World's last bastion of stable ice now thawing

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We thought it was one of the Earth's last remaining regions of stable ice. Now it seems the East Antarctic ice sheet has been losing mass since 2006 and could become a significant source of sea level rise, according to data from gravity-measuring satellites.

Previous studies have suggested that the ice sheet was either stable or even gaining ice mass. Now satellite measurements analysed by Jianli Chen of the Center for Space Research at the University of Texas at Austin and his colleagues suggest that the East Antarctic ice sheet is losing at least 5 billion tonnes of mass each year.

"This paper provides the most accurate measurements to date of the current rate of mass loss from Antarctica," says Eric Steig, a glaciologist at the University of Washington in Seattle.

Grace data

In 2002, NASA launched a pair of satellites called GRACE that measure how Earth's gravity field changes over time, as the mass of ice at the poles changes and water moves around the oceans. Chen's team used the satellites' data to estimate and map changes in ice abundance in Antarctica between 2002 and 2009.

"We've used the best available data set and the most up-to-date models to provide the most accurate estimates yet of ice loss in Antarctica," says Clark Wilson, a co-author at the Center for Space Research.

The team found that East Antarctica has been losing at least 5 billion tonnes of ice every year since 2006. They think the actual figure could be 57 billion tonnes per year.

Giant awakes

The study "underlines the importance of Antarctica as the formerly sleeping giant of global sea level rise that is no longer slumbering but is now undergoing a rude awakening", says Edward Hanna, who researches polar ice mass at the University of Sheffield, UK, but was not involved in the research.

Why is East Antarctica starting to melt? "One possible explanation is that climate change or simple year-to-year variability has changed patterns of snowfall over the continent, which determines where and how much ice forms," says Wilson.

Hanna, however, thinks the melting is probably down to anthropogenic warming. "I'd say this is another key observation highlighting the rapidity and sensitivity of global climate to human-driven greenhouse-gas forcing," he says.

Massive doubts

Some researchers are not convinced that the continent is losing mass, since the margins for error in the team's analysis range between 5 and 109 billion tonnes of ice loss per year.

"I don't think we can confidently make a statement yet on whether East Antarctica is growing or shrinking," says Philippe Huybrechts at the Free University of Brussels, Belgium. "Seven years is too short to make meaningful statements on the evolution of the Antarctic ice sheet," he says.

Part of the problem with accurately estimating ice loss is a phenomenon known as post-glacial rebound: the rock underneath Antarctica is rising up because the ice of the last ice age is no longer weighing it down, and this is naturally changing the continent's gravity field.

"One of the limitations of GRACE is that it can't distinguish between changes in mass underlying the continent caused by the post-glacial rebound effect from changes in ice mass at the surface," says Wilson.

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