predictions
- Hazard maps, information
- Media releases
- Web Pages
- Social Media

VOLCANIC ASH FAL

ADVICE FOR AIRPORT OPERATORS

ASH IMPACTS TO AIRPORTS

WARNING INFORMATION

RECOMMENDED ACTIONS

ADVICE FOR AIRPORT OPERATORS

Volcanic ash particles

WHAT TO DO IN AN ERUPTION

IF YOU ARE:

- IN A HUT/CAR PARK**
 - Stay put and await instructions from DOC staff or your transport operator.
- ON A TRACK IN THE HAZARD ZONE**
 - Move immediately away from the eruption towards the end of the track that can be accessed safely. This could be returning the way you came.
 - If you see flying rocks, or a steam & ash cloud coming towards you, take shelter behind something (a bank or ridge) & cover your head with your pack.

VOLCANIC HAZARDS

During an eruption, flying hot rocks & fast moving clouds of steam and hot ash may occur.

Lahars (volcanic mudflows) flow down valleys as a flash flood.

Anywhere on this map is at risk from ashfall - this can obscure vision and make it hard to breathe.

TONGARIRO HAZARD ZONE

HAZARDS Flying hot rocks, fast moving clouds of steam and hot ash.

IMPACTS Serious injury and can be fatal.

LAHAR HAZARD ZONE

HAZARDS Lahars/tracks mudflows.

IMPACTS Lahars can sweep you into the water and destroy cars and rivers.

WHAT TO DO The Lahar Hazard Zone is designated on this map. Move quickly through this area and do not stop.

There are 3 active vents on MT TONGARIRO: Te Maari, Red Crater, Ngauruhoe

ERUPTIONS can occur at any time with NO WARNING

Logos: UoA, Air New Zealand, Life Lines, Auckland Airport, CMA.

GUIDELINES ON PREPAREDNESS BEFORE, DURING AND AFTER AN ASH FALL

Logos: WJHNN, Cities and Volcanoes Commission, USGS, IAVCEI, GNS.

VOLCANIC HAZARDS ON MT TONGARIRO

There are 3 active vents on MT TONGARIRO: Te Maari, Red Crater, Ngauruhoe

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Logos: Department of Conservation, GNS Science.

Volcano Alert (Activity) Bulletins

- Issued on an as appropriate basis
- List current VAL and ACC
- Summarise volcano status, recent events
- Indicate if activity is Increasing-Decreasing-Steady
- Contain predictions (if issued)
- Highlight current, developing or expected problems
 - Acid rain
 - Remobilisation
- Distributed by email list (free subscription)
- Published to Web page
- Notified to Twitter, FaceBook,
- GeoNet App notification

GeoNet Geological hazard information for New Zealand EQC

Home Earthquake ^ Landslide ^ Tsunami ^ Volcano ^ Data ^ News Search

 Whakaari/White Island: Volcanic unrest continues, lower gas emission and steady active vent temperatures Published: Mon Oct 18 2021 2:00 PM

VOLCANIC ALERT BULLETIN WI – 2021/14
Mon Oct 18 2021 2:00 PM: Whakaari/White Island Volcano
Volcanic Alert Level remains at 2
Aviation Colour Code remains at **Yellow**

Recent gas and observation flights at Whakaari / White Island show lower gas emissions and low vent temperatures remain. The volcano still occasionally emits traces of volcanic ash and remains in a state of moderate to heightened unrest. The Volcanic Alert Level remains at Level 2.

Last week GNS scientists undertook a gas emission measurement flight and made visual observations and temperature measurements from a helicopter. The gas measurements showed emissions of Sulphur Dioxide (SO₂) have decreased to 267 tonnes per day from 520 tonnes per day at the end of September. The emissions in Carbon Dioxide (CO₂) and Hydrogen Sulfur (H₂S) also decreased to 757 and 10 tonnes per day, respectively. Temperatures measured in the active vent area were similar in value to those measured 2 weeks ago, with a maximum 220 °C recorded. The minor deposits from the intermittent volcanic ash emission described in previous bulletins were visible but were confined to the area close to the active vents.



