Were Africa and South America once connected?

2 Replies

In the beginning there was Pangea. A supercontinent of immense proportions. It formed roughly around 300 million years ago and began to break apart, into what we know now as the seven continents, 100 million years ago.

This theory that all the continents were once connected is one that is commonly accepted by the scientific community.

Well that begs the question why did it break apart?

The answer lies in plate tectonic. Under the crust of the earth are gigantic land masses called plates. These plates move every year in such small increments to be unnoticeable. But it was not just a big split up. This super continent fell apart in pieces.

The first rift resulted in the pacific ocean.

The second rift resulted in Asia.

And the final rift resulted in Africa.

When looking at a map now one can tell that the continents used to be together. But even in this day the tectonic plates still move so a super continent will once again form but it will be the exact opposite of what it used to be.

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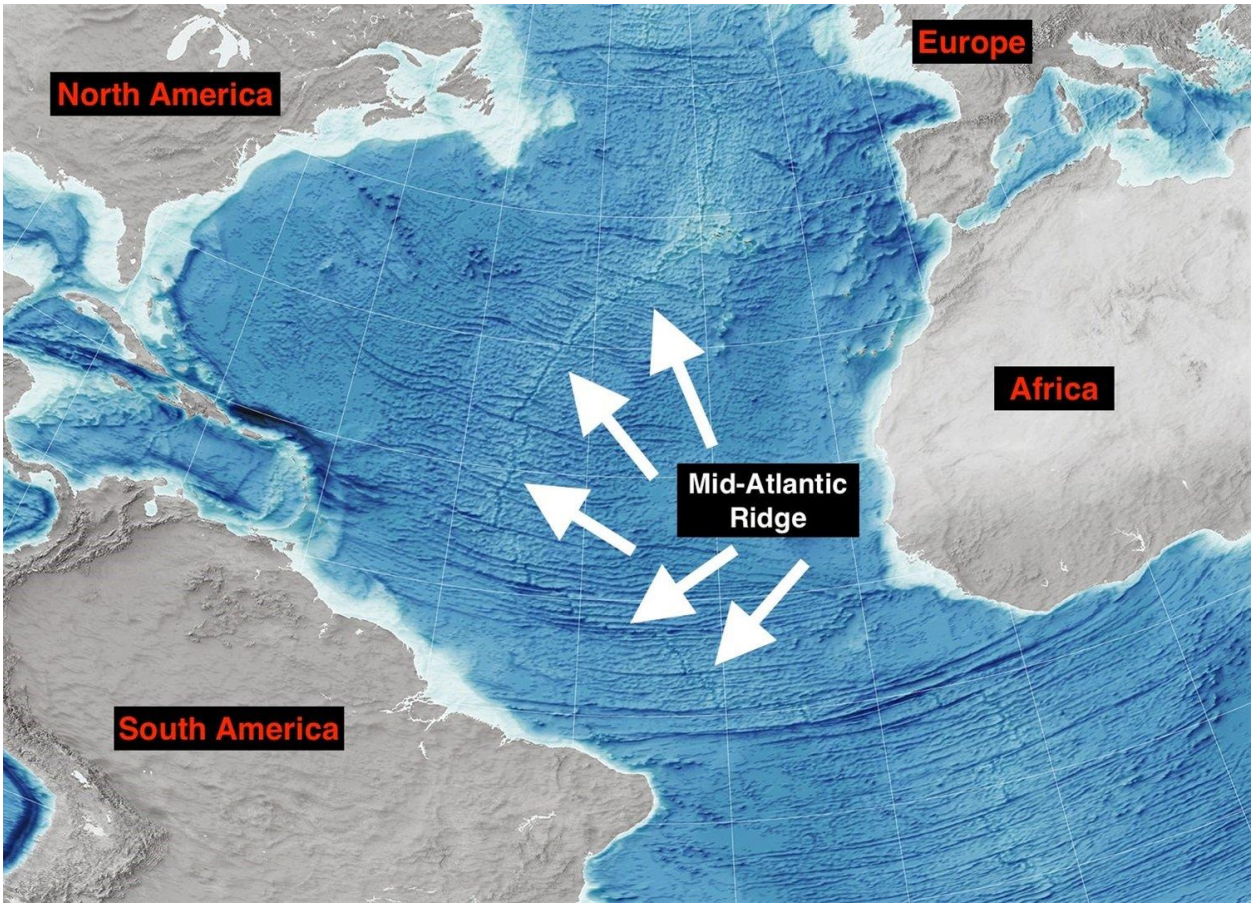
The Atlantic Ocean is getting wider every year, pushing the Americas away from Africa and Europe

Business Insider US
Aylin Woodward ,



A map of the Atlantic Ocean floor.

