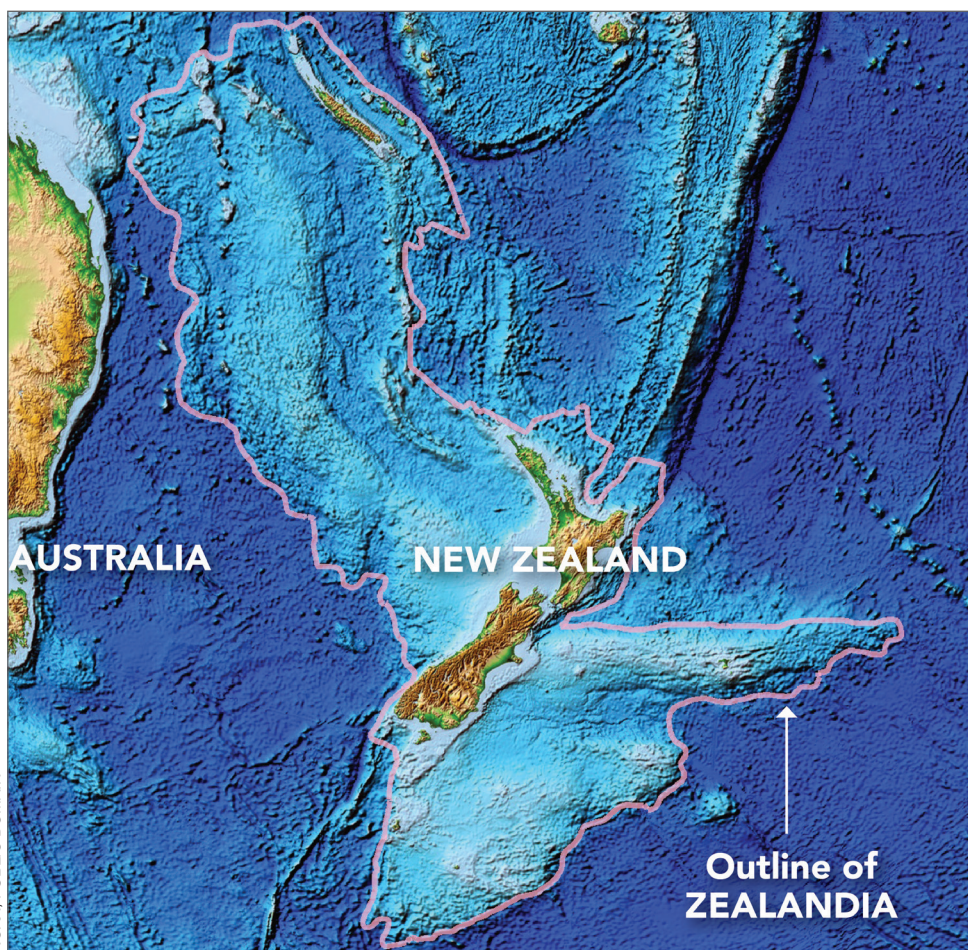


Discovering lost continents

Geoscientists are discovering new continents, such as Zealandia.



NOAA, PUBLIC DOMAIN

Zealandia, the world's eighth continent that extends underwater from New Zealand.

For most people, continents are Earth's seven main large landmasses. But **geoscientists** have a different take on this. They look at the type of rock a feature is made of, rather than how much of its surface is above sea level.

In the past few years, we've seen an increase in the discovery of lost continents. Most of these have been **plateaus** or mountains made of continental crust hidden from our view, below sea level.

One example is Zealandia, the world's eighth continent that extends underwater from New Zealand. Several smaller lost continents, called microcontinents, have also recently

VOCAB BUILDER

geoscientists (say "jeo-sain-tists"; noun) = experts in earth sciences or geology.

plateaus (say "pla-tos"; noun) = large flat areas of land located on high ground.

magma (say "meg-ma"; noun) = hot molten rock within the earth.

sample (say "sam-pel"; verb) = take a small quantity of material for study.

cores (say "kors"; noun) = long, thin tubes of material taken out of the earth for study.

been discovered submerged in the eastern and western Indian Ocean.

