

THE NZ
SERIES



VOLCANOES AND EARTHQUAKES

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A LAND OF VOLCANOES

Volcanoes have shaped the surface of New Zealand. They form some of the more spectacular mountains and lakes. The material ejected from inside the earth has coloured the cliffs and built the surface of whole regions of the country.

There are volcanoes, more than 50 of them, scattered through the country's largest city, Auckland, and the drowned landscapes of old volcanoes form the sheltering harbours of Otago and Lyttelton. New Zealanders are so used to seeing volcanoes that they disregard the danger of living in what other people often call the 'shaky islands'. For the fact is that even though New Zealanders choose to regard their mountains as solid, and their volcanoes as extinct, this is far from the case. A visit to any of the resort towns that line the thermal zone is a reminder that the surface of the earth here is particularly fragile, and that great pressures underground are continually trying to escape.

Volcanic activity has not only built mountains, it has destroyed them. Lakes such as Rotorua lie in the collapsed craters of ancient volcanoes. Our largest lake, Taupo, is born of vast explosions: a huge eruption 20,000 years ago may have accounted for much of its present shape. Again, less than 2000 years ago, Taupo scattered ash for thousands of square kilometres, to cover much of the land toward Rotorua and Waikato.

There is the brooding evidence of Tarawera, and the village it buried in 1886, as a reminder that what appears as solid ground can wreak havoc in just one night of disaster. A skiing holiday at



Ruapehu may be interrupted with warning sirens when the crater lake begins to bubble. Every few years Ruapehu and its companion mountains erupt with frightening force.

There are smaller signs, too. All through the Rotorua and Taupo districts, steam and boiling mud break through the earth. Tourists come from all around the world to see geysers, boiling mud pools, hot lakes and fumaroles; yet local people have learned to live with these phenomena. On the Rotorua golf course, boiling mud-pools serve as natural hazards. Local people have tapped the geothermal steam to warm their homes. For centuries Maori have used hot pools as a place to steam cook food.

While the Volcanic Plateau and the region of the Hot Lakes are most famous for their volcanic activity, little pockets of underground heat create active thermal features in many corners of the country. Not all are volcanic,

Frying Pan Lake at Waimangu is the world's largest hot pool, maintaining a temperature of around 50–60°C. The lake was created by the Tarawera eruption in 1886.

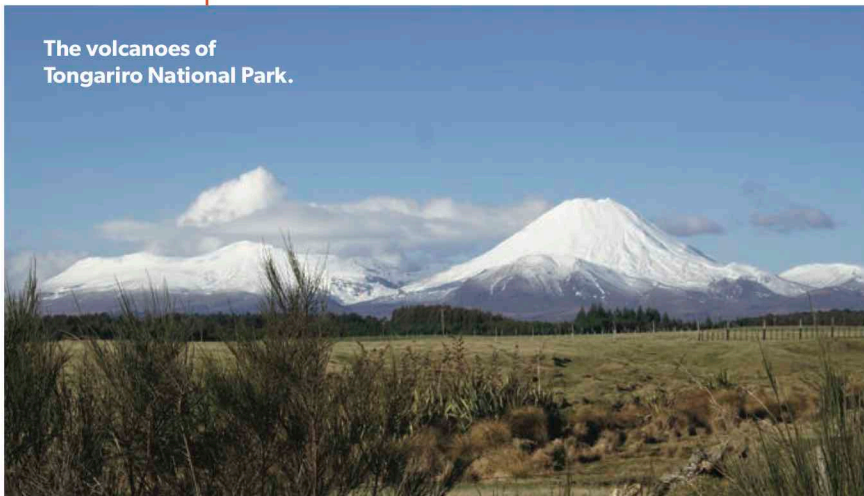
for hot springs can begin wherever surface water trickles into the warmer depths of the earth.

In the far north, there is a complex of geothermal mud pools near Kaikohe. About Auckland there are hot-pool resorts at Miranda and Helensville. There are more, too, along the line of the Kaimai Ranges. In the South Island, fissures in the earth about the main ranges create hot springs on the Lewis Pass, at Hanmer Springs and in the Copland River valley, south of Fox Glacier.

Fact file

- + Volcanoes arise from chambers of molten rock which can occur along a moving fault.

The volcanoes of
Tongariro National Park.



- + New Zealand's active volcanoes include Whakaari/White Island in the Bay of Plenty and the volcanoes of the Tongariro National Park.
- + Other volcanoes are regarded as dormant, or sleeping, but are likely to erupt again. These include Taranaki and those on the Auckland isthmus.
- + Extinct volcanoes no longer have an active reservoir of molten magma beneath them. They include Otago and Banks peninsulas, and the volcanic hills of North Otago.

