TUCSON REGION

Antarctic ocean may help slow heat here

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Tucson residents may have the Southern Ocean to thank for keeping temperatures down in the face of global warming, research conducted by a University of Arizona professor shows.

A climate model that Joellen Russell worked on shows that the Southern Ocean could help slow global warming because the ocean will take up about 20 percent more heat from the atmosphere than another, identical model predicted.

Eighteen different models from around the world all show that the westerly winds have moved south toward Antarctica in the last 30 years, but different models place the winds in different locations, which accounts for the conflicting results.

Russell, an assistant professor of geosciences, said she and her team were surprised by their findings.

The model was run at the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory in Princeton, N.J., and could mean good news for Tucsonans. Russell said that the ocean may help slow the increase of peak summer temperatures in the next 20 to 50 years.

The westerly winds run in a current around Antarctica. Because there is no land to disrupt its flow, the current is, on average, 30 times stronger than the jet stream that runs across the United States, Russell said.

Those strong winds bring water to the surface from as deep as 3 miles, Russell said.

The cycling of the surface water away from Antarctica brings more water from the deep ocean to the surface. The water can absorb more heat and carbon dioxide, which is why the ocean can help slow global warming, Russell explained. She also compared the Southern Ocean to a kitchen and the atmosphere to an oven.

"When you turn the oven on with its door closed, the oven heats up and so, more slowly does the entire kitchen," she wrote in a paper co-written with other NOAA researchers in the December issue of the Journal of Climate.

"The winds over the Southern Ocean act like an oven door. If you open the oven door, the kitchen heats up more quickly, but the oven heats up more slowly," Russell said.

Erik Pytlak, a meteorologist with the National Weather Service in Tucson, said his agency is unsure about the effects of global warming on Tucson.

"The literature we've seen is actually conflicting for what global warming will do here in Tucson," he said. "We're just starting to get our arms around what the impacts will be in specific locations."

The average low temperature from 1901 to 1930 was 50.8 degrees Fahrenheit; from 1976 to 2005, it was 55.5 F. Pytlak said that the weather service thinks the five-degree increase had more to do with Tucson's rapid growth and the addition of concrete and buildings through the years, known as the urban heat island effect, than with global warming. The average high temperature increased by less than 1 degree in those two timeframes.

The Southern Ocean

Never heard of the Southern Ocean? You're not alone. Here are some quick facts about the world's fifth ocean.

• It was added to the list of oceans in spring 2000 by the International Hydrographic Organization. The United States doesn't recognize it as a primary ocean, even though several U.S. agencies are part of the international group.

• It's the fourth-largest of the world's five oceans — the Arctic Ocean is the smallest. The other oceans are the Atlantic, Pacific and Indian.

• It's a deep ocean, ranging from 2.5 to 3 miles deep in most places. Its lowest point is roughly 4.5 miles deep.

• It's also very cold, with water that hits 28 to 50 degrees Fahrenheit.

• Its water circles all the way around Antarctica, and it has an area equal to slightly more than double the size of the United States.

Source: The World Factbook