- Curiosities and wonders



10 AMAZING EARTH FACTS

From its active core to its explosive surface, scientists have made incredible discoveries about the past, present and future of the rock we call home

WORDS AILSA HARVEY

34

PRINTED FROM PRESSREADER
NOT FOR SALE

DID YOU KNOW? Earth's longest mountain range is under the Atlantic Ocean


Stromatolites are the oldest fossils

1 EARTH IS 10,000 TIMES OLDER THAN HUMANS

The evolution of life on Earth, step by step

9 200 MILLION YEARS AGO
The earliest known mammals were the Morganucodontids, which were small animals the size of shrews.

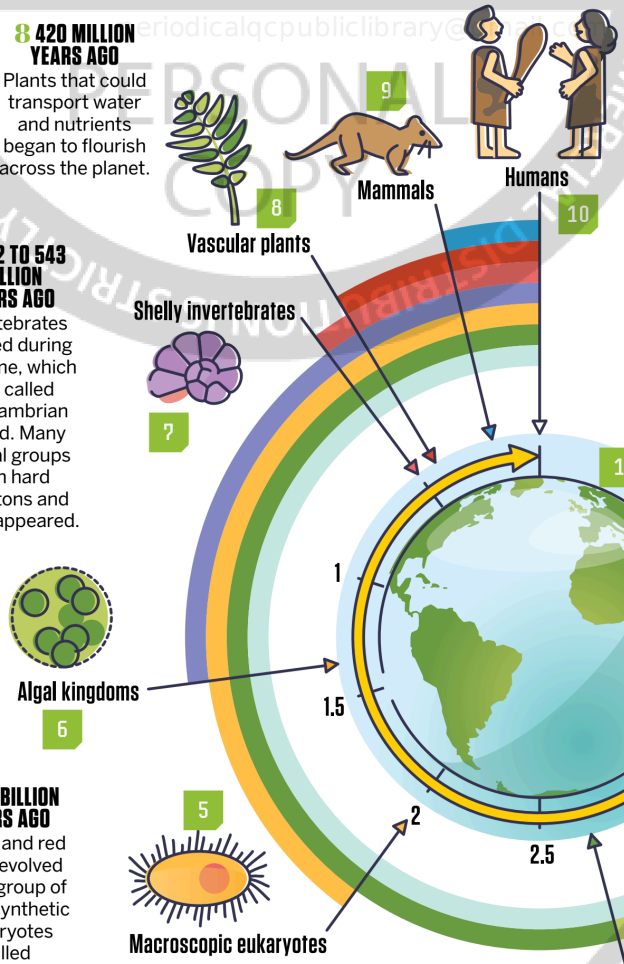
10 450,000 YEARS AGO
The first fossil evidence of early modern humans is from 300,000 years ago. *Homo sapiens* have existed for 450,000 years at most – 1/10,000th the age of Earth.

8 420 MILLION YEARS AGO
Plants that could transport water and nutrients began to flourish across the planet.

1 4.5 BILLION YEARS AGO
In the Big Bang, 13.8 billion years ago, masses of energy and matter were released. Over billions of years, dust and gas collided and stuck together in a process called accretion, growing larger until Earth was born.

7 542 TO 543 MILLION YEARS AGO
Invertebrates evolved during this time, which was called the Cambrian period. Many animal groups with hard skeletons and shells appeared.

2 3.7 BILLION YEARS AGO
Scientists think Earth evolved conditions that could support life by this time, such as an increase in oxygen in the atmosphere and volcanic activity altering organic molecules.



6 1.5 BILLION YEARS AGO
Green and red algae evolved into a group of photosynthetic eukaryotes called Archaeplastida.

3 3.5 BILLION YEARS AGO
Phototrophic bacteria were the earliest life forms that used sunlight to produce energy.

Did you know?
You weigh less at the equator than at the poles

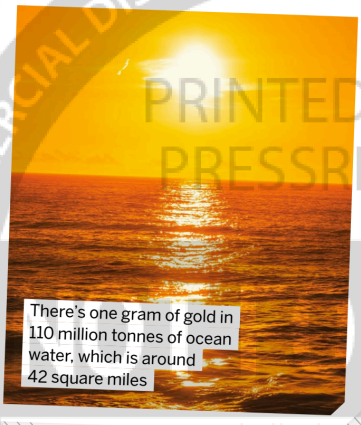
5 2 BILLION YEARS AGO
Multicellular organisms, large enough to be seen with the naked eye and containing cells with a clear nucleus, emerged at this time.

