

Vast Antarctic ice sheet 'in play' with global warming



Ralph Timmermann / Alfred Wegener Institute

Part of Antarctica's Filchner-Ronne Ice Shelf is seen in the Weddell Sea. Two new studies project the shelf will disappear by 2100, potentially releasing ice trapped on Antarctica's largest ice sheet.

By Miguel Llanos, msnbc.com

Scientists have long focused on Antarctica's smaller ice sheet as being vulnerable to warming, but two new studies project that part of the continent's much larger ice sheet is also at risk -- and that ice now held back on land there could add to sea level rise by 2100.

"This is the first legitimate evidence that this part of Antarctica is in play," Bob Bindschadler, a NASA earth scientist who has studied Antarctica for 30 years, told msnbc.com. "The potential, the reservoir of ice ... is vast."

In fact, that area, known as the East Antarctic Ice Sheet, has 10 times as much ice as the West Antarctic Ice Sheet.

One study, [published Wednesday in the journal Nature](#), used a computer model to project what would happen in Antarctica's Weddell Sea if temperatures rose in line with U.N. projections for 2100.

The result was a change in ocean circulation and a temperature increase that would disintegrate the now-intact Ronne-Filchner Ice Shelf, with warmer water eating away from underneath.

Ice shelves like Ronne-Filchner sit on water, and thus their disintegration can't raise sea levels directly. But they also hold back ice sheets that sit atop land -- and those would start to drain into the sea if shelves weren't there to block them.

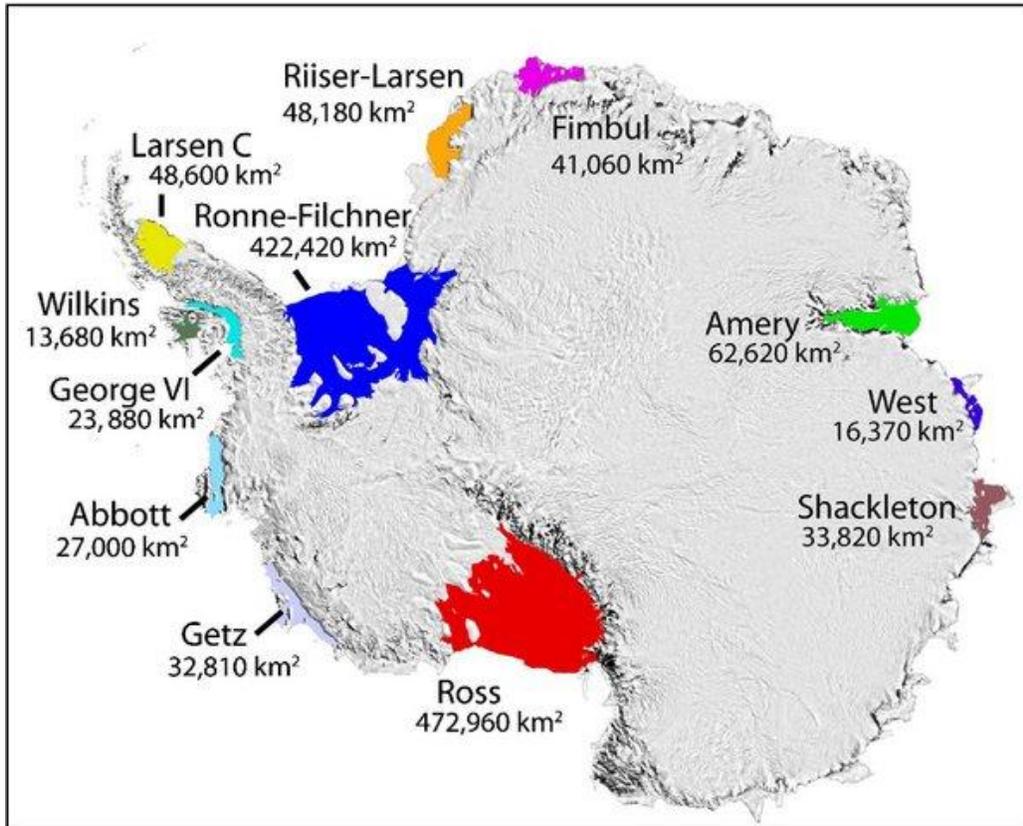
In the past century, as the climate has warmed, sea level rise has accelerated. Scientists predict it will only increase, and they're studying changes in the ocean and land to better understand how and why the water is rising. NBC's Anne Thompson reports for "Changing Planet," produced by NBC Learn in partnership with the National Science Foundation.

