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The beginning of wisdom, is "I do not know" - Lt. Commander Data

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Do Melting ice-caps generate earthquakes?

- Yes, thick layers of ice, in areas such as Greenland and Antarctica, can prevent tectonic plates from moving freely. Small earthquakes have been traced back to ice loss. It is unclear if larger ice losses could lead to larger earthquakes.

Geotour-walking

If you are not already aware, Constantia, the Geologist from the Geopark (Troodos), started a walking group called 'Geotour - walking with a Geologist'. Details can be found on her [Facebook](#) page. The walks tend to be during the week, as she leads these walks in her spare time.

Please check the Facebook page for details.

Zealandia:

Is there an eighth continent under New Zealand?

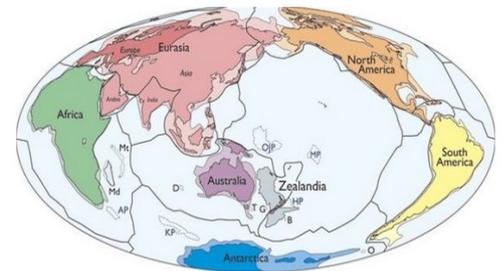
Scientists are pushing to have a huge landmass, which is almost entirely submerged in the southwest Pacific, classified as a new continent.

Named as Zealandia, its highest mountains are the only parts above water and we identify them as New Zealand.

Zealandia was formerly part of Gondwana. It's large area, of crustal structure and that it is separate from Australia, support its claim as a continent.

Today its five million sq km (1.9m sq miles), which is about two thirds the area of neighbouring Australia, is 94% submerged,. This is mainly as a result of widespread Late Cretaceous crustal thinning, preceding supercontinent breakup and consequent [isostatic balance](#).

Being above water would seem to be crucial to being classified as a continent, but the researchers looked at a



different set of criteria, all of which are met by Zealandia.

- elevation above the surrounding area
- distinctive geology
- a well-defined area
- a crust thicker than the regular ocean floor

There is no scientific body that formally recognises continents. So it could only change over time, if future research accepts Zealandia on par with the existing recognised continents. So eventually we might be learning about eight, not seven, continents.

Are we in a new Epoch? - The Anthropocene

The [Anthropocene](#) is a proposed new [epoch](#) dating from the commencement of significant human impact on the Earth's geology and [ecosystems](#). Humans are leaving an indelible mark on the planet in a vast array of manmade crystals. Future archaeologists and geologists will find that [208 of the present 5,200](#) officially recognised minerals are exclusively, or largely, linked to human activity. It is proposed that the

new epoch should begin about 1950. The current epoch, the [Holocene](#), is the 12,000 years of stable climate since the last ice age. Rapid rise of carbon dioxide emissions, radioactivity from bomb tests, sea level rise, global mass extinction of species and the transformation of land by deforestation and development mark the end of that slice of geological time.

[The Guardian online.](#)

Foxfire: The largest gem-quality diamond ever found in North America

In 2015 the largest gem quality diamond ever found in America was recovered from the Diavik diamond mine 130m from the Arctic circle in Canada's North-West Territories. The mine is located in [Precambrian](#) rocks. For most of the year the mine is closed and frozen under snow and ice.



[Diamonds](#) are carried from deep within the earth by magma pushing up through tubes. The magma solidifies into an igneous rock called [Kimberlite](#), which is mined

for its diamond content. The 187.63 [carat](#) diamond has been named '[Foxfire](#)'. The mine equipment is not designed for recovering large diamonds and normally material this size would be assumed to be Kimberlite and would be filtered out and crushed! However, due to the elongated shape of the Foxfire, it slipped through the filter screens. There are indications from the flat surfaces of the crystal that it was once larger. Most diamonds were created between one and three billion years ago, roughly a hundred miles beneath the surface of the Earth. Diamonds can help geologists understand Earth's history. The present owner of the Foxfire has loaned it to the Smithsonian Institute to study.

Naica's crystal caves hold long-dormant life

Many of you will be aware of the **Giant Crystal Cave**. The [cave](#) is connected to the [Naica Mine](#), which is 300 metres (980 ft) below the surface in [Naica, Chihuahua, Mexico](#).

The main chamber contains giant [selenite crystals](#) ([gypsum](#), $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$), some of the largest natural crystals ever found. The cave's largest crystal found to date is 12 m (39 ft) in length, 4 m (13 ft) in diameter and 55 tons in weight. The cave is extremely hot, with air temperatures reaching up to 58 °C (136 °F) with 90 to 99 percent humidity. The cave is relatively unexplored due to these factors. Without proper protection, people can only endure approximately ten minutes of exposure at a time.

The key to the growth of the extremely large crystals is their very slow rate of growth. Naica lies on an ancient [fault](#) above an underground [magma chamber](#) below the cave. The magma heated the [ground water](#) which was saturated with [sulfide](#) ions (S^{2-}). Oxygen, from surface water, slowly diffused into the heated water and oxidized the sulfides (S^{2-}) into [sulfates](#) (SO_4^{2-}). The hydrated sulfate gypsum [crystallized](#) at an extremely slow rate over the course of at least 500,000 years, forming the enormous crystals found today.