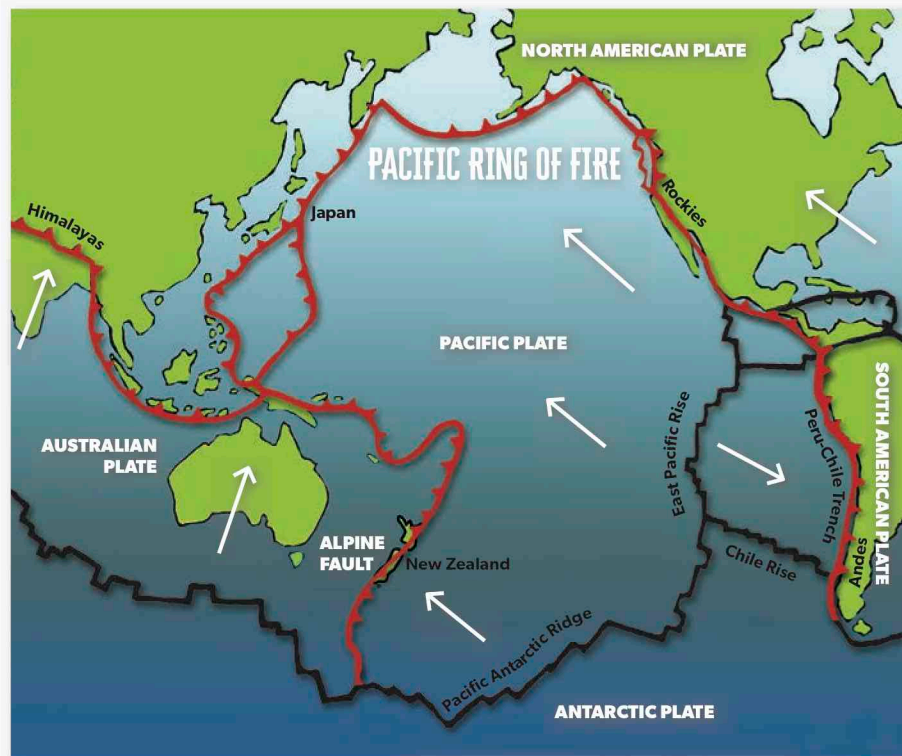
THE RING OF FIRE

The reason that New Zealand is so rich in volcanic activity is because of its place along a weakness in the earth's crust. An earth scientist's globe will show the surface of the world divided into vast and moving plates. The lines that divide these surface crusts of earth are weak points where molten magma can easily burst through.

A line of weakness where plates meet surrounds the Pacific Ocean, where the continental blocks press against the plate which holds the sea. Because of its volcanic nature, this boundary is sometimes called the Pacific Ring of Fire. It runs around the rim of the Pacific, down the western coast of North and South America and on the eastern side through Japan, Indonesia, the Philippines and through the Pacific. The islands that make up New Zealand also sit on one edge of that boundary, where the Pacific Plate meets the Australian Plate.

Such places, where the plates of the earth buffet against each other, are continually moving. That brings earthquakes and great temperatures, as rock mass grinds against rock mass. The escaping heat brings molten rock and superheated steam to the surface as volcanic activity. The majority of the world's volcanic and earthquake activity happens on the Ring of Fire.

The crust of the earth is quite thin; around 8 kilometres beneath the oceans and 30 to 60 kilometres beneath the continents. If it were possible to drill straight down, the temperature would rise about 30°C every kilometre.



The outline of the Pacific Ring of Fire.

Where two pieces of the earth's crust are thrusting against each other, the temperature rises even more rapidly. There, the force of friction melts the rock, which then may run to the surface through a weak spot to form a volcano. Water trickling underground may also meet the hotter rocks and become superheated under pressure or simply turned to steam. Then it too rises to the surface, perhaps to form a geyser or hot lake. Sometimes it liquifies the surface earth and turns the ground into boiling mud.

The fascinating variety of volcanic activity happens because each part of the earth is different. Sometimes huge pressures of underground gas build up and volcanoes erupt explosively. In other places they simply ease themselves out

through the earth in a gentle lava flow. The season and the amount of surface water will affect the force and direction of steam vents and mud pools. The blocking of a volcanic vent may stop activity. It may, however, lead to a new eruption nearby, or a further explosion to relieve the pressure.

Fact file

- + The temperature underground may rise 30°C with every kilometre of depth.
- + Where two crusts of the earth are thrusting against each other, the temperature rises even more rapidly.



Molten rock lies as little as 8 kilometres under the seabed.

Pixabay

- + The molten rock inside the earth normally lies some 30 kilometres underground (and as little as 8 kilometres under the seabed).
- + Volcanoes usually occur along the line of weakness where two earth plates meet.
- + New Zealand's active volcanoes occur along a fault line which extends from Tongariro to the Bay of Plenty in a band 20–24 kilometres wide.
- + The line of volcanic activity continues north under the Pacific Ocean, with several submarine volcanoes.