

CO2 may not warm the planet as much as thought

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The climate may be less sensitive to carbon dioxide than we thought – and temperature rises this century could be smaller than expected. That's the surprise result of a new analysis of the last ice age. However, the finding comes from considering just one climate model, and unless it can be replicated using other models, researchers are dubious that it is genuine.

As more greenhouse gases enter the atmosphere, more heat is trapped and temperatures go up – but by how much? The best estimates say that if the amount of carbon dioxide in the atmosphere doubles, temperatures will rise by 3 °C. This is the "climate sensitivity".

But [the 3 °C figure is only an estimate](#). In 2007, the Intergovernmental Panel on Climate Change (IPCC) said [the climate sensitivity could be anywhere between 2 and 4.5 °C](#). That means the temperature rise from a given release of carbon dioxide is still uncertain.

There have been [several attempts](#) to pin down the sensitivity. The latest comes from [Andreas Schmittner](#) of Oregon State University, Corvallis, and colleagues, who took a closer look at the [Last Glacial Maximum](#) around 20,000 years ago, when the last ice age was at its height.

Icy cold

They used previously published data to put together a detailed global map of surface temperatures. This showed that the planet was, on average, 2.2 °C cooler than today. We already know from ice cores that greenhouse gas levels in the atmosphere at the time were much lower than they are now.

Schmittner plugged the atmospheric greenhouse gas concentrations that existed during the Last Glacial Maximum into a climate model and tried to recreate the global temperature patterns. He found that he had to assume a relatively small climate sensitivity of 2.4 °C if the model was to give the best fit.

If climate sensitivity really is so low, global warming this century will be at the lower end of the IPCC's estimates. Assuming we keep burning fossil fuels heavily, the IPCC estimates that temperatures will rise about 4 °C by 2100, compared with 1980 to 1999. Schmittner's study suggests the warming would be closer to their minimum estimate for the "heavy burning" scenario, which is 2.4 °C.

Sensitive models

Past climates can help us work out the true climate sensitivity, says [Gavin Schmidt](#) of the NASA Goddard Institute of Space Studies in New York City. But he says the results of Schmittner's study aren't strong enough to change his mind about the climate sensitivity. "I don't expect this to impact consensus estimates," he says.

In particular, the model that Schmittner used in his analysis underestimates the cooling in Antarctica and the mid-latitudes. "The model estimate of the cooling during the Last Glacial

Maximum is a clear underestimate," Schmidt says. "A different model would give a cooler Last Glacial Maximum, and thus a larger sensitivity."

Schmittner agrees it is too early to draw firm conclusions. [Individual climate models all have their own quirks](#), so he wants to try the experiment with several models to find out if others repeat the result.

Even if the climate sensitivity really is as low as 2.4 °C, Schmittner says that doesn't mean we are safe from climate change. The Last Glacial Maximum was only 2.2 °C cooler than today, yet there were huge ice sheets, plant life was different, and [sea levels](#) were 120 metres lower.

"Very small changes in temperature cause huge changes in certain regions," Schmittner says. So even if we get a smaller temperature rise than we expected, the knock-on effects would still be severe.

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