- **The tectonic plates under the Americas, Europe, and Africa are being pushed apart as the Atlantic Ocean widens year by year.**
- **New research reveals what's pushing the plates apart: Material from deep within the Earth is bursting upward at an undersea ridge in the middle of the Atlantic.**
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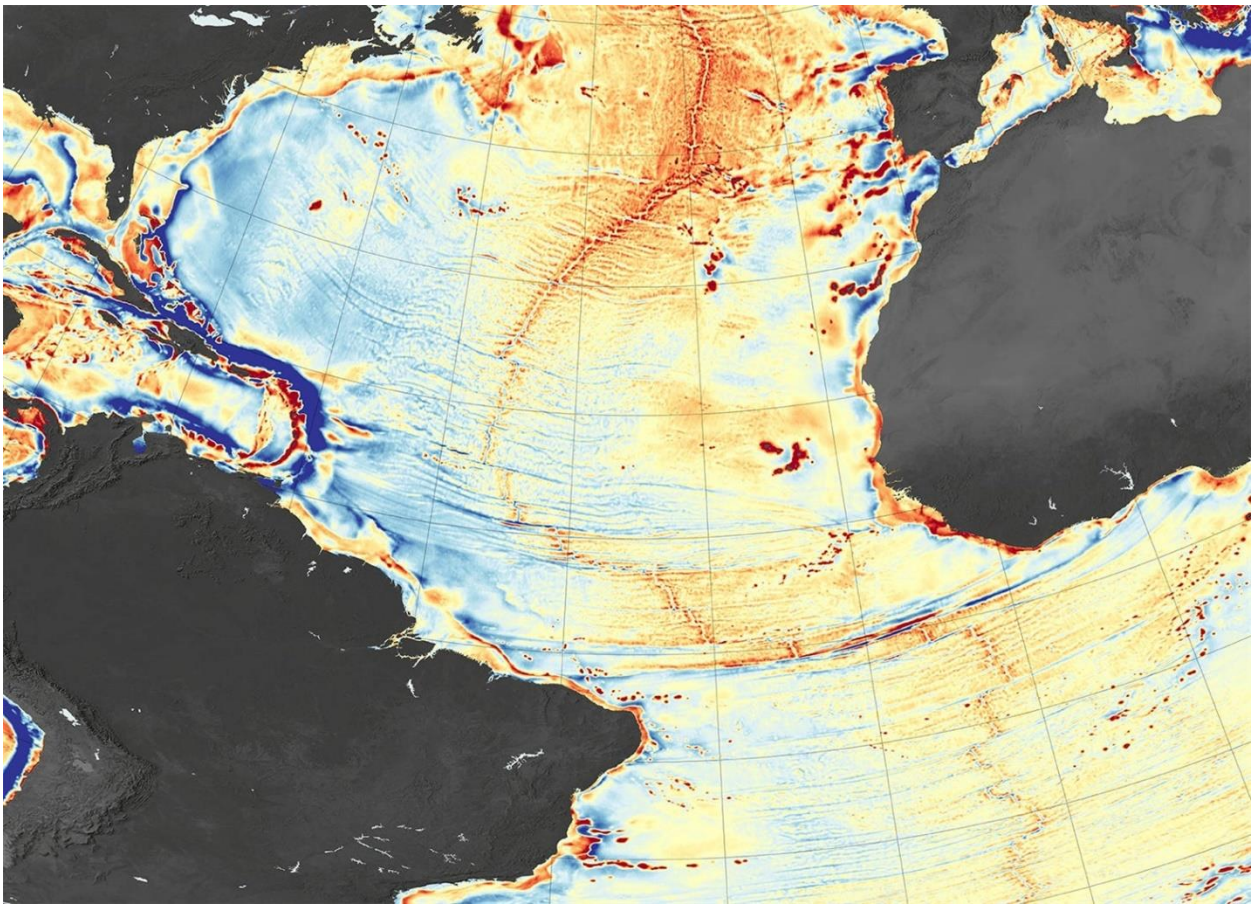
The Atlantic Ocean grows 4 centimetres wider every year.

