

Monster Hurricanes: Questioning Linkage between Severe Hurricanes and Global Warming

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New research calls into question the linkage between major Atlantic hurricanes and global warming. That is one of the conclusions from a University of Virginia study to appear in the May 10, 2006 issue of the journal *Geophysical Research Letters*.

In recent years, a large number of severe Atlantic hurricanes have fueled a debate as to whether global warming is responsible. Because high sea-surface temperatures fuel tropical cyclones, this linkage seems logical. In fact, within the past year, several hurricane researchers have correlated basin-wide warming trends with increasing hurricane severity and have implicated a greenhouse-warming cause.

But unlike these prior studies, the U.Va. climatologists specifically examined water temperatures along the path of each storm, providing a more precise picture of the tropical environment involved in each hurricane's development. They found that increasing water temperatures can account for only about half of the increase in strong hurricanes over the past 25 years; therefore the remaining storminess increase must be related to other factors.

"It is too simplistic to only implicate sea surface temperatures in the dramatic increase in the number of major hurricanes," said lead author Patrick Michaels, U.Va. professor of environmental sciences and director of the Virginia Climatology Office.

For a storm to reach the status of a major hurricane, a very specific set of atmospheric conditions must be met within the region of the storm's development, and only one of these factors is sufficiently high sea-surface temperatures. The authors found that the ultimate strength of a hurricane is not directly linked to the underlying water temperatures. Instead, they found that a temperature threshold, 89°F, must be crossed before a weak tropical cyclone has the potential to become a monster hurricane. Once the threshold is crossed, water temperature is no longer an important factor. "At that point, other factors take over, such as the vertical wind profile, and atmospheric temperature and moisture gradients," Michaels said.

While there has been extensive recent discussion about whether or not human-induced global warming is currently playing a role in the increased frequency and intensity of Atlantic hurricanes, Michaels downplays this impact, at least for the current climate.

"The projected impacts of global warming on Atlantic hurricanes are minor compared with the major changes that we have observed over the past couple of years," Michaels said.

He points instead to naturally varying components of the tropical environment as being the primary reason for the recent enhanced activity.

"Some aspects of the tropical environment have evolved much differently than they were expected to under the assumption that only increasing greenhouse gases were involved. This leads me to believe that natural oscillations have also been responsible for what we have seen," Michaels said.

But what if sea-surface temperatures continue to rise into the future, if the world continues to warm from an enhancing greenhouse effect?

"In the future we may expect to see more major hurricanes," Michaels said, "but we don't expect the ones that do form to be any stronger than the ones that we have seen in the past."

Michaels' co-authors are Robert E. Davis, associate professor of environmental sciences and Paul C. Knappenberger, former U.Va. graduate student in environmental sciences.

Reference: Michaels, P. J., P. C. Knappenberger, and R. E. Davis, 2006. Sea-surface temperatures and tropical cyclones in the Atlantic basin. *Geophysical Research Letters*, 33, doi:10.1029/2006GL025757

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