

# In 200 years, humans reversed a climate trend lasting 50 million years, study says

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Photos: Historic Mediterranean cities in danger from climate change

**(CNN)**What do scientists see when comparing our future climate with the past? In less than 200 years, humans have reversed a multimillion-year cooling trend, new research suggests.

If global warming continues unchecked, Earth in 2030 could resemble its former self from 3 million years ago, according to a [study](#) published Monday in the journal *Proceedings of the National Academy of Sciences* finds.

During that ancient time, known as the mid-Pliocene epoch, temperatures were higher by about 2 to 4 degrees Celsius (3.6 to 7.2 degrees Fahrenheit) and sea levels were higher by roughly 20 meters (almost 66 feet) than today, explained Kevin D. Burke, lead author of the study and a researcher and Ph.D. candidate at the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison.

Today is "one of the most difficult scenarios we've ever found ourselves in," Burke said. "This is a very rapid period of climatic change. Looking for anything that we can do to curb those emissions is important."

Climate scientists say that our globe is about 1 degree Celsius hotter today than it was between 1850 and 1900 and that this is due in part to gas emissions from cars, planes and other human activities. Some gases, including carbon dioxide and methane, trap heat in the atmosphere, producing a "[greenhouse effect](#)" that makes the planet warmer.

## Trying to make climate change vivid

The new study is basically "a similarity assessment," Burke said. "We have projections of future climate available for the year 2020, 2030 and so forth." For nearly 30 future decades, then, he and his co-authors drew future-to-past comparisons based on six reference periods.

The reference periods were the Historical, about mid-20th century; the Pre-Industrial, around 1850; the mid-Holocene, about 6,000 years ago; the last Interglacial Period, about 125,000 years ago; the mid-Pliocene, about 3 million years ago; and the early Eocene, about 50 million years ago.

If we continue our current level of greenhouse gas emissions -- what some would say is a "business as usual" scenario -- the overall global climate in 2030 will most closely resemble the overall climate of the mid-Pliocene period, Burke said.

What did Earth look like then? Annual temperatures on average were about 2 to 4 degrees Celsius warmer than today, there was little permanent ice cover in the Northern Hemisphere, and the sea level was about 20 meters higher.

In some places, though, including cities in the United States, temperatures in 2030 would be roughly double the global average.

Burke presented a second scenario: If we continue as we are doing now, "we see that by the year 2150, future climates have an analog [or equivalent] coming from the Eocene, the climate of 50 million years before present."

"Proxies and models tell us that it may have been as much as, globally, on average 13 degrees Celsius [about 23 degrees Fahrenheit] warmer than present," Burke said. "During that time period, there was essentially no permanent ice cover in either of the poles, so sea level would have been much higher as well."

Although the geography and configuration of our continents and oceans were different at that time, there may have been swampy forests "as far north as locations in the Arctic Circle," he said.

"Those different possible future outcomes are entirely dependent on the emissions scenario that we follow," he said.

Burke admitted that "the climate in and of itself wouldn't just wipe us out or anything," but "it's important to recognize that it would be a substantially different future."

## Disrupting the future of humanity

[Flavio Lehner](#), a project scientist at the US National Center for Atmospheric Research, said what's new in the study is the attempt to "draw parallels between past and future climates."

Lehner, who was not involved in the research, said that comparisons to the past typically are complicated by "many uncertainties" that make it challenging to "reconstruct and understand [hydroclimate change](#), even over the last 1,000 years."

"The study here does not magically reduce these uncertainties but seems to circumvent the problem by relying heavily on climate model simulations of past climates," he said. "That's not necessarily a scientific breakthrough but still makes for an interesting study."

[Nick Obradovich](#), a research scientist in the scalable cooperation group at the MIT Media Lab, said "it is well-established that the rate of warming we are currently experiencing is remarkable relative to historical rates of warming."

"Jumping back to climates not seen for millions of years -- in the course of decades -- will likely totally disrupt the future of humanity," said Obradovich, who also was not involved in the research. "It's very possible that both ecological systems and human systems may fail to adapt rapidly enough, with devastating consequences. No one knows exactly how this future will look, but if we don't curtail emissions drastically and immediately, it isn't likely to be a pretty one."

Burke emphasized, "This isn't really a problem for the future; this is a problem for now. What we're showing is that in the next decade or two, we may see climates like that of the Pliocene."

To avoid that future, both political representatives and individuals need to take action to reduce greenhouse gas emissions, he said. Individually, we can take public transport or use bicycles instead of driving, he suggested. And we can eat less of a meat-based or beef-based diet.

"When you think about the number of people who could make a change like that, that could have a significant effect," Burke said. "Anything that we can do to curb those emissions is important."