

# Study sheds light on vulnerability of polar ice sheets to modestly warmer climate

July 12 2012, by Donna Hesterman

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(Phys.org) -- A new study by a University of Florida researcher finds that sea level peaked between 18 and 30 feet above current sea level during the last interglacial period approximately 125,000 years ago.

That's significant, the researchers say, because knowing how high [sea level](#) peaked previously tells us something about how the earth may respond as global temperatures rise again.

The finding differs from many studies on sea level during the previous warming period because the researchers use fossil coral reef data to estimate sea levels and then factor in the physics of how ever-changing ice sheets have affected those estimates. The range of sea level maximums that they estimate for the period suggests that part of the Greenland [ice sheet](#) had collapsed, as well as a large portion of the West [Antarctic ice](#) sheet and possibly sectors of the East Antarctic ice sheet.

The study appears in the July 13 edition of *Science*.

A sea floor is like a container for the ocean that is continually changing its shape over time, and that affects sea level. The crushing weight of the ocean alters the container by compressing the rock below it. And continents change the container as they slowly rebound from compression exerted by massive glaciers during the last ice age.

“It's all very dynamic. Some points on the globe are rising while others are falling. And the gravitational pull of ice sheets literally causes sea

level to be higher around the sheet's perimeter. There's also this sloshing effect caused by the confluence of these forces," said study lead author Andrea Dutton, an assistant professor of geology at the University of Florida. "It sounds complicated, but the physics behind it is well understood."

Kurt Lambeck, a professor of geophysics at Australian National University in Canberra, Australia used computer modeling to turn back the geological clock and recreate the expected patterns of regional sea level during the last [interglacial period](#). He and Dutton then superimposed data from fossil coral species known to live near the surface of the ocean on the model to see how high sea level rose during the period in question.

The poles were approximately 5 to 10 degrees Fahrenheit warmer than they are today.

"That's well within range of what could occur before the end of this century," Dutton said.

Polar temperatures are of particular concern because scientists predict that a complete collapse of an already unstable West Antarctic ice sheet could cause average sea level to rise by approximately 10 feet rather precipitously. The process may have already begun with the western shelf of Antarctica's ice sheet slowly sloughing off into the warming waters of the Southern Ocean.

It could take more than a century for the ice sheet to melt, she said. But given the current trend of warming, the planet may already be committed to a path that the population isn't prepared to deal with.

"This can be a runaway process," she said.

Provided by University of Florida

Citation: Study sheds light on vulnerability of polar ice sheets to modestly warmer climate (2012, July 12) retrieved 27 April 2024 from <https://phys.org/news/2012-07-vulnerability-polar-ice-sheets-modestly.html>

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