That's because the tectonic plates undergirding the Americas are separating from those beneath Europe and Africa. But precisely how and why that is happening has been a mystery to scientists, since the geological forces that typically push plates apart aren't prevalent in the Atlantic.

A study released Wednesday finally answers that question. The research, published in the journal Nature, suggests the key to the Atlantic's expansion lies beneath a large underwater mountain range in the middle of the ocean.

This set of undersea peaks is known as the the Mid-Atlantic Ridge, and it separates the North American plate from the Eurasian plate, and the South American plate from the African plate. The researchers behind the study found that material from deep within the Earth is rising to the surface under the Mid-Atlantic Ridge, thereby pushing the plates on either side of the divide apart.

The Atlantic seafloor is spreading



The mid-Atlantic ridge, seen in deep orange, on a NASA Earth Observatory bathymetry map.

Imagine the Earth as a chocolate truffle - a viscous centre ensconced in a hardened shell.

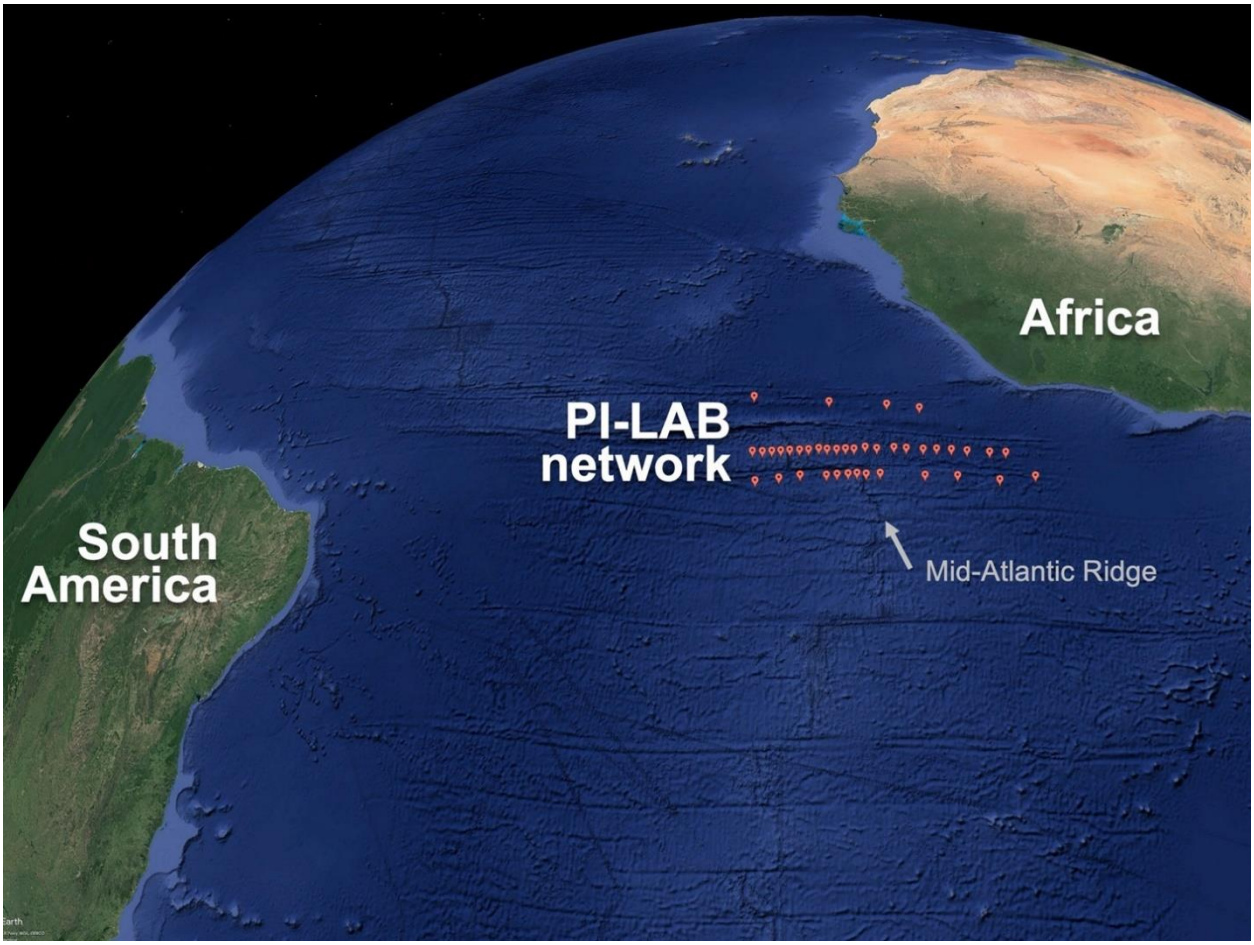
The centre consists of a 3,000km-thick, semi-solid mantle that encircles a super-hot core. The top layer of the truffle - only about 34km thick - is the Earth's crust, which is fragmented into tectonic plates that fit together like a puzzle. These plates surf atop the mantle, moving around as hotter, less dense material from deep within the Earth rises toward to the crust, and colder, denser material sinks towards the core. This process, known

