

# Antarctic Ice Sheet Is Melting Rapidly

New Study Warns Of Rising Sea Levels

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Friday, March 3, 2006; A01

The Antarctic ice sheet is losing as much as 36 cubic miles of ice a year in a trend that scientists link to global warming, according to a new paper that provides the first evidence that the sheet's total mass is shrinking significantly.

The new findings, which are being published today in the journal *Science*, suggest that global sea level could rise substantially over the next several centuries.

It is one of a slew of scientific papers in recent weeks that have sought to gauge the impact of climate change on the world's oceans and lakes. Just last month two researchers reported that Greenland's glaciers are melting into the sea twice as fast as previously believed, and a separate paper in *Science* today predicts that by the end of this century lakes and streams on one-fourth of the African continent could be drying up because of higher temperatures.

The new Antarctic measurements, using data from two NASA satellites called the Gravity Recovery and Climate Experiment (GRACE), found that the amount of water pouring annually from the ice sheet into the ocean -- equivalent to the amount of water the United States uses in three months -- is causing global sea level to rise by 0.4 millimeters a year. The continent holds 90 percent of the world's ice, and the disappearance of even its smaller West Antarctic ice sheet could raise worldwide sea levels by an estimated 20 feet.

"The ice sheet is losing mass at a significant rate," said Isabella Velicogna, the study's lead author and a research scientist at Colorado University at Boulder's Cooperative Institute for Research in Environmental Sciences. "It's a good indicator of how the climate is changing. It tells us we have to pay attention."

Richard Alley, a Pennsylvania State University glaciologist who has studied the Antarctic ice sheet but was not involved in the new research, said more research is needed to determine if the shrinkage is a long-term trend, because the new report is based on just three years of data. "One person's trend is another person's fluctuation," he said.

But Alley called the study significant and "a bit surprising" because a major international scientific panel predicted five years ago that the Antarctic ice sheet would gain mass this century as higher temperatures led to increased snowfall.

"It looks like the ice sheets are ahead of schedule" in terms of melting, Alley said. "That's a wake-up call. We better figure out what's going on."

Velicogna acknowledged that it is hard to predict how fast the ice sheet will melt in the future but said, "I don't expect it's going to stop in the next couple of years."

Scientists have been debating whether the Antarctic ice sheet is expanding or shrinking overall, because the center of the sheet tends to gain mass through snowfall whereas the coastal regions are more vulnerable to melting.

Velicogna and her co-author, University of Colorado at Boulder physics professor John Wahr, based their measurements on data from the two GRACE satellites that circle the world more than a dozen times a day at an altitude of 310 miles. The satellites measure variations in Earth's mass and gravitational pull: Increases or decreases in the Antarctic ice sheet's mass change the distance between the satellites as they fly over the region.

"The strength of GRACE is that we were able to assess the entire Antarctic region in one fell swoop to determine if it was gaining or losing mass," Wahr said.

But some scientists remain unconvinced. Oregon state climatologist George Taylor noted that sea ice in some areas of Antarctica is expanding and part of the region is getting colder, despite computer models that would predict otherwise.

"The Antarctic is really a puzzle," said Taylor, who writes for the Web site TSCDaily, which is partly financed by fossil fuel companies that oppose curbs on greenhouse gases linked to climate change. "A lot more research is needed to understand the degree of climate and ice trends in and around the Antarctic."

At the other end of the temperature spectrum, two South African researchers are reporting today in *Science* that their computer models indicate that by 2100 climate change may rob the south and west of Africa and areas in the upper Nile region of a significant portion of their current water supply. Warming may reduce the rainfall needed to replenish up to 25 percent of Africa's surface water, said Maarten de Wit and Jacek Stankiewicz at the University of Cape Town in Rondebosch, South Africa.

"Water is essential to human survival," they wrote, "and changes in its supply can potentially have devastating implications, particularly in Africa, where much of the population relies on local rivers for water."

Congressional Democrats, including Sen. John F. Kerry (Mass.) and Rep. Henry A. Waxman (Calif.) said yesterday that the two new papers show that the United States must act quickly to impose mandatory limits on carbon dioxide and other greenhouse gases. The Bush administration opposes such curbs on the grounds that they could hurt the country's economy and has instead invested money on new technology to limit greenhouse emissions and further climate science research.

"Climate change is not just someone else's concern but a very real threat to the lives and livelihood of people across the globe," Kerry said.

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