

Study says Earth's climate sensitivity to CO2 may be lower than IPCC says

Lauren Morello, Environment & Energy Publishing, 11-29-11

Earth's climate may be less sensitive to changes in the amount of carbon dioxide in the atmosphere than scientists had suspected, a new study suggests.

In its last major report, published in 2007, the Intergovernmental Panel on Climate Change estimated that doubling the amount of carbon dioxide in the atmosphere from preindustrial levels would warm the planet between 3.6 to 8.1 degrees Fahrenheit, with a best estimate of 5.4 degrees. Some studies published since that report was released have put that number even higher, up to 18 degrees Fahrenheit.

But the new research, published Friday in the journal *Science*, suggests the true climate sensitivity may be lower than the IPCC projection. It predicts doubling CO2 would raise temperatures between 3.1 and 4.7 degrees, with a best estimate of about 4.3 degrees.

Its authors arrived at that conclusion by reconstructing the climate during the last ice age, more than 20,000 years ago, using a combination of climate modeling and data gleaned from ice cores, ocean floor sediments, pollen trapped in lake-bed cores, and other natural records of the past climate.

"This rules out some of the very high climate sensitivity estimates," said lead author Andreas Schmittner, a climate scientist at Oregon State University. "If you do climate projections with very high climate sensitivity, you would expect to see strong impacts [from climate change] in the very near future -- and those impacts would be very difficult to avoid."

The good news, he said, is that the new study suggests climate sensitivity is at the lower end of the range scientists have estimated. "We probably still have some time to reduce CO2 emissions so we can avoid those severe impacts," said Schmittner.

But the scientist cautioned that if climate sensitivity is lower than researchers had believed, as his study suggests, that shouldn't make people complacent about the risk posed by climate change.

Uncertainty remains in signals from the past

The paleoclimate data he analyzed show that small changes in sea surface temperatures at the peak of the last ice age, 21,000 years ago, produced dramatic changes in conditions on land.

"The global average cooling of the ocean surface at the last glacial maximum was only 2 degrees Celsius," roughly 3.6 degrees Fahrenheit, Schmittner said. "But that helped create huge ice sheets that were 3 kilometers thick in some places. Sea level was 120 meters lower. The vegetation was completely different."

Meanwhile, experts who were not involved with the new study said there are reasons to be cautious when interpreting the new findings.

"The work of Schmittner et al. demonstrates that climates of the past can provide potentially powerful information to reduce uncertainty in future climate predictions and evaluate the likelihood of climate change

that is larger than captured in present models," wrote Gabriele Hegerl and Tom Russon of the University of Edinburgh in a commentary accompanying the new research.

But the pair also argued that a range of factors -- including the large uncertainty in climate measurements of the distant past obtained from so-called climate proxies, like tree rings -- make it hard to rule out higher estimates of climate sensitivity.

Hegerl and Russon also noted that the new study examines an ice age, and the relationship between CO₂ and temperature changes during that period may be different than it is during warm periods like the present.