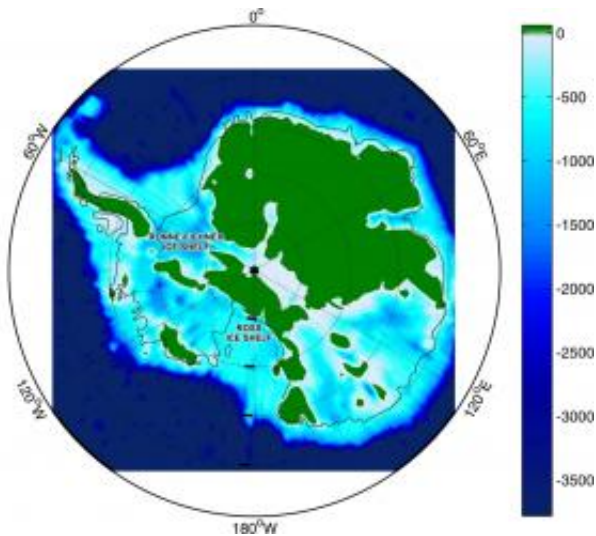


# Sea level rise could be worse than anticipated

5 February 2009



A digital image of what Antarctica would look like if it consisted only of land actually above sea level.

"We aren't suggesting that a collapse of the West Antarctic Ice Sheet is imminent," said Peter Clark, a professor of geosciences at Oregon State University. "But these findings do suggest that if you are planning for sea level rise, you had better plan a little higher."

The Intergovernmental Panel on Climate Change has estimated that a collapse of this ice sheet would raise sea levels around the world by about 16.5 feet, on average, and that figure is still widely used. However, that theoretical average does not consider several key forces, such as gravity, changes in the Earth's rotation or a rebound of the land on which the massive glacier now rests, scientists say in the new study.

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If global warming some day causes the West Antarctic Ice Sheet to collapse, as many experts believe it could, the resulting sea level rise in much of the United States and other parts of the world would be significantly higher than is currently projected, a new study concludes.

The catastrophic increase in sea level, already projected to average between 16 and 17 feet around the world, would be almost 21 feet in such places as Washington, D.C., scientists say, putting it largely underwater. Many coastal areas would be devastated. Much of Southern Florida would disappear.

The report will be published Friday in the journal *Science*, by researchers from Oregon State University and the University of Toronto. The research was funded by the National Science Foundation and other agencies from the U.S. and Canada.

Right now, this ice sheet has a huge mass, towering more than 6,000 feet above sea level over a large section of Antarctica. This mass is sufficient to exert a substantial gravitational attraction, researchers say, pulling water toward it - much as the gravitational forces of the sun and moon cause the constant movement of water on Earth commonly known as tides.

"A study was done more than 30 years ago pointing out this gravitational effect, but for some reason it became virtually ignored," Clark said. "People forgot about it when developing their sea level projections for the future."

And aside from incorporating the gravitational effect, the new study adds further wrinkles to the calculation - the weight of the ice forcing down the land mass on which it sits, and also affecting the orientation of the Earth's spin. When the ice is removed, it appears the underlying land would rebound, and the Earth's axis of rotation defined by the North and South Pole would actually shift about one-third of a mile, also affecting the sea level at

various points.

Source: Oregon State University

When these forces are all taken into calculation, the sea level anywhere near Antarctica would actually fall, the report concludes, while many other areas, mostly in the Northern Hemisphere, would go up.

If the West Antarctic Ice Sheet completely melted, the East Coast of North America would experience sea levels more than four feet higher than had been previously predicted - almost 21 feet - and the West Coast, as well as Miami, Fla., would be about a foot higher than that. Most of Europe would have seas about 18 feet higher.

"If this did happen, there would also be many other impacts that go far beyond sea level increase, including much higher rates of coastal erosion, greater damage from major storm events, problems with ground water salinization, and other issues," Clark said. "And there could be correlated impacts on other glaciers and ice sheets in coastal areas that could tend to destabilize them as well."

It's still unclear, Clark said, when or if a breakup of the West Antarctic Ice Sheet might occur, or how fast it could happen. It may not happen for hundreds of years, he said, and even then it may not melt in its entirety. Research should continue to better understand the forces at work, he said.

"However, these same effects apply to any amount of melting that may occur from West Antarctica," Clark said. "So many coastal areas need to plan for greater sea level rise than they may have expected."

A significant part of the concern is that much of the base of this huge ice mass actually sits below sea level, forced down to the bedrock by the sheer weight of the ice above it. Its edges flow out into floating ice shelves, including the huge Ross Ice Shelf and Ronne Ice Shelf. This topography makes it "inherently unstable," Clark said.

"There is widespread concern that the West Antarctic Ice Sheet, which is characterized by extensive marine-based sectors, may be prone to collapse in a warming world," the researchers wrote in their report.

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