The Giant Crystal Cave was discovered in 2000. However, Scientists have recently extracted long-dormant microbes from inside the famous giant crystals and



[revived them](#). Around 40 different strains of microbes and some viruses have been found.

The organisms were likely to have been encased in the gypsum at least 10,000 years ago, and possibly up to 50,000 years ago. As the environment is hot (40-60C), humid and acidic, with no light, any lifeform must [chemo-synthesise](#) to survive. That is, it must derive the energy needed to sustain itself by processing rock minerals such as iron and manganese.

Finding life in locations such as the Naica caves extends the envelope of environments where we now know life can exist. Many scientists suspect that if life does exist elsewhere in the Solar System, it is most likely to be underground, chemo-synthesising like the microbes of the giant Crystal cave of the Naica mine.

Minerals of Cyprus—Copper

The mining history of Cyprus is very rich because of the copper metal production, which dates back to 2500 BC. Unfortunately, the mining industry has been on the decline (practically non - existent) for the last three decades. The only mining activity is the



Native copper (~4 cm in size)

[Skouriotissa Copper Mines](#) where by the application of the leaching - SX - EW method the production of high purity copper cathodes (99,999%) are achieved.

Native copper was probably one of the early metals worked by ancient people. Nuggets of the metal could be found in streams and its properties allowed it to be easily worked without a required processing step. This led to very early human use, from c. 8000 BC. It was the first metal to be smelted from its ore, c. 5000 BC, the first metal to be cast into a shape in a mold, c. 4000 BC and the first metal to be purposefully alloyed with another metal, [tin](#), to create [bronze](#), c. 3500 BC

It is a soft, malleable, and [ductile](#) metal with very high [thermal](#) and [electrical conductivity](#). Large amounts are also used to make alloys such as brass (copper and zinc) and bronze (copper, tin, and zinc). Copper is also alloyed with precious metals such as gold and silver. In the [Roman era](#), copper was principally mined on [Cyprus](#), the origin of the name of the metal, from *aes cyprium* (metal of Cyprus), later corrupted to *cuprum*, from which the words *copper* (English), *cuiivre* (French), *Koper* (Dutch) and *Kupfer* (German) are all derived. [Aphrodite](#) ([Venus](#) in Rome) represented copper in mythology and alchemy because of its lustrous beauty and its ancient use in producing mirrors; Cyprus was sacred to the goddess. The Romans in their heyday produced nearly 17,000 tons of copper annually, Cyprus being their second largest supplier. The copper pollution of the Roman days is still evident in Cyprus with large deposits of slag to be found in a number of different locations.

Physical Properties of Copper

Chemical Classification	Native element
Color	Copper red on a fresh surface, dull brown on a tarnished surface
Streak	Metallic copper red
Luster	Metallic
Diaphaneity	Opaque
Cleavage	None
Mohs Hardness	2.5 to 3
Specific Gravity	8.9
Diagnostic Properties	Color, luster, specific gravity, malleability, ductility
Chemical Composition	Copper, Cu
Crystal System	Isometric
Uses	Conducts electricity and heat; wiring, electrical contacts and circuits; coinage, alloys

Modern copper exploration activities have been centred on the Troodos Ophiolite complex targeted on the Volcanic-hosted Massive Sulphide (VMS) deposits. [EMED Mining Public Ltd](#) has explored its Klirou copper-zinc property 20 km SW of Nicosia. Explora-



Cyprus Copper ingot in the shape of an ox hide, Bronze Age

tion was primarily within the upper pillow Lavas of the Troodos complex. Deposits extend about 200m below the surface and are potentially minable by open pit methods. Northern Lion (See P3A Geology Newsletter November 2012) announced results of drill samples of 5.1% copper and 7.7% zinc. Mapping and surface sampling located a series of [gossan](#) outcrops along the west edge of a known VMS deposit.

Please Google: [Cyprus Copper Itinerary A Tour through the heart of Cyprus](#)

Glossary & General

Acknowledgements

- Geological Society of America
- BBC
- Wikipedia
- The Guardian online.
- Smithsonian.com
- Geology.com
- USGS
- Cyprus Tourist Organisation
- BBC Focus Magazine

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Glossary: *To continue in the next issue*

N

Natural Arch—a bridge or arch joining two rock pillars, produced by weathering or erosion.

Natural Gas—The gaseous constituents of petroleum, i.e. Methane, Ethane, Propane & n-Butane.

Neo—New

O

Obliquity — Earth rotates around an axis; the angle of this axis changes from 22.1 to 24.5 degrees.

Oligocene — The period of time between 23 and 34 million years ago.

Ooidal limestone — A limestone that is formed of abundant ooids (sometimes called ooliths), small spheres of calcium carbonate that look like fish eggs. This is sometimes called 'oolitic limestone'

Ooids — Spherical grains that formed when aragonite is precipitated in concentric layers in gently agitated water. They usually have a sand grain or shell fragment in the core.

Ombrogenous mires — Have a high-water table maintained by precipitation.

Open water transition mires — Developed from encroachment of vegetation around bodies of open water.

Ordovician — The period of time between 443 and 485 million years ago.

Orogeny — The process of mountain formation, especially by a folding and faulting of the earth's Crust.

Oxidised — A chemical reaction with oxygen or where electrons are lost. .