as convection, typically happens when two plates collide and one subducts, or sinks, under another.

Generally, any upward oozing of material under tectonic boundaries like the Mid-Atlantic Ridge usually starts from a part of the mantle very close to the Earth's surface, about 3km below the crust. Material from the lower mantle, the part closest to the core, isn't generally found bursting crustward there.

But the new study found that the Mid-Atlantic Ridge is a convection hotspot.

The researchers measured geologic activity across a 1,000km span. They dropped 39 seismometers under the waves in 2016, then left them for a year to collect data from earthquakes around the world. Seismic waves reverberating through material in Earth's core offered the scientists a peek into was happening in the mantle under the Mid-Atlantic Ridge.



The part of the Mid-Atlantic Ridge where University of Southampton researchers deployed earthquake-measuring instruments in 2016.

The group found that magma and rock from 660km under the crust can push its way to the surface there. That upwelling of material is what is spreading the tectonic plates - and the continents on top - apart at a rate of 4 centimetres per year.

"Upwelling from the lower to the upper mantle and all the way up to the surface is typically associated with localized places on Earth, such as

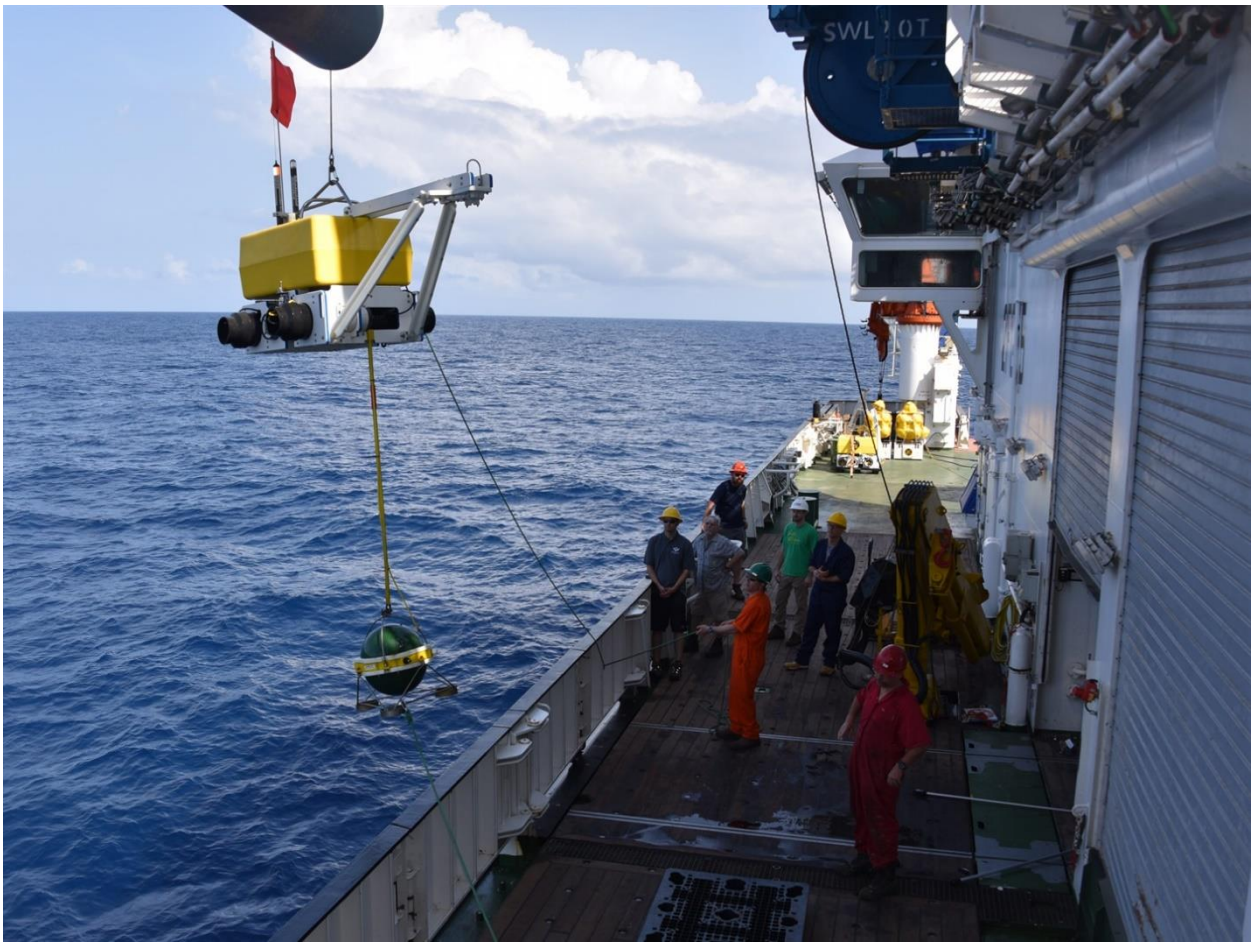
celand, Hawaii and Yellowstone, and not with mid-ocean ridges," Matthew Aguis, a seismologist at Roma Tre University and a co-author of the new study, told Insider. "This is what makes this result exciting because it was completely unexpected."

Often, material trying to make its way from the lower to upper mantle is hindered by a band of dense rock known as the mantle transition zone, between 400km and 660km under our feet.

