



FLYING AROUND VOLCANOES

The enormous ash clouds generated by the violent eruption in January of the volcano Hunga Tonga-Hunga Ha'apai shows what a risk to aviation such events are.

Located astride the crash zone of the Australian and Pacific plates, New Zealand has some of the world's most dramatic landscapes – formed by violent earthquakes and powerful volcanic eruptions.

Volcanic eruptions in New Zealand may seem rare, but on geological timescales, New Zealand is one of the more active volcanic regions in the world.

Over the last few million years, New Zealand's volcanic activity has been largely confined to the Taupō Volcanic Zone (TVZ), which extends northeast from Ruapehu to Whakaari/White Island.

There are two styles of volcanic activity in the TVZ. The first includes relatively frequent explosive eruptions from cone volcanoes, such as Whakaari/White Island, Ngauruhoe, Te Maari and Ruapehu. The other eruptions come from the caldera volcanoes in the Rotorua-Taupō area (Ahi Tupua) but these are much less frequent; every one to two thousand years.

In the last 50 years there has been an average of one eruptive episode each year from the cone volcanoes in the TVZ. These explosive eruptions have produced a wide variety of volcanic ash plumes, ranging from weak ash plumes rising a few tens of feet above the volcano to those reaching around 20,000 feet. The larger ash plumes have all been capable of causing significant disruption to aviation. »

/// Hunga Tonga-Hunga Ha'apai volcanic activity, 2015.



» Getting the latest information

When a significant change in volcanic activity is identified, a change in volcanic alert level (VAL) is communicated through a Volcanic Activity Bulletin (VAB) at geonet.org.nz. The VAB will also advise of the current aviation colour code – the ICAO universal volcano activity description system for aviation.

A VAB may also be issued to update on current activity, even if there's no change to the VAL or aviation colour code.

“The VABs are the most up-to-date summaries of activity at our volcanoes,” says GNS Science volcanologist Brad Scott. “The VAB are found on the GeoNet website, geonet.org.nz.”

Pilots can also receive a notification on their phones when a new VAB is issued if they download the GeoNet app and ensure the volcano notifications are turned on.

A volcanic eruption can occur with little to no useful warning, recently evidenced by the 2019 tragedy at Whakaari/White Island, and the violent eruption of Tongan volcano Hunga Tonga-Hunga Ha'apai in January.

Even without an eruption, it can be dangerous flying around or near volcanoes.

“Even when quiet,” says Brad, “some of our active volcanoes give off a lot of gas and water vapour, and this can seed local meteorological clouds.”

“The odour from volcanic gases can also enter a cockpit possibly causing pilots and their passengers to become nauseous. And those gases can also potentially

trigger a response in people with a predisposition for respiratory issues.”

The effect on airspace

Changes in volcanic activity also affect how the airspace is managed in New Zealand.

“Volcanic Hazard Zones (VHZ) are designated airspace around New Zealand's more active volcanoes,” says CAA Aeronautical Services Technical Specialist Hamish McKoy.

“Published on the visual navigation charts, these provide protection to aircraft from sudden debris and ash hazards that may happen without warning.

“The CAA may also designate a temporary VHZ if another New Zealand volcano was to suddenly become active.”

When the VAL moves through level 2 or higher for a particular volcano, the Christchurch NOTAM office will publish a NOTAM including a change in the size of the VHZ. The NOTAM will also refer the reader to the latest VAB issued by GNS Science for that volcano.

Finally, if volcanic ash is detected in the atmosphere, MetService will issue volcanic ash SIGMETs and volcanic ash advisories. These alert operators to the observed and forecast areas of airborne volcanic ash. Further, GNS Science will provide ashfall maps via the GeoNet site, indicating which areas may experience ash deposits – important for airport operations, highlighting possible ashfall clean up that may be required.

// Mount Ruapehu volcanic eruption, and Mount Ngauruhoe, at sunrise, 19 June 1996.



Pilot obligations in volcanic hazard zones

It's important that pilots understand their obligations when entering a volcanic hazard zone, as outlined in rule 91.137. These obligations include entering only during the day and in VMC conditions, and only after the pilot – having reviewed the relevant published information – is satisfied the flight will not be affected by volcanic hazards.

Volcanic Air's Tim Barrow has operated sightseeing flights for many years, taking in the sights of the North Island's volcanic landscapes.

“My advice is pretty simple really: check the VAL and aviation colour codes for the area you're working in.

“And if the pilot identifies any steam or ash in the atmosphere, they should stay well upwind of the plume.”

CAA Safety Investigator Jason Frost-Evans emphasises the importance of risk management processes.

“For private flying, pilots should consider volcanic hazards as part of their threat and error management. Check the NOTAMs and use official aviation weather products as well as any others you find useful.

“For most commercial flying, operators must take a more formal approach which includes suspending or restricting operations when a hazardous situation develops.

“The Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 require that risks associated with remote or isolated work, and substances hazardous to health must be managed using the hierarchy of controls – eliminate the risk, substitute the risk, engineering controls, administrative controls,

and finally, if some risk remains, personal protective equipment.”

For more information

The CAA's safety education team has recently published a new Good Aviation Practice (GAP) booklet, *Flying around volcanoes*. This booklet is intended to help pilots understand some of the hazards they may encounter when flying in New Zealand's volcanic regions. Download a digital copy from the CAA website, or email publications@caa.govt.nz for a printed copy.

For more information on New Zealand's Volcanic Ash Advisory System, or any other questions or comments, email paula.acethorp@caa.govt.nz. 

// GNS SCIENCE

GNS Science is the designated ICAO State volcano observatory in New Zealand. It monitors New Zealand's active volcanoes, through the GeoNet programme.

GNS Science uses a range of monitoring equipment to better understand what's going on at each of New Zealand's active volcanoes. This data is converted into useful information for the public, as GNS Science volcanologist Brad Scott explains, "The information GNS provides ranges from activity update bulletins to learning material on volcanic hazards, monitoring, eruptions and volcano types. Monitoring data collected by GNS is also available online for the public to view".

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