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# Report: Climate change didn't kill dinosaurs

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STATE COLLEGE, Pa. (AP) - Climate changes in the years leading up to a cataclysmic asteroid impact did not kill off the dinosaurs or cause other mass extinctions, as some scientists believe, a Penn State University researcher concluded.

Peter Wilf, an assistant professor of geosciences, analyzed both land and ocean fossil data from the end of the Cretaceous period for a paper published in the Proceedings of the National Academy of Sciences.

Most scientists agree that an asteroid impact in Mexico more than 65 million years ago threw enough debris into the atmosphere to block out the sun, starving plants of light and, in turn, starving dinosaurs and other animals of the plants they needed to survive. But a minority believe that climate changes in the million years or so before the asteroid strike were really to blame.

"We've seen over and over again that plants and animals in an ecosystem can reorganize when there's a climate change, and that mass extinctions do not result merely from climate change," Wilf said.

"It's sort of a response to the old argument that climate change killed the dinosaurs. We're saying, 'OK, here are your climate changes, but they did not kill the dinosaurs;

an asteroid did that."

In the paper, Wilf and two colleagues say that life on Earth underwent continual evolution during a series of dramatic climate changes in the last 1 million years of the Cretaceous period, which ended with the asteroid strike. By analyzing fossil data - both from land and sea - they concluded that plant life thrived during those climate changes, with mass extinctions coming only after the asteroid strike.

Kirk R. Johnson, curator of paleontology at the Denver Museum of Nature and Science, provided the terrestrial data, and Brian T. Huber of the Smithsonian Institution's National Museum of Natural History provided the marine data.

Although the world generally cooled during the Cretaceous period, the last million years of that era saw periods of both warming and cooling. Wilf acknowledges that those climate changes might have caused some extinctions, but not the mass extinctions that appear in the fossil record after the asteroid strike.

Art Busbey, a vertebrate paleontologist and professor of geology at Texas Christian University, said the study was groundbreaking in its use of both terrestrial and marine fossil data to track climate changes, saying it was "certainly better information than anyone has had before."

But, he said, several questions remain about the fates of dinosaurs and other large vertebrates in the late Cretaceous that can't be answered simply by pointing to the asteroid impact.

"There's still a puzzling pattern ... that if you look at vertebrates as you go toward the end of the Cretaceous, there is a long decline in vertebrate diversity. So something funny is going on for quite some time before the end of the Cretaceous that is causing a decrease in dinosaur diversity and the diversity in some other groups," Busbey said.

"The impact occurred, and the impact obviously must have had some pretty disastrous effects," Busbey said. "But was the impact the real reason for the disappearance, or was the impact a coup de grace for systems that already appeared to be in trouble?"

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On the Net:

Proceedings of the National Academy of Sciences: <http://www.pnas.org/>

Penn State geosciences department: <http://www.geosc.psu.edu/>

Denver Museum of Nature and Science: <http://www.dmns.org/>

Smithsonian Institution's National Museum of Natural History:  
<http://www.mnh.si.edu/>



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