But Agius and his colleagues estimated that beneath the Mid-Atlantic Ridge, temperatures in the deepest part of that transition zone were higher than expected, making the zone thinner in the area. That's why material can rise to the ocean floor more easily there than in other parts of the Earth.

Solving a geological mystery

Solving a geological mystery



One of the remote seismometers deployed by University of Southampton scientists in the Atlantic Ocean.

The discovery helps solve a longstanding geological puzzle.

Researchers knew that oceans expand and contract at different rates. They also knew plates move apart most markedly at subduction zones, which typically occur at active continental margins - where the boundary between a continent and the ocean is also a tectonic plate boundary. That's why the Pacific Ocean expands faster than the Atlantic: Most of the Pacific sits atop one tectonic plate, and its boundaries line up almost perfectly with the continental ones on the east and west sides, the North American and Eurasian plates. Subduction at these boundaries causes the earthquakes and volcanic eruptions that characterize the region's aptly named "Ring of Fire."

The Atlantic Ocean, however, sits atop four major plates with boundaries that don't match continental borders - the boundaries occur in the middle of the ocean. So scientists were flummoxed as to how its seafloor was expanding.

But the new research suggests the upwelling of material from deep within the mantle could be the engine of that Atlantic expansion.

Catherine Rychert, a geophysicist from the University of Southampton and a co-author of the new study, said this process started 200 million years ago. But someday, the rate of expansion could speed up.

"Most probably the rate will remain the same during our lifetime. However, it is likely the rate will change over millions of years because it has varied in the past," Rychert told Insider.