

Scientists simulate Earth's creation to solve core problem

Using computer simulations, researchers from the University of California, Davis and the Chinese Academy of Sciences in Beijing have helped to solve a mystery that scientists have puzzled over since the early 1950s: What accounts for Earth's core density?

Their discovery: That Earth's core contains 0.1 to 0.8% carbon, the largest reservoir of carbon on the planet.

The findings were published in *PNAS Early Edition*.

"We knew the density of the core, and we knew that metal iron and nickel alone couldn't account for that density," says UC Davis geology professor and study co-author Qing-Zhu Yin. "You need something lighter."

Carbon was one of the major missing light element candidates; others included silicon, oxygen, phosphorus, magnesium, hydrogen, and nitrogen. To discover their content in the Earth's core, Yin and co-author Yigang Zhang went to the computer.

"We played with about 260 atoms to try to simulate Earth's formation," Yin says. "We assigned them their basic properties and let the quantum mechanics do the work in the computer. Now we know how to account for that density deficit."

An accurate knowledge of carbon's influence will help to increase our understanding of the Earth's age and the exact timing of the core's formation.

"It's about understanding the nature of the Earth," Yin says. "We're able to better understand the physical and chemical processes involved in Earth's formation."

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