

Resolving the Paradox of the Antarctic Sea Ice

ScienceDaily (Aug. 16, 2010) — While Arctic sea ice has been diminishing in recent decades, the Antarctic sea ice extent has been increasing slightly. Researchers from the Georgia Institute of Technology provide an explanation for the seeming paradox of increasing Antarctic sea ice in a warming climate.



A tabular iceberg floating within Paradise Harbor, Antarctica. (Credit: iStockphoto/Julie Harris)

The paper appears in the Early Edition of the *Proceedings of the National Academy of Science* the week of August 16, 2010.

"We wanted to understand this apparent paradox so that we can better understand what might happen to the Antarctic sea ice in the coming century with increased greenhouse warming," said Jiping Liu, a research scientist in Georgia Tech's School of Earth and Atmospheric Sciences.

Currently, as the atmosphere warms, the hydrological cycle accelerates and there is more precipitation in the Southern Ocean surrounding Antarctica. This increased precipitation, mostly in the form of snow, stabilizes the upper ocean and insulates it from the ocean heat below. This insulating effect reduces the amount of melting occurring below the sea ice. In addition, snow has a tendency to reflect atmospheric heat away from the sea ice, which reduces melting from above.

However, the climate models predict greenhouse gases will continue to increase in the 21st century, which will result in the sea ice melting at a faster rate from both above and below. Here's how it works. Increased warming of the atmosphere is expected to heat the upper ocean, which will increase the melting of the sea ice from below. In addition, increased warming will also result in a reduced level of snowfall, but more rain. Because

rain doesn't reflect heat back the way snow does, this will enhance the melting of the Antarctic sea ice from above.

"Our finding raises some interesting possibilities about what we might see in the future. We may see, on a time scale of decades, a switch in the Antarctic, where the sea ice extent begins to decrease," said Judith A. Curry, chair of the School of Earth and Atmospheric Sciences at Georgia Tech.