Aerial view of the Main Crater at Whakaari/White Island showing the active vent and crater lakes. Taken Oct 2021

Weak ash emission was occurring during the observations made last week, and intermittent ash emission is still possible. Seismic activity remains similar to last week, with low levels of volcanic tremor and occasional low-frequency volcanic earthquakes. The current level of activity is consistent with moderate to heightened levels of unrest. As such the **Volcanic Alert Level remains at 2** and the **Aviation Colour Code remains at Yellow**. Equipment that provides real-time monitoring on the island is currently degraded and we are continuing to work on restoration options. The Volcanic Alert Level reflects the current level of volcanic unrest or activity and is not a forecast of future activity. While Volcanic Alert Level 2 is mostly associated with volcanic unrest hazards (including discharge of steam and hot volcanic gases, earthquakes, landslides, and hydrothermal activity), potential for eruption hazards also exists and eruptions can still occur with little or no warning. Further information about the volcanic alert levels and what they mean can be found [here](#). GNS Science and the National Geohazards Monitoring Centre continue to monitor Whakaari/White Island for further changes in unrest. Agnes Mazot Duty Volcanologist **Media Contact:** [021 574541](tel:021-574541) or media@gns.ori.nz

Volcano Alert Bulletins (VAB)

Volcanic Alert Bulletins

Volcano Alert Bulletins (VABs) are New Zealand's official source of volcano status information including the current Volcanic Alert Level (VAL). They are issued on an as needed basis summarising the volcano status and recent events. They can indicate if activity is increasing, decreasing, or in a steady state. They may contain forecasts, highlight developing, or expected problems.

If you'd like to be notified as soon as we issue a new bulletin, our [social media channels](#) and the [GeoNet app](#) will keep you up-to-date.

Volcano: All ▼

Search
Reset
More filters ▼

Whakaari/White Island: Volcanic unrest continues, lower gas emission and steady active vent temperatures 3 days ago

Recent gas and observation flights at Whakaari / White Island show lower gas emissions and low vent temperatures remain. The volcano still occasionally emits traces of volcanic ash and remains in a state of moderate to heightened unrest. The Volcanic Alert Level remains at Level 2.

3 days ago

Mt Ruapehu status update: Crater Lake (Te Wai ā-moe) now cooling 3 weeks ago

Another heating phase has passed at Mt Ruapehu. Over the last two months the temperature of Crater Lake (Te Wai ā-moe) rose from 20 °C to 39.5 °C, peaking on 4 September 2021, and has now cooled to 28 °C. The Volcanic Alert Level at Mt Ruapehu remains at Level 1.

3 weeks ago

Whakaari/White Island: Notable cooling of vent area 3 weeks ago

A recent observation flight measured a sharp decline in vent temperatures; however, gas emissions stay high. The volcano is still in a state of moderate to heightened unrest and the Volcanic Alert Level remains at Level 2.

3 weeks ago

Whakaari/White Island: Intermittent weak ash emissions continue Last month

Intermittent ash emissions continued last week, and further occasional emissions are expected to occur in the coming weeks. Small amounts of ash were carried by the vigorous degassing a few hundred metres into the atmosphere near the volcano, and further activity of this type is unlikely to affect the mainland. The volcano remains in a state of moderate to heightened unrest and the Volcanic Alert Level remains at Level 2.

Last month

Whakaari/White Island: Ash emissions reduced, night glow continues Last month

While intermittent ash emissions have reduced since last week, the volcano remains in a moderate to heightened state of unrest. The Volcanic Alert Level remains at Level 2.

