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### [UCI: Heating soil could worsen warming](#)

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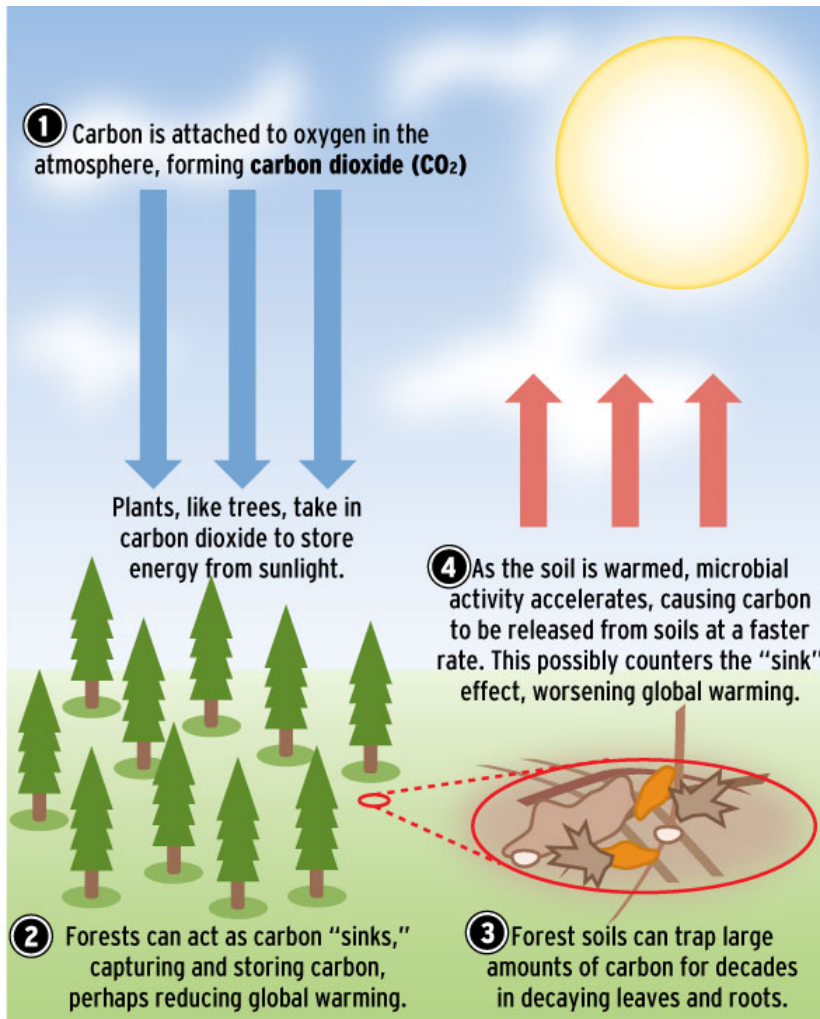
UC Irvine doctoral researcher Francesca Hopkins at a soil sampling site. She found a strong release of carbon when soil is warmed, which could worsen global warming.

Warming forest soil in mid to high latitudes could speed the release of its carbon, worsening global warming and creating a “vicious cycle,” according to [newly published research](#) by scientists at [UC Irvine](#).

The discovery solves a longstanding problem: whether the heating of carbon that has lain in soil for decades causes the same release seen in younger soil carbon.

The answer is yes, the research shows — in fact, the scientists found a strong response to warming in most of the soils they tested.

The carbon release could potentially augment the rise of atmospheric carbon dioxide, or CO<sub>2</sub>, and other greenhouse gases because of human activity that scientists say is warming the



planet.

The Register

“The majority of carbon in surface temperate forest soils is decades old; that can contribute to elevated CO<sub>2</sub>, which creates more warming,” said Francesca Hopkins, a UCI doctoral researcher and lead author of the study.

With, say, a global average temperature increase of 5 degrees by 2100, as some scenarios suggest, “we may see something more like a doubling of what is currently being emitted,” Hopkins said. “That is the fear.”

Hopkins and her co-authors, including Susan Trumbore of UCI and the [Max Planck Institute for Biogeochemistry](#), analyzed soil gathered from [Department of Energy](#) forest plots in Wisconsin and North Carolina.

After pumping out the carbon dioxide from the air inside jars containing the soil samples, the scientists warmed them by 10 and 20 degrees.

A warming of 20 degrees caused up to an eight-fold increase in the release of carbon dioxide from the soil.

Warming boosts the activity of microbes in the soil, causing them to consume more carbon, which is released as carbon dioxide.

“As temperatures increase, metabolic processes go faster,” Hopkins said. “They eat more quickly, they respire more quickly.”

As temperatures rise, the effect would be strong in temperate forests, such as those in the United States, she said — possibly overwhelming the forests’ ability to capture and hold carbon, acting as a carbon “sink.”

“In the northern latitudes, the boreal tundra regions, the carbon there is probably even more vulnerable than what we saw in these temperate soils,” Hopkins said.

But tropical soils, she said, would likely see little effect. “I don’t think these results apply because it’s already pretty warm,” she said.

Still, Hopkins said, two-thirds of the carbon in surface soils in places like North America is more than a decade old. The scientists were able to distinguish the ages of their samples in part because atmospheric CO<sub>2</sub> includes a spike in carbon 14 in the early 1960s, a result of above-ground nuclear weapons testing; the amount of carbon 14 tailed off at a known rate in the years since such tests were banned.

The strong release of decades-old carbon from surface soils is a cause for concern, Hopkins said.

“This is a problem because there’s so much of this older soil carbon,” she said. “Even though it’s released slowly, there’s so much of it it could create this extra source of CO<sub>2</sub> to the atmosphere as the planet warms.”

The study was published online Monday in the [Proceedings of the National Academy of Sciences](#).

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