4 2.4 BILLION YEARS AGO
Cyanobacteria feature in some of the oldest fossil records on Earth.

"*Homo sapiens* have existed for 450,000 years at most"

© AdobeStock / Shutterstock / Getty

ENVIRONMENT



There's one gram of gold in 110 million tonnes of ocean water, which is around 42 square miles

THE SEA IS FULL OF GOLD

2 There are 20 million tonnes of gold suspended in Earth's oceans. However, this gold can't be easily and efficiently extracted. In 1872, chemist Edward Sonstadt discovered traces of gold in samples of seawater. Scientists had previously known that there was silver, copper and lead suspended in the oceans, but after news of its valuable gold content, people rushed to explore ways of extracting the wealth in the waves. Despite there being about 100 times more gold in the ocean than on land, when dispersed throughout the oceans, the concentration is very low and extraction isn't cost effective.

In 2018, chemists in Switzerland invented a gold-collecting sponge material that binds with and concentrates the gold in water. This is a porous polymer that targets and attracts 90 to 99 per cent of gold ions in water. Even though production of this material is relatively inexpensive, it would need to be treated with ascorbic acid between uses to regenerate the chemical attraction, making the process too costly.

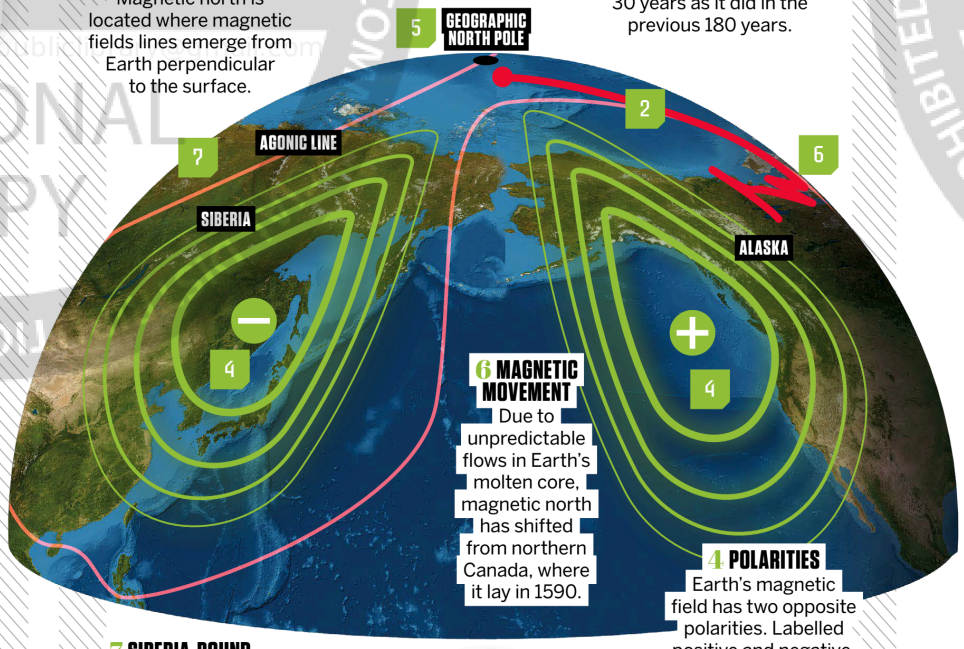
Did you know?
Coral reefs are Earth's largest living structures

3 EARTH'S MAGNETIC NORTH POLE IS MOVING

How does Earth's core affect the magnetic field surrounding the planet?

2 MAGNETIC NORTH
The magnetic north pole has moved almost the same distance in the last 30 years as it did in the previous 180 years.