Last month

Persistent low-level ash emission from Whakaari/White Island. Volcanic Alert Level remains at 2. Last month

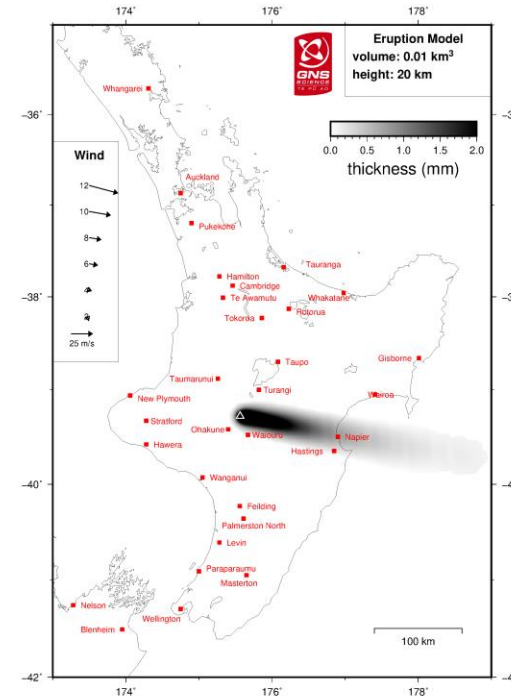
Minor-weak ash emission has been occurring at Whakaari/White Island since early this morning. The Volcanic Alert Level remains at 2.

Last month

Ashfall Predictions

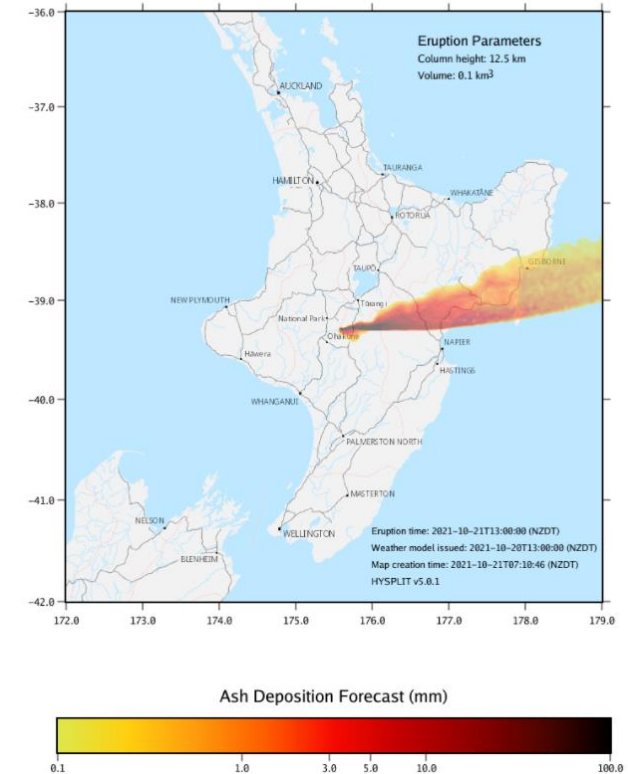
(what falls on the ground)

PREDICTED ASHFALL AREA
For a Ruapehu eruption at 0600 Thursday 21 October 2021



Current tool

Ruapehu – 24 h Ash deposition forecast



Tool in development

ACC and VONA

- The GeoNet Volcano Monitoring Group set the ACC (Aviation Colour Code) for ICAO for New Zealand's active volcanoes
- Changes in the ACC and the level of volcanic activity (Alert level changes and/or ash emissions) are notified by VONA (Volcano Observatory Notices For Aviation)

ICAO COLOUR CODE	STATUS OF ACTIVITY OF VOLCANO
GREEN	Volcano is in normal, non-eruptive state. <i>or, after a change from a higher level: Volcanic activity considered to have ceased, and volcano reverted to its normal, non-eruptive state.</i>
YELLOW	Volcano is experiencing signs of elevated unrest above known background levels. <i>or, after a change from higher alert level : Volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.</i>
ORANGE	Volcano is exhibiting heightened unrest with increased likelihood of eruption. <i>or, Volcanic eruption is underway with no or minor ash emission. [specify ash-plume height if possible].</i>
RED	Eruption is forecasted to be imminent with significant emission of ash into the atmosphere likely. <i>or, Eruption is underway with significant emission of ash into the atmosphere. [specify ash-plume height if possible].</i>

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- Notified to Twitter, FaceBook,
- GeoNet App notification

Subscribe to get these
info@geonet.org.nz

Ask to be added to email list


We prefer generic emails for the Organisation;
operations@airline name.com/org
safety@airline name
airport@airport name



App Store

Global Volcanic Ash Impacts web page;

https://volcanoes.usgs.gov/volcanic_ash/



Volcanic Ashfall Impacts Working Group

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Volcanic Ash Impacts & Mitigation Choose Topic ▾

For Scientists About Us References Resources What can I do? Multimedia

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Volcanic Ash Impacts & Mitigation




Volcanic-ash hazards are far reaching and disruptive, affecting more people, infrastructure, and daily activities than any other eruptive phenomena.

