

By Seth Borenstein, AP Science Writer

WASHINGTON — When the water in the hurricane breeding grounds of the Atlantic warms one degree in the dead of summer, overall hurricane activity jumps by half, according to a new study.

Scientists have long known that hurricanes get their enormous energy from warm waters, so the warmer the water, the more fuel a storm has to either start up or get stronger. The study calculates how much storm frequency and strength is due to warmer sea water, said author Mark Saunders, professor of climate prediction at the University College London.

Saunders found a distinct numerical connection between the ups and downs of water temperatures and how nasty hurricane season gets. That helps explain why hurricanes have been so much worse in the past dozen years, and even why 2007 — with waters slightly cooler than normal — was an exception and not that bad a hurricane year, Saunders said.

"It's very surprisingly sensitive to small changes in sea-surface temperature," he said.

His study, published Thursday in the journal *Nature*, found that changes in wind patterns caused a bigger shift in hurricane activity, but he concentrated his analysis on what sea temperature did to storms. Saunders didn't look at what caused the temperature fluctuations, although he believes that climate change is a contributing factor.

Scientists have clashed in recent years about whether man-made global warming has already increased hurricane activity in the Atlantic by warming the sea and shifting wind patterns, and what global warming may mean in the future.

Saunders focused on the water temperature in a band of tropical sea that stretches from around Puerto Rico and the northern coast of South America east to near the coast of Africa since 1950. He looked at hurricane activity since 1965.

The average August-September water temperature in the region is about 81 degrees. Saunders calculated that for every one degree Fahrenheit increase:

- Overall hurricane activity — a combination of frequency and hurricane strength — increases 49%.
- The number of intense hurricanes, with winds over 110 mph, increases 45%.
- The number of hurricanes of any size increases 36%.
- The number of tropical storms increase 31%.

For example, 2005 was the most active hurricane season on record, and Atlantic water temperatures were the warmest, about 1.4 degrees above normal. That hurricane season set a new high with 28 storms and 13 hurricanes. Seven of the hurricanes were major storms.

In 1971, when the water temperatures were the coolest, there were 13 storms and six hurricanes, including one major one.

The index of overall hurricane activity was more than twice as high in 2005 as it was in 1971.

The scientists who have linked global warming to stronger storms said the study makes sense, and is, if anything, just repeating and refining what they have already said.

National Oceanic and Atmospheric Administration scientist Chris Landsea, whose studies have dismissed such links, said Saunders' study doesn't go back far enough to exclude natural cyclical causes for the hurricane activity changes.

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