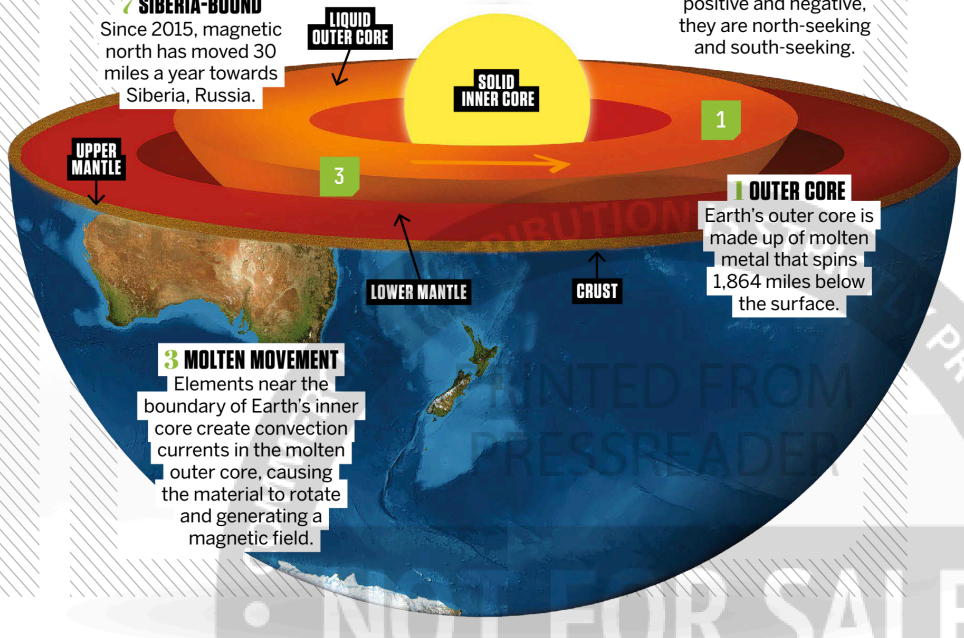
5 MAGNETIC POLE
Magnetic north is located where magnetic fields lines emerge from Earth perpendicular to the surface.



6 MAGNETIC MOVEMENT
Due to unpredictable flows in Earth's molten core, magnetic north has shifted from northern Canada, where it lay in 1590.

4 POLARITIES
Earth's magnetic field has two opposite polarities. Labelled positive and negative, they are north-seeking and south-seeking.

7 SIBERIA-BOUND
Since 2015, magnetic north has moved 30 miles a year towards Siberia, Russia.



1 OUTER CORE
Earth's outer core is made up of molten metal that spins 1,864 miles below the surface.

3 MOLTEN MOVEMENT
Elements near the boundary of Earth's inner core create convection currents in the molten outer core, causing the material to rotate and generating a magnetic field.

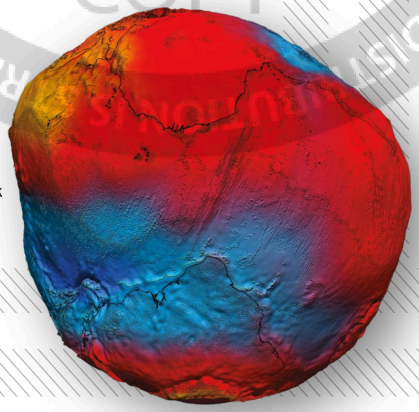
DID YOU KNOW? Antarctica holds 70 per cent of Earth's freshwater



Antarctic landscapes are extremely dry because the cold air holds less moisture

5 EARTH IS SQUISHED

When viewed from space, Earth looks round, but our planet is an ellipsoid. Earth bulges at the equator under the centrifugal force produced by the planet's rotation. Centrifugal force is the tendency of an object spinning in a circular motion to move away from the axis it's rotating on. The outward force is greater at the equator, and because of the fluidity of the molten core, it's capable of contorting slightly. As a result, the diameter of Earth at the poles is about 7,900 miles, while at the equator it's about 7,926 miles.



The bulge at the equator is 26 miles. This is twice the distance from Mount Everest's peak to the ocean's deepest point

4 ANTARCTICA IS THE WORLD'S LARGEST DESERT

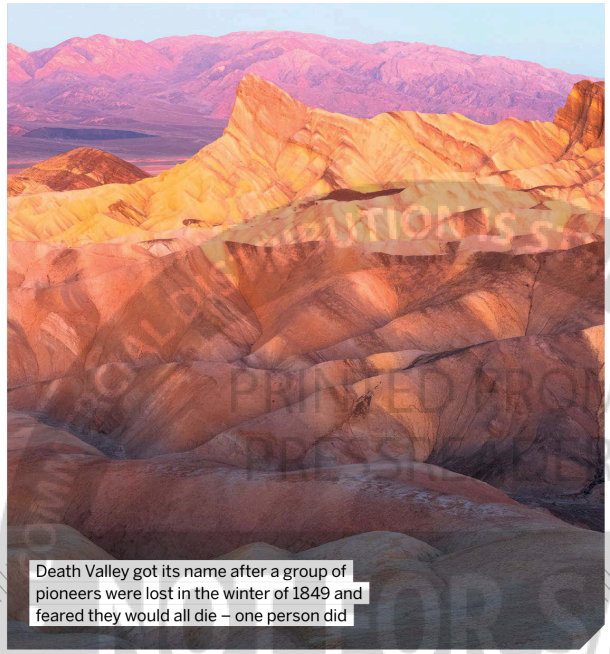
The world's largest desert doesn't bake in extreme heat or feature sand dunes stretching to the horizon. Instead, the entire record-breaking continent of Antarctica is extremely dry – the definition of a desert being a region of low precipitation. It has an area of 5.37 million square miles and the lowest temperature ever recorded on Earth: -89 degrees Celsius.

