Global climate models both agree and disagree with actual Antarctic data

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Scientists who compared recorded Antarctic temperatures and snowfall accumulation to predictions by major computer models of global climate change offer both good and bad news.

The models' predictions covering the last 50 years broadly follow the actual observed temperatures and snowfall for the southernmost continent, although the observations are very variable.
That's the good news.

The bad news, however, is that a similar comparison that includes the entire last century is a poor match Projections of temperatures and snowfall ranged from 2.5 to five times what they actually were during that period.

The findings, reported last month in the journal *Geophysical Research Letters*, suggest that current computer models of the effects of global warming may not work as well for the remote Antarctic regions.

"This doesn't say that global warming from a planetary perspective is wrong," argues David Bromwich, professor of geography at Ohio State. "It says nothing about the tropics or the subtropics!

"It does imply that with the ocean north of Antarctica and the continent itself, there are some significant issues with the current climate models."

Bromwich's emphasis can be traced back to a preliminary report he gave

a year ago at a major national science meeting.

He announced then that an apparent conflict existed between the models' Antarctic predictions and the actual recorded data. People who deny climate change flocked to the report as evidence that the planet wasn't at risk, in spite of overwhelming evidence that it is.

"I think the reaction to this new work may be pretty much what it was the last time," Bromwich said sadly.

In their latest work, Bromwich, Andrew Monaghan, formerly a researcher at Ohio State's Byrd Polar Research Center, and David Schneider from the National Center for Atmospheric Research, relied on two sets of data. Monaghan has since joined the staff at NCAR.

One set came from observations of snowfall and temperature recorded from Antarctica since the International Geophysical Year a half-century ago. The other consisted of temperature data derived from short ice cores recovered from the continent.

This information was compared to an average taken from five of the major climate change models used by the Intergovernmental Panel on Climate Change (IPCC) for that period. While there are 23 global climate models (GCMs) available, the average of these five provided the best combination for this research.

Most worrisome is the finding that the century-long data set shows temperatures that vary from 2.5 to five times higher than actually occurred, based on the data. The models show a warming of the continent at the global rate, whereas the actual warming is much more muted.

Bromwich and his colleagues think they may know why the predictions

vary so much from the records. They're blaming the errors on water vapor in the atmosphere over the ice.

They suggest that long-wave radiation emitted by water vapor may be heating the ice surface and raising the temperature projected by the models.

"The models predict the water vapor," Bromwich says, "but we don't have anything to actually measure the amount of water vapor over the Antarctic continent.

"Regarding water vapor over mainland Antarctica, the models just have to be wrong," he said.

Bromwich says that the Antarctic climate has not warmed like the rest of the globe due, in part, to the strengthening of winds around the continent. That strengthening is driven by a combination of the Antarctic ozone hole in the stratosphere, greenhouse gas increases and internal climate variability across the continent, he says.

"We don't know how any of these factors will evolve during the coming century and therefore, there is still considerable uncertainty as to how much warming will occur in Antarctica," he says.

"Most people are convinced that the warming along the Antarctic Peninsula is due to human influences, but the question is how far south that warming will go, and what effect it will have," Bromwich says.

Key to this is that if melted, the ice stacked atop the Antarctic continent is enough to raise sea levels 200 feet worldwide. "That question of global sea level rise should be one that is relevant to almost everybody," he said.

Source: Ohio State University