

# Antarctic glaciers' melt is happening more rapidly than was first believed

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This undated handout photo provided by NASA shows the Thwaites Glacier in West Antarctica. Two new studies indicate that part of the huge West Antarctic ice sheet is starting a slow collapse in an unstoppable way. Alarmed scientists say that means even more rises in sea level than they figured. Photo: AP Photo/NASA

As warming ocean water melts away the base of the Antarctic ice shelf, the irreversible collapse of a massive cluster of glaciers in Antarctica has begun. This could mean that sea levels will rise another 4 feet within 200 years, flooding coastal areas.

Researchers had previously estimated that the glacier cluster in the Amundsen Sea region of the West Antarctic Ice Sheet would last for thousands of years. But new studies found that the glacier collapse is underway and occurring far more rapidly than scientists expected.

The warming water is tied to several environmental phenomena, according to two studies released Monday. They include [global warming \(https://www.newsela.com/?tag=global warming\)](https://www.newsela.com/?tag=global+warming) and depleted ozone. The ozone is a gas in the atmosphere that has changed wind patterns.

“There is no red button to stop this,” said Eric Rignot, a University of California, Irvine (UCI) professor of Earth system science. He is the lead author of one of the studies conducted with NASA’s Jet Propulsion Laboratory (JPL), which will be published in a journal of the American Geophysical Union.

## **No Going Back**

The six glaciers have passed “the point of no return,” Rignot said, meaning that total collapse — the melting of the glaciers — cannot be prevented. “The only question is how fast it’s going to go.”

Antarctica, surrounding the South Pole, has the largest amount of ice on the planet and contains an estimated 80 percent of the world’s fresh water. Its scale is difficult to fathom. One environmental foundation said that if you loaded the ice onto cargo ships and started counting the vessels, one per second, it would take 860 years before you were finished counting.

The loss of even a portion of that ice would have consequences across the globe. Scientists have predicted the possibility of glacier collapse for decades. Confirmation of their hypothesis arrived Monday.

## **When Melt Happens**

For the UCI-JPL study, scientists used 40 years’ worth of measurements. Much of it came from data from satellite radar systems that can measure changes on Earth’s surface to within a quarter of an inch.

The data was used to measure the precise location of the glaciers’ so-called grounding lines — the point at which glaciers connect to the ocean floor. It is here that ocean water encounters the glaciers and causes it to melt.

The problem compounds itself in several ways, scientists said.

The more grounding lines recede, for instance, the less glaciers weigh. This lifts them farther off Earth’s bedrock, which allows even more warm water to wear away at the glaciers’ foundations. Similarly, as the glaciers float into deeper portions of the ocean, their ice faces become steeper. This makes them increasingly unstable and exposes them even more to warmer water.

The second study, conducted by researchers at the University of Washington, focused largely on the Thwaites Glacier. Scientists attempted to pinpoint how quickly the giant Thwaites might disappear altogether. By itself, the disappearance of the Thwaites could cause global sea levels to rise 2 feet.

That amount of sea level rise would have a disastrous impact.

## **The Glacial Clock Is Ticking**

Another study this year of the potential effect in Southern California, for instance, said that even a lower rise in the sea level would threaten portions of the Pacific Coast Highway in Southern California. It would endanger power plants and wastewater treatment plants. It would also worsen tides and storm surges in low-lying communities near Los Angeles, such as Venice and San Pedro.

Using satellite measurements and computer models, the Washington study determined that the Thwaites could melt in as little as 200 years or as long as 1,000 years. Ian Joughin, a university glaciologist and the lead author of that study, said the the lower estimate is more likely.

“There is quite a bit of ongoing destabilization,” he said, and the glacier's disappearance would begin slowly and accelerate over time.

The Thwaites is an important test case because the glacier is an anchor for the rest of the West Antarctic Ice Sheet. As goes the Thwaites, many scientists fear, so goes the rest of the ice sheet. Its disappearance would undermine the entire glacial system, exposing many more miles of grounding lines to the warming ocean water.

“You can't just remove this glacier cleanly,” Joughin said. “You pull one part out, the rest will move into the void.”

## **Domino-Effect Disappearance**

If the entire ice sheet disappeared, the global sea level could rise by a catastrophic 15 feet.

“Eventually, this could lead to the demise of ice across Antarctica,” Rignot said.

The scientists were careful to point out that the melting of the glaciers may be inevitable, but it's not a reason to give up on stopping global warming. The 800-year range is enormous, they pointed out — and was driven by computer models that gave many scenarios. More emissions from the burning of fossil fuels, including oil, gas and coal, mean more melting and faster collapse, the researchers said, but the reverse is true, too.

“Eight hundred years is a long time,” Joughin said.

A significant reduction in emissions and other safeguards against climate change could put the glacier collapse closer to 1,000 years. Think of the technological advances that have occurred in the last 800 years and think of what scientists could come up with in the next 800 years to protect coastal areas, Joughin said.

“The system really is going down,” Rignot said. “How fast it is going to go is critical.”

## Quiz

- 1 Select the paragraph from the article that gives detailed imagery describing the amount of ice contained in Antarctic glaciers.
  
- 2 According to the article, all of the following are impacts of global warming EXCEPT:
  - (A) droughts in coastal areas
  - (B) receding grounding lines
  - (C) melting of glaciers
  - (D) rise in sea levels
  
- 3 The article draws a connection between all of the following EXCEPT:
  - (A) global warming and warming of sea water
  - (B) burning of fossil fuels and melting of glaciers
  - (C) warming of sea water and melting of glaciers
  - (D) 800 years and the flooding of the Pacific Coast Highway
  
- 4 How does change in grounding lines affect the melting of glaciers?
  - (A) The more the grounding lines recede, the glaciers become lighter.
  - (B) The more the grounding lines recede, the glaciers become heavier.
  - (C) The less the grounding lines recede, the glaciers become lighter.
  - (D) The less the grounding lines recede, the glaciers become heavier.