Tornado threat increases as Gulf hurricanes get larger (w/ Video)

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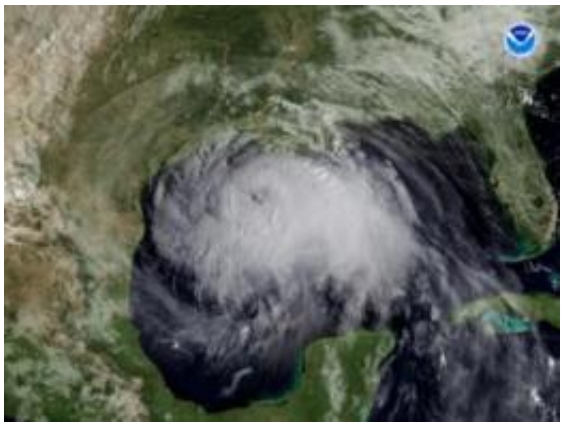

The study predicted exactly the number of hurricanes seen for Hurricane Ike: 33. Credit: National Oceanic and Atmospheric Administration

Tornadoes that occur from hurricanes moving inland from the Gulf Coast are increasing in frequency, according to researchers at the Georgia Institute of Technology. This increase seems to reflect the increase in size and frequency among large hurricanes that make landfall from the Gulf of Mexico. The findings can be found in *Geophysical Research Letters* online and in print in a future issue.

"As the size of landfalling hurricanes from the Gulf of Mexico increases, we're seeing more tornadoes than we did in the past that can occur up to two days and several hundred miles inland from the landfall location," said James Belanger, doctoral student in the School of Earth and Atmospheric Sciences at Georgia Tech and lead author of the paper.

Currently, it's well known that when hurricanes hit land, there's a risk that tornadoes may form in the area. Until now, no one has quantified that risk because observations of tornadoes were too sporadic prior to the installation of the NEXRAD Doppler Radar Network in 1995. Belanger along with co-authors Judith Curry, professor and chair of the School of Earth and Atmospheric Sciences at Tech and research scientist Carlos Hoyos, decided to see if they could create a model using the more reliable tornado record that's existed since 1995.

The model that they developed for hurricane-induced tornadoes uses four factors that serve as good predictors of tornado activity: size, intensity, track direction and whether there's a strong gradient of moisture at midlevels in the storm's environment.

"The size of a tropical cyclone basically sets the domain over which tornadoes can form. So a larger storm that has more exposure over land has a higher propensity for producing tornadoes than a smaller one, on average," said Belanger.

The team looked at 127 tropical cyclones from 1948 up to the 2008 hurricane season and went further back to 1920 modifying their model to account for the type of data collected at that time. They found that since 1995 there has been a 35 percent percent increase in the size of tropical cyclones from the Gulf compared to the previous active period of storms from 1948-1964, which has lead to a doubling in the number of tornadoes produced per storm. The number of hurricane-induced tornadoes during the 2004 and 2005 hurricane seasons is unprecedented in the historical record since 1920, according to the model.

"The beauty of the model is that not only can we use it to reconstruct the observational record, but we can also use it as a forecasting tool," said Belanger.

To test how well it predicted the number of tornadoes associated with a given hurricane, they input the intensity of the storm at landfall, it's size, track and moisture at mid-levels, and were able to

generate a forecast of how many tornadoes formed from the hurricane. They found that for Hurricane Ike in 2008, their model predicted exactly the number of tornadoes that occurred, 33. For Hurricane Katrina in 2005, the model predicted 56 tornadoes, and 58 were observed.

The team's next steps are to take a look to see how hurricane size, not just intensity (as indicated by the Safir-Simpson scale), affects the damage experienced by residents.

"Storm surge, rain and flooding are all connected to the size of the storm," said Curry. "Yet, size is an underappreciated factor associated with damage from hurricanes. So its important to develop a better understanding of what controls hurricane size and how size influences hurricane damage. The great damage in Galveston from Hurricane Ike in 2008 was inconsistent with Category 2 wind speeds at landfall, but it was the large size that caused the big storm surge that did most of the damage."

Source: Georgia Institute of Technology