This web encyclopedia provides information on the impacts of volcanic ash and mitigation strategies for dealing with them. Content is summarized from expert and peer-reviewed sources.

- Use '**Choose Topic**' in the header or the left menu to find information categorized by affected sector.
- Posters and booklets in a range of languages are available in **Resources**.
- Technical guidance for scientists undertaking ash studies is presented in the **For Scientists** section.
- Do you have technical information or images you'd like to contribute to this Web site? New case studies and well documented experiences are valuable, and we welcome your contributions. Please **Contact Us** if you have information to add or questions.

DO YOU NEED URGENT INFORMATION?

If a volcanic eruption is forecast or ash has fallen in your area, follow the advice of your local Civil Defense or Emergency Management officials.



Volcanic Ash & Gases
Buildings
Transportation
Power Supply
Health
Agriculture—Plants & Animals
Clean up & Disposal
Water & Wastewater
Equipment & Communications
Case Studies
What can I do?

Aviation

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Volcanic Ash Impacts & Mitigation
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Select Language ▾
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Aviation

Effects on Aircraft
Signs of an Encounter
Actions for Flight Crew
Global Mitigation
Eyjafjallajökull Impact
Airports
Resources & References

This section provides a brief overview of impacts to airports and should be read in conjunction with detailed cleanup advice found in ICAO Document 9691 Appendix A and in the Airport Clean-Up section of this website.

The effects of volcanic activity on airports include disruption of operations, damage to aircraft, and damage to facilities. The most common effect is temporary operational disruption, ranging from flight cancellations to airport closures for periods of hours to weeks.

A 2009 report, *Volcanic Hazards to Airports*, and a detailed incident database document that through 2006, 101 airports in 28 countries were affected by eruptions at 46 volcanoes. About half of the affected airports are located within 150 km (93 mi) of the source volcanoes, and about three-quarters are within 300 km (186 mi).

The main hazard to airports is ashfall. Accumulation on runways of only a few millimeters of ash is sufficient to force temporary closure of an airport, although landings and takeoffs also can be disrupted by the presence of ash in airspace in the vicinity of airports, without ground accumulation.

Read the Airport Clean-Up section of this website for more information.

Ecuador's Geophysical Institute Aerial View of the Quito International Airport During an Eruption of Reventador Volcano. Quito's international airport was covered with 3-5 mm of ash from the 3 November 2002 eruption of Reventador Volcano, located ~60 miles to the east of the Ecuadorian capital. The airport was closed for 8 days while clean up took place.

- Volcanic Ash & Gases
- Buildings
- Transportation
- Aviation
- Roads & Highways
- Vehicles
- Railways
- Marine Transportation
- Case Studies
- Power Supply
- Health
- Agriculture—Plants & Animals
- Clean up & Disposal
- Water & Wastewater
- Equipment & Communications

Volcanic ash is:
-2mm (0.1 in) diameter, hard, abrasive and corrosive, and conductive if wet

VOLCANIC ASHFALL

ADVICE FOR: AIRPORT OPERATORS

ASH IMPACTS ON AIRPORTS

Volcanic ash accumulations of less than 1mm (0.04 in) may be sufficient to temporarily affect airport operations.

Impacts include:

- Structural loading on hangars is considerably worsened if ash becomes wet, increasing the likelihood of damage and collapse.
- Covering of airfields and grounded aircraft, which can lead to various impacts including loss of runway visibility, abrasion and impaired landing conditions.
- Contamination of electrical systems, including ground-support equipment and machinery.
- Loss of local visibility and complications to the reporting of meteorological conditions.
- Difficult landing conditions due to reduced runway friction, whether ash is wet or dry.
- Damage to aircraft and grounded flights from ingestion of ash into jet engines during taxiing, takeoff and landing.
- An ashfall may affect road transport, which may in turn affect staff access to airports.