A landscape is classed as a desert when it receives less than 250 millimetres of rainfall over a year. Antarctica falls well below this threshold. With an average annual precipitation of 50 millimetres, it's a cold, polar desert. The other main desert types include hot and dry, semi-arid and coastal deserts.

The polar desert of Antarctica shares features of some more common desert types with its flat, desolate and windswept land. There are only two flowering plants that grow on the continent – Antarctic hair grass and Antarctic pearlwort.

6 THE HOTTEST PLACE ON EARTH AVERAGES 45°C

Furnace Creek in Death Valley, California, has blazing air temperatures, reaching a high of 56.7 degrees Celsius on 10 July 1913. Currently, the summer months see an average daily high of 45 degrees Celsius, and surface heat is even higher. On a typical summer night, the lowest temperatures are between 30 and 35 degrees Celsius. In 1972, the ground temperature was recorded to be close to the boiling temperature of water. This is largely due to the shape and depth of Death Valley. The valley has a depth of 86 metres below sea level and is surrounded by steep mountain walls. Because the ground is unable to support much vegetation, the intense summer sunlight has direct contact with the desert's rock and soil, heating the surface. As a result, any heat that radiates from the ground becomes trapped in the valley.



Death Valley got its name after a group of pioneers were lost in the winter of 1849 and feared they would all die – one person did

© Alamy / Shutterstock

ENVIRONME

Did you know?
People have climbed Mount Everest with no oxygen



8 THE GROUND YOU WALK ON IS RECYCLED

Earth's crust is recycled through subduction, melting and eruption

1 WEATHERING AND EROSION
Changes in temperature and exposure to wind and rain cause rock and soil to break apart.

2 SEDIMENT TRANSPORTATION
Sediments that break away from the surface are washed or blown to new areas to make new layers.

3 COMPACTION AND CEMENTATION
As sand, clay or dirt is pressed together over time by gravity pushing upper layers downwards, gaps between sediment are reduced to form sedimentary rock.

4 PRESSURISED ROCK
Sedimentary rock is exposed to increased heat and high pressures that change the rock's mineral structure and texture, turning it into harder metamorphic rock.

5 MELT TO MAGMA
Geothermal heat melts metamorphic rock into magma.

6 CRYSTALLISATION
When magma cools and solidifies, it crystallises into a new structure to form igneous rock.

7 MAGMA TO LAVA
In a volcanic eruption, magma spills onto the surface of Earth, becoming lava. When this cools, it becomes a new layer of igneous rock.

8 HEIGHTENED LAYERS
New rock layers reach the surface when the top layer is eroded away, exposing the minerals beneath.

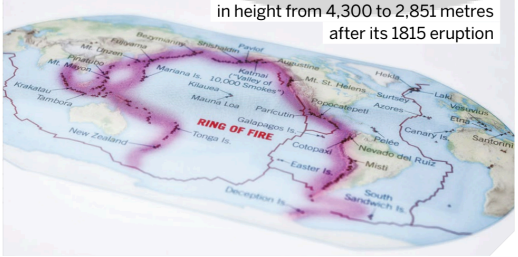
"In a volcanic eruption, magma spills onto the surface"


Lava is molten rock above the surface

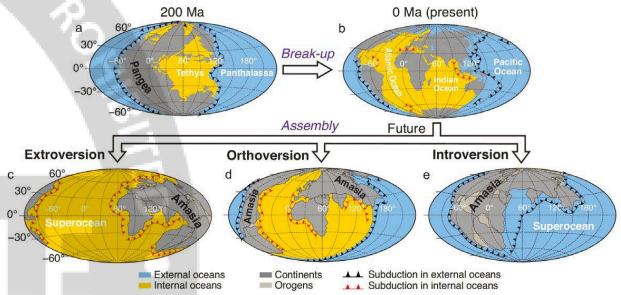
DID YOU KNOW? Depending where on the planet you stand, you could be spinning over 1,000 miles per hour with Earth

MILLIONS OF INDONESIANS LIVE IN RANGE OF A VOLCANIC ERUPTION

7 When a volcano erupts, most fatalities occur in communities that lie within 6.2 miles of it. In Indonesia, there are around 130 active volcanoes that make up the Pacific Ring of Fire, and 8.6 million people live within this deadly range. More than 70 per cent of Indonesia's population live within 62 miles of the ring's 130 active volcanoes. Indonesia's abundance of volcanoes is due to its placement in the Ring of Fire. This is a horseshoe-shaped zone where seismic activity is high and 75 per cent of the world's active volcanoes lie, as it traces the boundaries between multiple tectonic plates. When Earth's tectonic plates move, they can release magma from beneath the surface.



