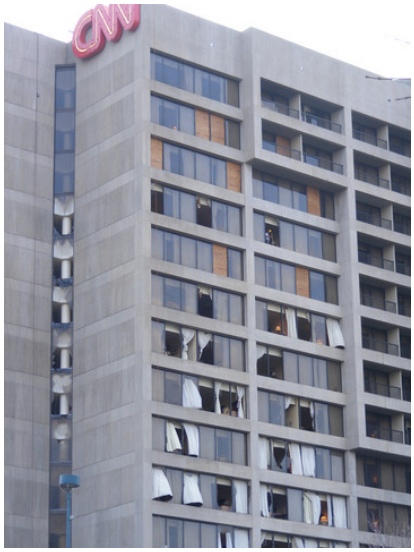
Study Links Tornadoes to Urban Heat Island Effect

Posted By Jay Michaels On March 19, 2009 @ 11:46 am In Extreme Weather,Meteorology,Severe Weather | 3 Comments



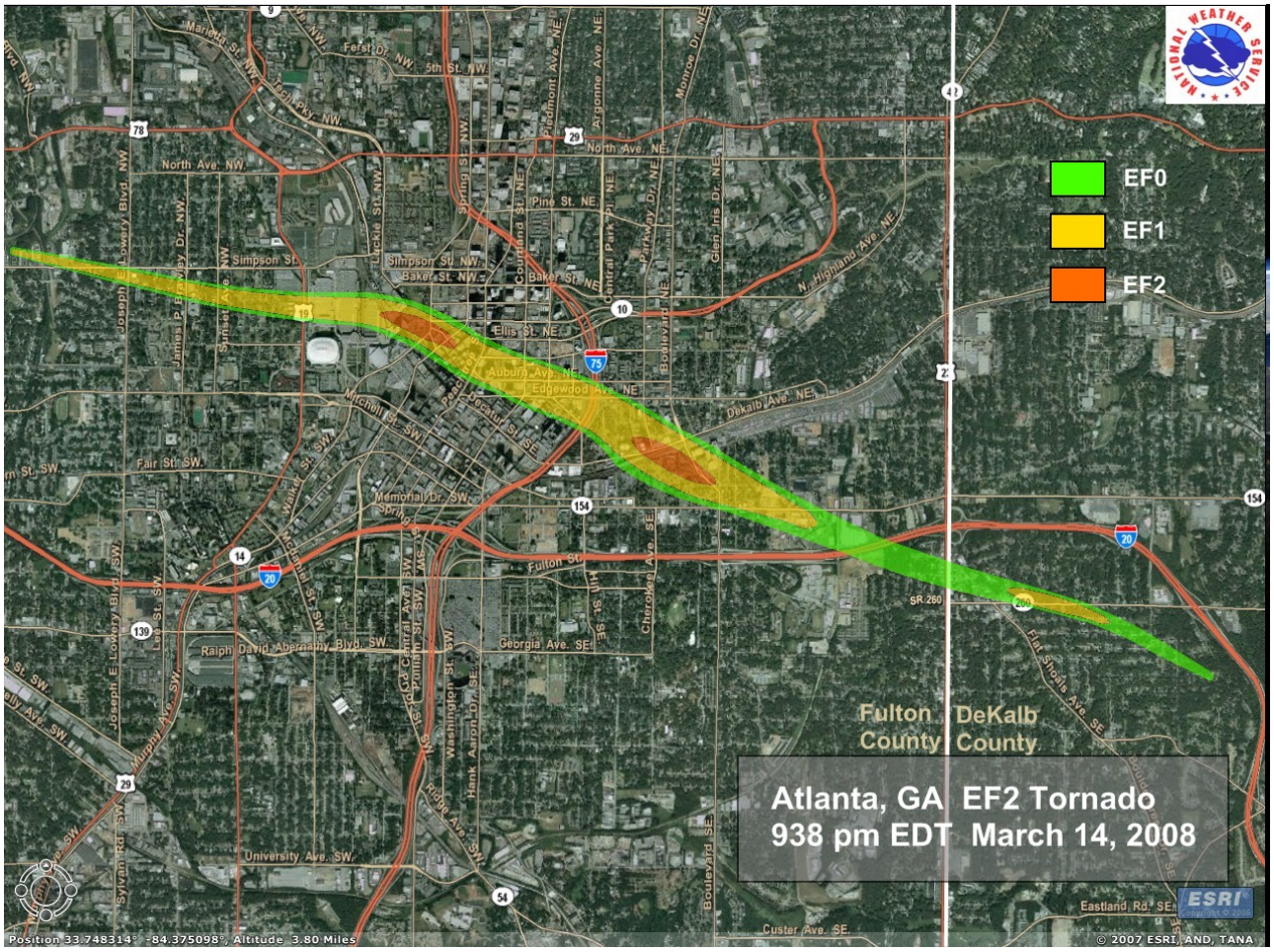
Damage to the CNN building in downtown Atlanta, GA following a tornado on the evening of March 14, 2008.