Cleaning up airports after an ashfall is time-consuming, repetitive, costly and resource intensive. The complexity and immensity of this task should not be underestimated.

RECOMMENDED ACTIONS

WHERE TO FIND HAZARD & WARNING INFORMATION

ASH CLOUD FORECAST (airborne ash):

- Volcanic Ash Advisory Centers (VAAC) will issue Volcanic Ash Advisories (VAAs) and Volcanic Ash Graphics (VAGs) on airborne ash affecting aviation. See: <https://gis.icao.int/kaavaaa/>

AVIATION COLOR CODES (airborne ash):

- International aviation color codes are recommended by the International Civil Aviation Organisation. See: <https://www.bo.iner.it/aviation-colour-codes.html>

ASHFALL FORECAST (ash falling to ground):

- Refer to the website of your local volcano observatory, national weather service and/or disaster management agency for warnings of ashfall.

HOW TO RESPOND

If physical damage to aircraft occurs, the airline, local civil aviation authority or aircraft manufacturer should be contacted for advice.

Clean-up must be planned carefully. Property owners and contractors may have legal duties under local health and safety regulations. These may include:

- Ensuring a safe working environment.
- Ensuring that workers have adequate personal protective equipment (long-sleeved clothing, heavy footwear, fitted goggles and a properly-fitted P2, N95 or FFP2 dust mask). Masks should be changed when clogged.

If industry-certified masks are not available, other masks may provide partial protection. For more information: www.jhnhn.org/index.php/ash-protect

WHERE TO FIND HAZARD & WARNING INFORMATION

- Operational plans should be developed well in advance for infrastructure at risk from volcanic ashfall.
- Coordinate plans with emergency management groups, scientists and infrastructure providers.
- For advice on protecting building facilities from ashfall, see companion Buildings poster. These plans should, where possible, be integrated with aviation and airline plans. <https://www.icao.int/Pages/default.aspx>

The ICAO resource provides guidance on:

- Standing arrangements prior to volcanic eruptions.
- Responses during an eruption.
- Post-eruption cleanup and re-opening of the airport.

ASH IMPACTS ON AIRCRAFT IN FLIGHT

Volcanic ash in airspace in the vicinity of airports may also cause disruptions to airports even if it does not accumulate on the ground.

Volcanic ash is hazardous to aircraft in flight and can cause:

- Accumulation of melted ash in the engines, potentially leading to engine failure.
- Abrasion and corrosion to engine components, windows and exterior surfaces.
- Clogging of inlets and pilot-static systems.

Ash cleanup at Mariscal Sucre Airport, Quito, Ecuador.

It took 500 people at least 7 days to clear ash from the airfield using brooms when 4 mm (0.2 in) ash accumulated following the 2002 eruption of Reventador volcano. Photo by Mariscal Sucre Airport, Ecuador.

Ash covering San Carlos de Bariloche International Airport, Argentina.

The airport was closed for 1 month when 25 mm (1 in) of ash accumulated on the airfield following the 2011 eruption of Cordón Caulle volcano in Chile. Extra volumes of antifreeze were required to remove ice contaminated with ash. 1000 tons of ash were removed and distributed in the immediate area. The ash was stabilized using irrigation systems to encourage grass growth. Photo by Bariloche International Airport, Argentina.

FURTHER RESOURCES

https://volcanoes.usgs.gov/volcanic_ash/aviation.html

www.jhnhn.org (volcanic health hazards information)

Content by Carol Stewart, Tom Wilson and Daniel Blake.
Layout by Lisa M. Faust. Version 1 of International Volcanic Ash Impacts Poster, November 2020.

<https://www.gns.cri.nz/Home/Learning/Science-Topics/Volcanoes/Global-Ash-Impact-Posters>



 National Geohazards Monitoring Centre
Te Puna Mōrearea i te Rū



www.geonet.org.nz

