Antarctic peninsula likely to warm over next two decades

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An analysis of historic and projected simulations from 19 global climate models shows that, because of climate change, the temperature in the Antarctic peninsula will increase by 0.5 to 1.5 degrees Celsius by 2044.

The projections also showed that precipitation—a threat to ice if it manifests as rain—will likely increase on the peninsula by about 5% to 10% over that same time period.

The estimates were published recently in the journal *Climate Dynamics*.

"We are concerned about these findings. We've been seeing overall quite big changes on the peninsula, generally getting warmer and ice shelves and glaciers discharging into the ocean," said David Bromwich, a leading author of the study and a research professor at The Ohio State University Byrd Polar and Climate Research Center and department of geography.

The peninsula sticks up like a tail off the northwest side of Antarctica, curving near the southernmost part of South America and Chile.

Since the 1950s, the peninsula, along with the rest of the western part of Antarctica, has been one of the fastest-warming regions on Earth. And because it is covered in mountains—the highest peak is just over 10,600 feet—standard climate models overlook some of the nuances of how climate change affects the peninsula, Bromwich said.

"The issue for the Antarctic peninsula is that it's this narrow but high mountain range, and these big models spanning the whole continent don't take that into account. Our goal was to provide more detail in those projections," he said.

The analysis found that the greatest increases in temperature—about 2 degrees Celsius—were likely to happen in the Antarctic fall and winter, but warmer temperatures projected for summer would cause the most trouble.

That could create a double threat to the ice on the peninsula, Bromwich said: Warmer temperatures also mean that some precipitation that might

have previously fallen as snow will likely fall as rain.

More rain means less snow on top of the ice, which protects ice from the sun's rays by reflecting them back into the sky.

"But now, if you have bare ice, or ice that's a little bit melting, and the sun beats down on it, a good fraction of that energy goes into melting," Bromwich said. "And we've seen this in the past with other ice shelves—it's like a hammer, it just shatters."

The study's authors also found that, to truly predict what might happen on the peninsula, better, more nuanced climate models are needed.

Big climate models—those that cover the surface of the Earth—often do not consider other factors specific to smaller regions. In the Antarctic peninsula, Bromwich said, an overlooked factor is the modification of the westerlies, winds that blow from west to east near either pole. The westerlies blow directly over the Antarctic peninsula, creating a sort of micro-climate that big climate models often miss.

Those nuances are especially important in the Antarctic peninsula, which has since the late 1970s been considered an important vanguard of what might happen throughout the rest of Antarctica. The peninsula, climate scientists have come to understand, is more susceptible to the effects of climate change. The first person to predict that changes throughout Antarctica would first be seen on the peninsula was another Ohio State researcher, John Mercer, who was known around the world for his work on climate change in Antarctica.

More information: Deniz Bozkurt et al, Temperature and precipitation projections for the Antarctic Peninsula over the next two decades: contrasting global and regional climate model simulations, *Climate Dynamics* (2021). DOI: 10.1007/s00382-021-05667-2

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