

# Earth's inner core may have started spinning other way: Study

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Far below our feet, a giant may have started moving against us.

Earth's inner core, a hot iron ball the size of Pluto, has stopped spinning in the same direction as the rest of the planet and might even be rotating the other way, research suggested on Monday.

Roughly 5,000 kilometers (3,100 miles) below the surface we live on, this "planet within the planet" can spin independently because it floats in the liquid metal outer core.

Exactly how the inner core rotates has been a matter of debate between scientists—and the latest research is expected to prove controversial.

What little is known about the inner core comes from measuring the tiny differences in seismic waves—created by earthquakes or sometimes nuclear explosions—as they pass through the middle of the Earth.

Seeking to track the inner core's movements, new research published in the journal *Nature Geoscience* analyzed seismic waves from repeating earthquakes over the last six decades.

The study's authors, Xiaodong Song and Yi Yang of China's Peking University, said they found that the inner core's rotation "came to near halt around 2009 and then turned in an opposite direction".

"We believe the inner core rotates, relative to the Earth's surface, back and forth, like a swing," they told AFP.

"One cycle of the swing is about seven decades", meaning it changes direction roughly every 35 years, they added.

They said it previously changed direction in the early 1970s, and predicted the next about-face would be in the mid-2040s.

The researchers said this rotation roughly lines up with changes in what is called the "length of day"—small variations in the exact time it takes Earth to rotate on its axis.

Stuck in the middle

So far there is little to indicate that what the inner core does has much effect on surface dwellers.

But the researchers said they believed there were physical links between all Earth's layers, from the inner core to the surface.

"We hope our study can motivate some researchers to build and test models which treat the whole Earth as an integrated dynamic system," they said.

Experts not involved in the study expressed caution about its findings, pointing to several other theories and warning that many mysteries remain about the center of the Earth.

"This is a very careful study by excellent scientists putting in a lot of data," said John Vidale, a seismologist at the University of Southern California.

"(But) none of the models explain all the data very well in my opinion," he added.

Vidale published research last year suggesting that the inner core oscillates far more quickly, changing direction every six years or so. His work was based on seismic waves from two nuclear explosions in the late 1960s and early 1970s.

That timeframe is around the point when Monday's research says the inner core last changed direction—which Vidale called "kind of a coincidence".

Geophysicists 'divided'

Another theory—which Vidale said has some good evidence supporting it—is that the inner core only moved significantly between 2001 to 2013 and has stayed put since.

Hrvoje Tkalčić, a geophysicist at the Australian National University, has published research suggesting that the inner core's cycle is every 20 to 30 years, rather than the 70 proposed in the latest study.

"These mathematical models are most likely all incorrect because they explain the observed data but are not required by the data," Tkalčić said.

"Therefore, the geophysical community will be divided about this finding and the topic will remain controversial."

He compared seismologists to doctors "who study the internal organs of patients' bodies using imperfect or limited equipment".

Lacking something like a CT scan, "our image of the inner Earth is still blurry", he said, predicting more surprises ahead.

That could include more about a theory that the inner core might have yet another iron ball inside it—like a Russian doll.

"Something's happening and I think we're gonna figure it out," Vidale said.

"But it may take a decade."