Scientists Discover 6 Mysterious Structures Deep Inside Earth

Scientists have discovered six previously unknown structures near the boundary between Earth's mantle and outer core, approximately 1,800 miles beneath the planet's surface.

The mysterious formations lie far beyond humanity's physical reach. The deepest artificial point on Earth, Russia's Kola Superdeep Borehole, extends approximately 7.6 miles below the surface. That means the newly identified structures are more than 230 times deeper than humans have ever drilled.

Because Earth's deepest layers remain inaccessible, scientists rely on seismic waves generated by powerful earthquakes to investigate the planet's interior. According to the Daily Mail, researchers in China used artificial intelligence to examine more than 2 million seismic recordings from roughly 5,000 earthquakes.

The AI model searched for PKP precursors, faint seismic waves that arrive shortly before stronger earthquake waves. These signals scatter when they encounter differences in density or composition deep inside Earth, allowing scientists to detect structures that otherwise remain invisible.

Finding those weak signals manually has traditionally been difficult and time-consuming.

"Manual identification of these precursors is inefficient, subjective, and insufficient for vast global seismic data sets," the researchers wrote in a study published in JGR Solid

Earth.

After training the AI model with waves previously identified by humans, researchers detected 174,929 high-quality PKP precursor signals. That total is more than 10 times the number included in all previous studies combined.

The expanded data revealed six previously undocumented areas containing significant variations, or “heterogeneities,” near the core-mantle boundary.

“We also discovered six areas that likely host significant heterogeneities that had never been documented before, providing clear priority targets for future exploration of Earth’s deep interior,” the researchers wrote.

Scientists described the structures as possible “thermochemical piles,” meaning they may contain material with a different temperature and chemical composition from the surrounding mantle. The researchers suggested the formations could include pieces of Earth’s crust that were pulled deep into the planet through geological processes.

Under the enormous heat and pressure found near the core-mantle boundary, that material may partially melt, undergo mineral transformations or otherwise develop properties different from the surrounding rock.

The new seismic map also indicates that formations previously considered isolated fragments may be connected as larger, continuous belts.

Scientists have not determined the structures’ precise composition or how they formed. Researchers said continued AI analysis of seismic data could produce increasingly detailed models of the lowermost mantle and improve understanding of the forces operating deep within Earth.

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