The Ronne-Filchner shelf is unusual in that it "sits on the fence" between Antarctica's two ice sheets, so it "can affect both sides," said Bindschadler, who was not involved in the research.

The finding echoes earlier research showing a similar warming effect in the Amundsen Sea on the other side of the Antarctic Peninsula. Ice shelves along the Amundsen Sea coast have weakened in recent decades.

"The Weddell Sea is as vulnerable as the Amundsen Sea," study co-author Hartmut Hellmer of Germany's Alfred Wegener Institute said at a press conference, "and it affects a much larger ice shelf."

"We found a mechanism which drives warm water towards the coast with an enormous impact on the Filchner-Ronne Ice Shelf in the coming decades," he added in a statement released with the study.



National Snow and Ice Data Center

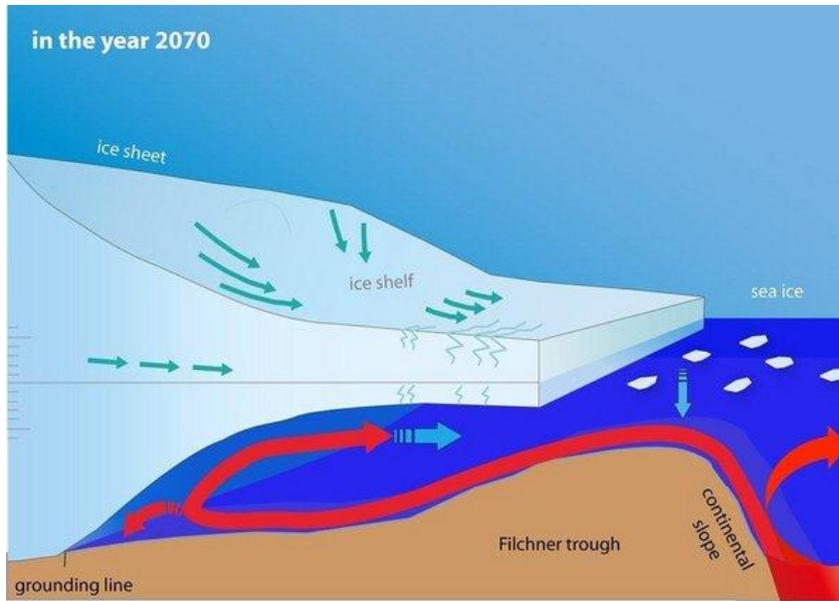
The Ronne-Filchner ice shelf, seen in blue, sits between Antarctica's two ice sheets, which are divided by the Transantarctic Mountains going from that ice shelf to the Ross ice shelf.

"It appears all hell could break loose there, too," added Bindschadler.

The second study, published in *Nature Geoscience* on Wednesday, found that the Ronne-Filchner ice shelf has a slope that would accelerate melt since warmer seas would flow toward the ice being held back on land.

That scenario, said Bindschadler, "sets off alarms in my mind."

The study authors -- and Bindschadler -- emphasized that the east sheet has not started eroding but they certainly worry about the potential.



Alfred Wegener Institute

The scenario seen by researchers includes warming seas that reduce sea ice and eat away at the bottom of the Ronne-Filchner ice shelf.

"It still doesn't look like they've done much," Bindshadler said of the ice streams that could flow into the Weddell Sea, "but lo and behold, the vulnerability is perhaps greater than the ice shelves we've been focused on recently."

Just how much ice could escape into the sea -- and raise global sea levels -- if the Ronne-Filchner ice shelf disintegrated is the big unknown.

The two studies didn't look at that aspect but "we think there is cause for concern," said Martin Siegert, co-author of the slope study and a University of Edinburgh researcher.

Another group at the Alfred Wegener Institute is now studying the potential impact on sea levels.

If the ice sheet flow toward the sea is as great as the ice shelf loss, the institute said in its statement, then global sea levels would rise 0.17 inches a year.

That might not sound like much, but sea levels rose by just 0.05 inches a year from 2003 to 2010 due to ice melt, the institute noted.

Moreover, the U.N. Intergovernmental Panel on Climate Change [projects other sources will raise sea levels](#) between seven inches and two feet by 2100, potentially flooding many low-lying areas.