Mount Tambora in Indonesia was reduced in height from 4,300 to 2,851 metres after its 1815 eruption



This diagram shows how Pangaea became today's continents and three possible plate movements that could form Amasia

ASIA AND AMERICA WILL COLLIDE IN 200 MILLION YEARS

9 The Pacific is the largest of Earth's oceans, but it won't exist forever. Scientists predict that the surrounding continents of America, Asia and Australia will close in with the movement of tectonic plates, and will eventually collide and connect in over 200 million years. The supercontinent that will be formed as a result is referred to as Amasia, aptly merging the names of these continents.

The existence of a huge supercontinent isn't new. Millions of years ago, Earth's land was unified as Pangaea. Continents are embedded within tectonic plates, which are constantly moving against and underneath one another in a process called subduction. The very same convection currents in the mantle that will slowly bring Amasia together caused the continent of Pangaea to be broken apart into today's land masses.

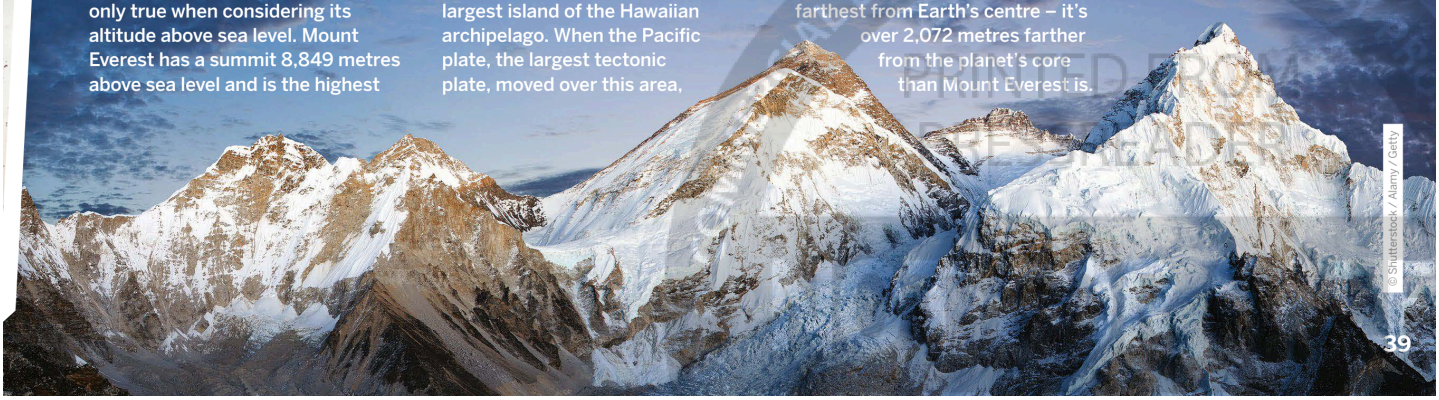
© Wikimedia Commons / Chuan Huang, Zheng-Xiang Li, Nan Zhang

EVEREST ISN'T EARTH'S TALLEST MOUNTAIN

10 Most people will tell you that the tallest mountain in the world is Mount Everest, straddling Nepal and China. However, this is only true when considering its altitude above sea level. Mount Everest has a summit 8,849 metres above sea level and is the highest peak. But if you were to measure the world's mountains from the base to the summit, Mauna Kea in Hawaii can be considered the tallest. Mauna Kea is 10,210 metres from its base to its peak. It's located on the largest island of the Hawaiian archipelago. When the Pacific plate, the largest tectonic plate, moved over this area, a column of molten rock was released up to the surface to form the volcanic mountain.

Mount Chimborazo in Ecuador could also be considered a contender for the record, as its peak is the farthest from Earth's centre – it's over 2,072 metres farther from the planet's core than Mount Everest is.

More than 7,000 people have summited Mount Everest



© Shutterstock / Alamy / Getty