

West Antarctica Begins to Destabilize With ‘Intense Unbalanced Melting’

Warmer ocean water is attacking ice at its base, adding dangerously to sea-level rise.

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If you want to see the future of New York, Tokyo, or Mumbai, look no further than West Antarctica, where a warmer sea is turning ice into water that may be headed to your doorstep.

The bottom of the world has drawn increased scrutiny from scientists over the last few years, as West Antarctic ice loss in some places shows signs of becoming “unstoppable.” There’s enough water locked up in West Antarctica’s Amundsen Sea region alone to raise the global average sea level by four feet, and it’s the fastest-melting spot on the continent. The National Science Foundation and a U.K. counterpart last week announced that they’ll fund up to \$25 million in research that will help the scientific community better understand the timing and mechanics of a critical glacier, the Thwaites. It’s basically the climate-science equivalent of an FBI “Most Wanted” poster.

A study issued on Tuesday in *Nature Communications* measures directly just how dramatically glaciers are being gnawed at from beneath. The research focuses on those that empty into a section of the Amundsen Sea just south of the Thwaites Glacier. A significant portion of Antarctica is now subject to “intense unbalanced melting,” the authors write.

Everyone has heard of global warming, and most understand that letting ice melt will eventually flood coastal cities. But many may not understand how these critical parts of the globe function. In West Antarctica, for example, glaciers flow (yes, they move, albeit slowly) off the continent, toward the sea, terminating at a final “grounding line”— the extent of the ice that’s lying on bedrock. From there, a frozen sheet called an ice shelf extends into the sea. The problem, increasingly, is the sea encircling West Antarctica has warmed up and is flowing beneath those ice shelves, washing grounding lines back toward the continent. It’s as if the foundation of your house were slowly being chipped away from below. It may be only a matter of time before the structure collapses.

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as you descend.

Scientists can see the ice retreat because of direct measurements taken in 2002, 2009, and 2014, when NASA's [Operation IceBridge](#) flew over the area with ice-penetrating radar. The program is expected to fly the same route again this season to produce a contemporary snapshot.

This [NASA video](#) provides a visual overview of West Antarctica's Amundsen Sea glaciers. It is narrated by Eric Rignot, a scientist at NASA's Jet Propulsion Laboratory and University of California-Irvine and a co-author of the new paper.

Always concerned that their instruments might not to be sensitive enough to detect the changes they're studying, authors of the *Nature Communications* paper could at least put *that* out of their minds. The changes in the ice surpassed their instrument's uncertainty by a factor of 10 or 100. "Any change within a few meters probably would not have been easy to discern," said Ala Khazendar of NASA's Jet Propulsion Laboratory and the lead author, "but here we're talking about between 300 and 500 meters in seven years."

The topography of the region isn't helping matters. The ground beneath the glaciers sinks the farther you move inland. So when grounding lines retreat, they also descend, leaving a deeper target for warming waters to flow into and carving away additional ice. The Smith Glacier's grounding line, for example, is now 2,100 meters below sea level, by far the deepest in its neighborhood. It's also much more susceptible to further melt because the temperature at which frozen seawater melts drops

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