Located in the Waitemata Harbour, Rangitoto Island is an iconic part of Auckland’s landscape. Rangitoto is the youngest and largest volcano in the Auckland Volcanic Field (AVF). It is also the only AVF volcano known to have erupted more than once and to have erupted two different types of lavas. All of this together makes Rangitoto a bit of a mystery to scientists. Within the AVF, it is definitely the ‘odd one out’.

**Two kinds of magma**

Rangitoto has erupted at least twice, once about 600 years ago and once around 550 years ago. When it erupted ~600 years ago, it ejected a type of magma called alkali basalt. This is the same type of magma erupted from all of the other volcanoes in the AVF. Scientists think it formed by melting mantle rock around 80 kilometres deep in the Earth. When Rangitoto erupted 550 years ago, however, it erupted subalkaline basalt, which is a magma that contains less sodium. Scientists think this magma formed shallower, just ~65 km beneath the surface. The rise of the earlier, deeper magma may have triggered the later, shallower melting.

**Footprints in the ash**

There were people around during the last Rangitoto eruption! Footprints of an adult, a child, and a dog were found in a layer of Rangitoto ash on Motutapu Island. These footprints were made by members of the Tainui tribe, who named the island ‘Te Rangi-totongia-ai-te-ihu-o-Tamatekapua’ (the day that Tamatekapua had a bloody nose) after a Māori chief who was injured there.

**Older lava flows?**

In 2014, scientists drilled 150 m into Rangitoto’s upper flank. They drilled through layer after layer of lava until they hit the pre-eruption sediments. The lowermost lava flow was separated from the overlying stack of lava by a layer of mud. Scientists originally thought that this lava flow was thousands of years older than the rest, but recent studies have shown it to be close in age to the overlying lava flows.

**Building a Volcano**

600 YEARS AGO • Molten rock erupted into the harbour and hit cold sea water, causing an explosive eruption. Known as phreatomagmatic activity, this water-magma interaction created an explosion crater surrounded by ash deposits, which scientists call a tuff ring. Over time, the tuff ring walls got so high that they blocked the water from reaching the vent. Lava then began to erupt and cool inside the tuff ring, eventually building up a pile of volcanic rock called a scoria cone.

550 YEARS AGO • A new batch of lava erupted through the old deposits, forming a new vent. As the volcano continued to erupt, lava flowed away from the vent and cooled. Eventually these flows built up, covering the old tuff ring and creating the current topography of the island, including the central summit cone and crater.