

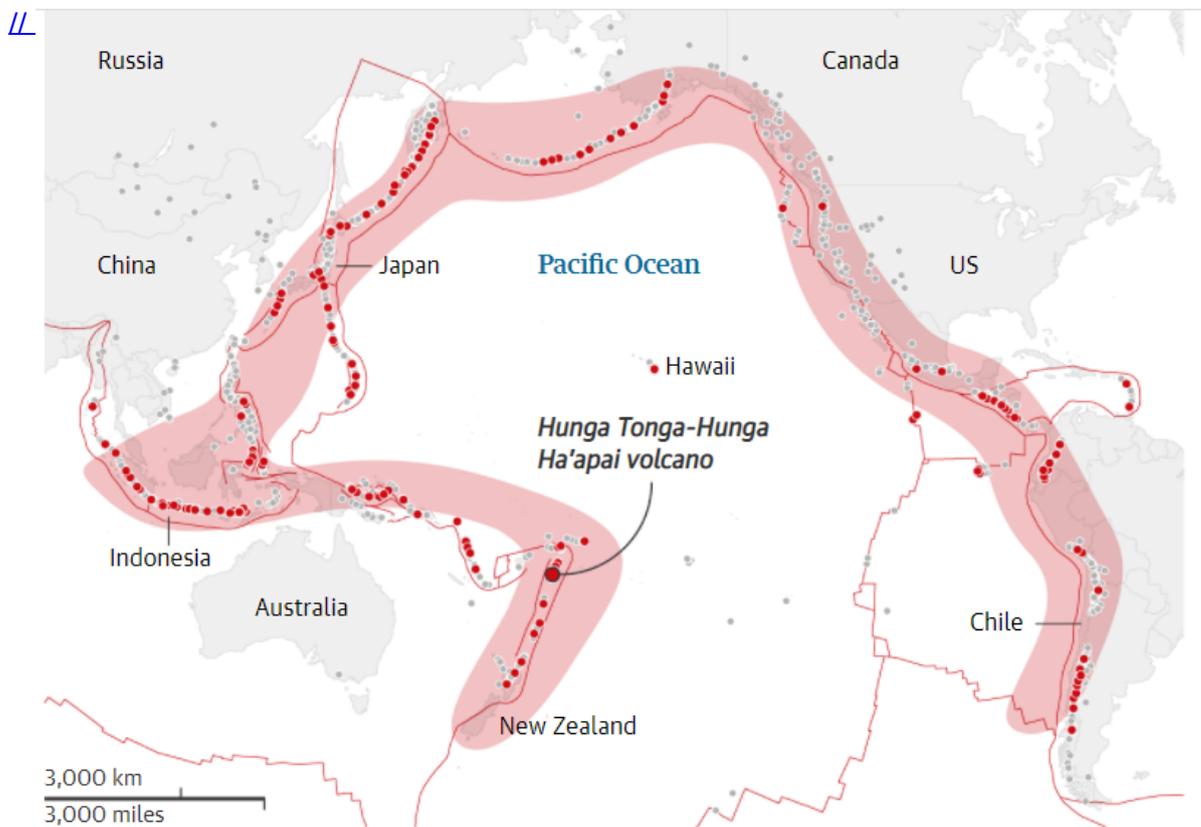


Volcanic Eruption in Tonga

Why in News

Recently, a volcano erupted in the southern Pacific Island of Tonga, which triggered [Tsunami waves](#) around the [Pacific](#).

- The Tonga Islands occur along the [Ring of Fire](#)—a perimeter of heightened volcanic and seismic activity that encircles the Pacific Ocean basin.



Key Points

▪ About:

- It is an [Undersea Volcanic Eruption](#) consisting of two small uninhabited islands, **Hunga-Ha'apai and Hunga-Tonga.**
- The Hunga-Tonga-Hunga-Ha'apai volcano has **erupted regularly over the past few decades.**
- During events in 2009 and 2014/15, hot jets of magma and steam exploded through the waves. But **these eruptions were small, dwarfed in scale by the**

January 2022 events.

- This is one of the massive explosions the volcano is capable of producing **roughly every thousand years**.
- One of the reasons for it being highly explosive is the **Fuel-Coolant interaction**.

▪ **Impact:**

- Huge volcanic eruptions **can sometimes cause temporary global cooling as sulfur dioxide is pumped into the stratosphere**. But in the case of the Tonga eruption, initial satellite measurements indicated the amount of sulfur dioxide released would only have a tiny effect of perhaps 0.01 Celsius global average cooling.
- The eruption altered **atmospheric pressure that may have briefly helped clear out the fog** in Seattle, in the United States.
- The waves crossed the Pacific, drowning two people in Peru and causing minor damage from New Zealand to Santa Cruz, California.
- The US Geological Survey estimated the **eruption caused the equivalent of a magnitude 5.8 earthquake**.

Volcano

- A volcano is **an opening or rupture in the earth's surface that allows magma** - which comes out as hot liquid and semi-liquid rock - volcanic ash and gases to escape.
- The volcanic hotspots are places which are found where Earth's tectonic plates come together.
- A **volcanic eruption is when lava and gas are released from a volcano** - sometimes explosively.

Undersea Volcano

- The undersea volcanic eruption happens in a **volcano which is located under the ocean surface**. There are an estimated one million undersea volcanoes, and most of them are located near the tectonic plates.
- Apart from lava, these openings also spew out ash. These deposit on the ocean's floor and lead to the **formation of sea mounds - underwater mountains that are formed on the ocean floor** but do not reach the water surface.

Fuel-Coolant Interaction

- If magma rises into sea water slowly, even at temperatures of about 1200 degrees Celsius, **a thin film of steam forms between the magma and water**. This provides a layer of insulation to allow the outer surface of the magma to cool. But this process doesn't work **when magma is blasted out of the ground full of volcanic gas**.
- When magma enters the water rapidly, **any steam layers are quickly disrupted, bringing hot magma in direct contact with cold water**.
- It is akin **to weapons-grade chemical explosions**.
- Extremely violent blasts tear the magma apart.
- A chain reaction begins, with new magma fragments exposing fresh hot interior surfaces to water, and the explosions repeat, **ultimately jetting out volcanic particles and causing blasts with supersonic speeds**.

[Source: IE](#)

