



Up to half of Arctic melting can be explained by natural changes

'But you can't use this as an excuse' to write off the bigger trend in warming, says one of the study's co-authors.

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A decade after "An Inconvenient Truth" featured a CGI polar bear paddling through an ice-free sea, the scientific consensus that humans are driving climate change is stronger than ever.

But it's less clear whether that bear should blame us for the loss of his ice. "You have two things going on in the Arctic," explains David Battisti, professor of atmospheric sciences at the University of Washington. You have "sea-ice melt due to increased greenhouse gases, and then you have this circulation variability" – natural fluctuations in Earth's weather and wind currents – "that's not due to greenhouse gases."

While Arctic seas have been melting at a faster-than-expected rate in recent decades, scientists are still debating the degree to which these two factors are to blame.

Professor Battisti and other scientists now say they've found an answer. In a study published Monday in the journal Nature Climate Change, they say that "internal variability," not human-caused climate change, "may be responsible for about 30–50 percent of the overall decline in September sea ice since 1979."

He and other climate scientists say this study marks a step forward for our understanding of the thawing Arctic, and for the accuracy of climate models. And while humans aren't entirely at fault for that polar bear's untimely demise, scientists see our carbon dioxide emissions continuing to influence the climate.

"What I really like about this particular study is that it's taking a look [at how much] human activities such as burning coal, oil, and gas, heating up our atmosphere, are driving changes on the ground," says Brenda Ekwurzel, director of climate science at the Union of Concerned Scientists. "It's really nice to see research trying to divide the proportions in a more refined way."

Having journeyed to the North Pole on icebreakers twice to conduct research, Dr. Ekwurzel has seen the Arctic's melt firsthand. But its causes – natural and human – hadn't been pinned down by the computer models that scientists use to predict and simulate changes in Earth's systems. In 2012, Scientific American reported, "Summer ice is thinning faster than every climate projection... For scientists, it is increasingly clear that the models are under-predicting the rate of sea ice retreat because they are missing key real-world interactions."

In two separate phone interviews with The Christian Science Monitor, Professor Battisti and one of his colleagues, Axel Schweiger, explain that when scientists run climate models to test the impact of CO2 emissions, they run the same simulation multiple times. One-off variations in temperature, precipitation, and other factors cancel each other out, leaving scientists with a trendline that can be attributed to the emissions – and compared with real-world observations.

Dr. Schweiger sees two possible reasons why this process fell short for sea ice: "1) [the models] are not sensitive to greenhouse gases because they oversimplify physical processes or 2) natural variability has added to the observed trend and the models are fine, [but] because by design of the experiment...they cannot match the observed trend."

The lead author of this study, the University of California-Santa Barbara's Qinghua Ding, had focused his past research on "natural variability": in particular, how changes in tropical Pacific rain patterns can cause Arctic temperature shifts. He and the study's other researchers decided to focus on changes like these, rather than on CO2, in their model.

As Schweiger puts it, "We took the CO2 out and put the weather in.... We basically just made the winds blow in the direction that they actually did blow." Battisti explains that re-playing several decades' worth of Arctic wind gusts, heat waves, and cold snaps "gave us a good chunk" of the sea ice melt, about "30 to 50 percent of it."

That percentage range, they concluded, was the amount of sea ice melt that could be attributed to a current warm spell the Arctic's facing – one not directly related to anthropogenic climate change.

"Our results suggest that [natural variability] is a good explanation for the discrepancy" between predictions and observations, Schweiger notes. He also posits that climate models "may be not sensitive enough" to greenhouse gases and the ways they interact with natural fluctuations.

However this study guides climate science moving forward, it could also get picked up by policy-makers. The researchers' findings come amid official skepticism towards the causes of climate change. Just last week, EPA Administrator Scott Pruitt denied that CO2 was "a primary contributor to the global warming that we see."

At first glance, this new study might appear to bolster Pruitt's point, but Schweiger doesn't want his research being taken that way. "I'm concerned about this," he tells the Monitor. "When we put the paper out, we knew that this was a possibility."

On its website, the Union of Concerned Scientists lists several "Global Warming Skeptic Organizations" that "are actively working to sow doubt about the facts of global warming."

One of these groups, the Cato Institute, maintains a Center for the Study of Science. Its assistant director, Paul “Chip” Knappenberger, says that he and his colleagues “think that humans are having a role in climate change,” but he doesn’t link every warm spell back to this trend.

“When you start looking for human impacts on the climate, it shows up on larger scales, like the global average surface temperature,” he tells the Monitor over the phone. But on “regional scales, it gets a little bit harder, so these guys sort of documented that in the Arctic sea ice, and when you get to local scales, natural variability starts to be a driving factor.”

For their part, the papers’ authors want to make sure that natural variations in the Arctic don’t obscure the overall human-caused trend towards warmer temperatures.

“You [can] have a warm day and a cold day in Boston in the springtime,” Battisti points out, the result of natural, short-term changes in weather. But “you know ... it's gonna be hot in the summer,” because Earth's tilt puts the sun more directly overhead. [**Editor's note:** *This paragraph has been revised for clarity.*]

He takes a similar view towards what’s happening now in the Arctic, but with heat-trapping CO₂ as the key factor. "If you increase carbon dioxide, inevitably, it's gonna be a lot warmer and there's gonna be a lot less sea ice. There's gonna be bumps up and down along the way, but you can't use this as an excuse” to write off the bigger trend.

“If anything, what this [study] says is, we know that this is natural variability that's amplifying, right now, the effects of increased CO₂.”

Even if the Arctic’s current warm spell breaks, he predicts that increased CO₂ will continue to drive ice melt, albeit at a reduced rate. "When you see that, you shouldn't say, ‘Oh, there's no problem,’” Battisti warns. "What you should say is, ‘Wow, there's a real problem, because even in this cold phase of natural variability, we're still losing sea ice.’”