

# Earth's surface, scientists say

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🕒 Updated 3:50 PM ET, Tue July 17, 2018



**(CNN)** — As it turns out, diamonds in the Earth are much more common than we thought. About 1,000 times more common, according to the Massachusetts Institute of Technology.

A new study by an interdisciplinary team of researchers used seismic technology (the same kind used to measure earthquakes) to estimate that a quadrillion tons of diamonds lie deep below the Earth's surface.

That's 1,000,000,000,000,000 --- or one thousand times more than one trillion.

Don't expect a massive diamond rush, though.

The deposits sit some 90 to 150 miles below the Earth's surface, much deeper than current mining machinery allows. The Mir Diamond Mine in Russia, for instance, is the world's second-largest human-made hole and only goes about a third of a mile deep.

## Here's how researchers crunched the numbers

Seismic technology uses sound waves to make measurements, because their speeds change depending on the composition, temperature and density of the rocks and minerals they're traveling through.

Deep in the earth are cratons, masses of rock shaped like upside-down mountains. They are usually cooler and less dense than surrounding rock and result in faster sound waves.



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But scientists observed that the waves got even faster when moving through the bottom of the cratons, known as their roots.

So they put together virtual rocks, made from potential combinations of materials, and using three-dimensional models, compared the velocities of sound through the variations.

Sound travels through diamond twice as fast as other rocks, so the team of researchers figured there had to be some of the material in the cratons.

"Diamonds are a perfect match because they're a little bit more dense, but we don't need a lot of them," said Ulrich Faul, a researcher in MIT's Department of Earth, Atmospheric, and Planetary Sciences and a senior participant in the study.

Faul, who worked in the lab with a team of seismologists, geochemists and other scientists, slightly increased the amounts of diamond in the virtual rocks, until they reached a combination that produced the same advanced speeds they'd been encountering by using seismic technology on the real Earth.

That amount was 1-2% of the craton.

Next, the team multiplied this percentage by the total volume of cratonic roots in the Earth, estimated by thorough mapping of new and old rock formations. They came up with one quadrillion. That's at least 1,000 times more diamonds than scientists had expected.

## How diamonds are formed

Faul said the location of the diamonds at the base of the cratons makes the most sense, as diamonds are formed via extreme pressure and extreme heat, so the weight from all the rock above provides ideal conditions for their formation deep in the Earth's mantle.

The diamonds that end up in necklaces and rings come closer to Earth's surface, usually through volcanic eruptions, Faul told CNN.

The study also included researchers from various national and international institutions, including the University of California at Berkeley, Harvard University, the University of Melbourne and the University of Science and Technology of China, among others.