But why, with so much geographical knowledge at our fingertips, are we still discovering lost continents in the 21st century?

Another lost continent?

In August, we undertook a 28-day voyage on the research vessel RV Investigator to explore a possible lost continent in a remote part of the Coral Sea. The area is home to a large underwater plateau off Queensland, called the Louisiade Plateau, which represents a major gap in our knowledge of Australia's geology.

On one hand, it could be a lost continent that broke away from Queensland about 60 million years ago. Or it could have formed as a result of a massive volcanic eruption taking place around the same time. We're not sure, because nobody had recovered rocks from there before — until now.

We spent about two weeks collecting rocks from this feature and recovered a wide variety of rock types from parts of the seafloor as deep as 4,500m. Most were formed through volcanic eruptions, but some show hints that continental



CSIRO

The Research Vessel *Investigator* is packed with scientific equipment that can map the sea floor at any depth. It can also reveal the composition of the sea bed 100m below the sea floor.

rocks are hiding beneath. Lab work over the next couple of years will give us more certain answers.

Down to the details

There are many mountains and plateaus below sea level scattered across the oceans, and these have been mapped from space. They are the lighter blue areas you can see on Google Maps.

However, not all submerged features qualify as lost continents. Most are made of materials quite distinct from what we traditionally think of as continental rock and are instead formed by massive outpourings of **magma**.

A good example is Iceland which, despite being roughly the size of New Zealand's North Island, is not considered continental in geological terms. It's made up mainly of volcanic rocks deposited over the past 18 million years, meaning it's relatively young in geological terms.

The only foolproof way to tell the difference between massive submarine volcanoes and lost continents is to collect rock samples from the deep ocean. Finding the right samples is challenging, to say the least. Much of the seafloor is covered in soft, gloopy sediment that obscures the solid rock beneath.

We use a sophisticated mapping system to search for steep slopes on the seafloor, that are more likely to be free of sediment. We then send a metal rock-collecting bucket to grab samples.

The more we explore and **sample** the depths of the oceans, the more likely we'll be to discover more lost continents.

The ultimate lost continent

Perhaps the best-known example of a lost continent is Zealandia. While the geology of New Zealand and New Caledonia have been known for some time, it's only recently their common

HOW ZEALANDIA WAS BORN

Zealandia is an underwater continent near New Zealand. Researchers went on a scientific drilling expedition in 2017 to collect sediment **cores** beneath its seabed. They found fossil evidence that suggested northern Zealandia may have been dry land some 50–35 million years ago. Later on, the whole area subsided under water to where it is now. This happened at about the same time that rock layers were heaving, and underwater volcanoes were forming in the western Pacific — the Pacific Ring of Fire. Scientists believe the formation of the Pacific Ring of Fire played an important part in shaping Zealandia.

heritage as part of a much larger continent (which is 95% underwater) has been accepted.

This acceptance has been the culmination of years of painstaking research, and exploration of the geology of deep oceans through sample collection and geophysical surveys.

New discoveries continue to be made. During a 2011 expedition, we discovered two lost continental fragments more than 1,000km west of Perth. The granite lying in the middle of the deep ocean there looked similar to what you would find around Cape Leeuwin, in Western Australia.

Other lost continents

However, not all lost continents are found hidden beneath the oceans. Some existed only in the geological past, millions to billions of years ago, and later collided with other continents as a result of plate tectonic motions.

Their only modern-day remnants are small slivers of rock, usually squished up in mountain chains such as the Himalayas. One example is Greater Adria, an ancient continent now embedded in the mountain ranges across Europe.

Due to the perpetual motion of tectonic plates, it's the fate of all continents to ultimately reconnect with another and form a supercontinent.

But the fascinating life and death cycle of continents is the topic of another story.

— By MARIA SETON and SIMON WILLIAMS of University of Sydney, and JOANNE WHITTAKER of University of Tasmania. This story first appeared at <https://theconversation.com/>.