

# New findings could sway thought on climate change

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Ross Secord

(PhysOrg.com) -- A newly published paper written by a University of Nebraska-Lincoln researcher and his team could influence the way scientists think about global warming and its effects.

Researchers found that a major pulse of ancient global warming may have been more complex than scientists previously believed. This pulse of warming may have been preceded or even caused by an earlier pulse of warming, said Ross Secord, assistant professor of Earth and atmospheric sciences and curator of vertebrate paleontology at the University of Nebraska State Museum.

"That has implications for [climate models](#) designed to predict the consequences of future global warming," he said.

While a few marine records have suggested a similar finding, the issue has remained unresolved, he said. This is the first evidence of its kind from the continental record, he added.

The team's findings are the focus of a paper published in the Oct. 21 issue of *Nature*, the international weekly journal of science.

The research was conducted on fossils collected from the Bighorn Basin in north-central Wyoming. Their evidence for warming is based on [oxygen isotopes](#) in mammal teeth, which reflect temperature-sensitive sorting processes, Secord said.

Scientists have long focused on a period called the Paleocene-Eocene thermal maximum, or PETM, which occurred about 56 million years ago and was marked by geologically rapid [climate change](#).

The Bighorn Basin has the most detailed record of warming on land during that period yet discovered anywhere on earth, Secord said.

"You could think of it as an ancient laboratory where the global warming experiment has already happened," Secord said. "You could look at it and try to determine what's happened in the past and maybe draw some inferences from that as to what we can expect to see happen with global warming in the future."

Scientists look to that period because the magnitude of warming seen then, about 10-15 degrees Fahrenheit, is similar to the warming expected across the globe over the next century or two. Scientists are trying to better understand the consequences of this ancient warming in hopes of being able to better predict the consequences of future warming.

The ancient period of [global warming](#) was marked by dramatic changes, Secord said. The composition of forests changed as plant species moved northward in North America by as much as 900 miles and some microorganisms in the oceans went extinct. Never-before-seen mammals like the first true primates and the ancestors of horses also began arriving in North America as high-latitude land bridges warmed and became hospitable.

Scientists have been able to recognize the event in continental and marine records because there was a huge amount of isotopically light carbon released into the atmosphere.

"Many scientists have thought that warming was the direct result of the release of this light carbon, but we found evidence from stable isotopes that warming actually preceded the release of this light carbon," Secord said. "This implies that there were two sources of warming."

Greenhouse gases released from north Atlantic volcanoes or the "lining up" of Earth's orbital cycles could have caused the first round of warming, Secord speculated.

Greenhouse gases, likely including methane, have often been considered the main cause of the second pulse of warming.

"The causes and consequences are still a matter of debate," he said. "But we think it's really important to understand the sequence of events before and during the PETM in order to understand the causes of abrupt climate change and the earth's response to that climate change."

Provided by University of Nebraska-Lincoln

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