A recent study by experts on land-atmosphere interactions suggests a connection may exist between large urban population centers and the intensity of tornadoes that impact these areas.

The *urban heat island effect* is the term given to the hot, dry conditions generated by large expanses of buildings, asphalt, and other human-made conditions that alter the landscape otherwise covered by fields, forests, and bodies of water.Â Decades of research have indicated that large urban areas reach higher temperatures during the day, stay warmer at night, and tend to have drier air surrounding them, as there is little open water or moist soil to provide atmospheric moisture.

Atlanta Tornado of 2008

The study indicates a connection between the intensity of the 2008 urban Atlanta tornado and the heat island effect suggests that the hot, dry urban conditions may have led to a larger discrepancy with the surrounding atmospheric conditions, enhancing stability and thus intensifying the storm as it approached the city.



This map published by the Atlanta National Weather Service office describes the track and intensity of the tornado that struck Atlanta, GA on 03/14/2008.Â Click for a high resolution image (Credit:Â NOAA / NWS)

The recent research has taken our understanding of the urban heat island one step further by connecting its impact to severe weather.Â “Urban regions create their own weather,” said Dev Niyogi, a climatology professor at Purdue University in Indiana and the lead author of the study, which was funded by the National Aeronautics and Space Administration. “As we are becoming bigger and bigger in terms of our urban footprint, there’s a distinct probability we are going to see cities have their own weather patterns.”

However, not all meteorologists and climatologists agree.Â Harold Brooks, a research meteorologist at the federal government’s National Severe Storms Laboratory, in Norman, Okla., said it is already widely accepted that wet ground breeds tornadoes, and noted that strikes on urban areas aren’t rare. There is no evidence suggesting downtown areas are hit “any less or more than any other area of the same size,” Mr. Brooks said. In the past decade, tornadoes have hit Nashville, Tenn.; Fort Worth, Texas; and Miami, as well as Atlanta, he said.

Urban Tornadoes

A tornado strikes downtown Salt Lake City, UT in 1999.

The myth that tornadoes are less likely to strike urban areas continues to remain pervasive, even in the face of evidence to the contrary.

It is a common – and definitely false myth that tornadoes do not strike downtown areas. The odds are much lower due to the small areas covered, but paths can go anywhere – including over downtown areas.Â St. Louis, MO, for instance, has been struck 4 times in the last century.

It may seem tornadoes impact urban areas less frequently than rural areas simply because urban population centers cover a much smaller fraction of land area than rural areas.Â As such, any given tornado is more likely to impact a rural wheat field in Kansas rather than the urban core of a city such as Wichita or Kansas City.

However, tornadoes impacting large urban areas are far from rare.Â Beyond the 2008 Atlanta tornado, violent tornadoes have also impacted other large urban centers:

- Omaha, NE (F5, 03/23/1913)
- Topeka, KS (F5, 06/08/1966)
- Lubbock, TX (F5, 05/11/1970)
- Nashville, TN (F3, 04/16/1998)
- Little Rock, AR (F3, 01/21/1999)
- Salt Lake City (F2, 08/11/1999)
- Fort Worth, TX (F3, 03/28/2000)

For a more exhaustive list and details, see the table compiled by Roger Edwards and Joe Schaefer of the Storm Prediction Center on downtown tornadoes.
