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NOAA NCEI WEB STORY

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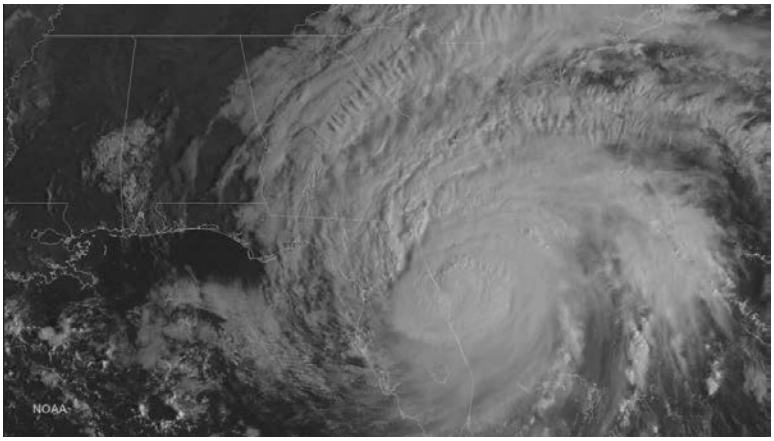
Periods of Greater Atlantic Hurricane Activity Linked to Weaker U.S. Landfalls

A new study finds that a protective barrier weakens storms approaching the U.S. Coast during periods of greater Atlantic hurricane activity.

During periods of greater Atlantic hurricane activity, a protective barrier of vertical wind shear and cooler ocean temperatures forms along the U.S. East Coast, weakening storms as they approach land, according to a new study by NCEI scientist, Jim Kossin. In his paper, “Hurricane Intensification along United States Coast Suppressed during Active Hurricane Periods,” published in *Nature*, Kossin identifies this “buffer zone” and describes its relationship with both active and inactive periods of Atlantic hurricane activity.

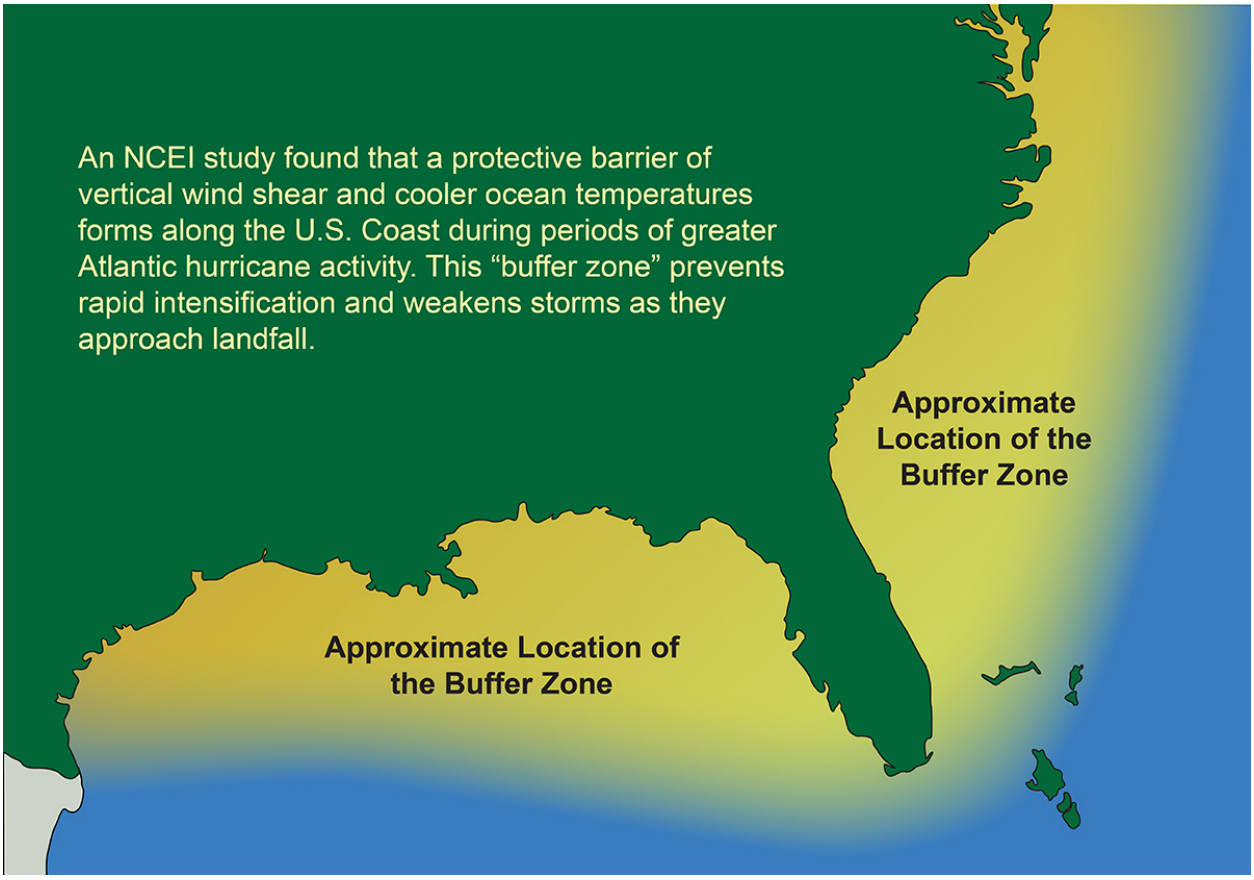


This image, captured on October 7, 2016, from the GOES East satellite, shows Hurricane Matthew's western eye wall beginning to brush portions of the northeast coast of Florida.

Credit: NOAA Environmental Visualization Laboratory

Hurricanes depend on warm sea surface temperatures to power their warm cores with heat and moisture. But, vertical wind shear—changes in wind speed and direction from the surface to the top of the troposphere—removes the heat and moisture from a storm’s center, potentially breaking it apart completely. In the tropical Atlantic, where hurricanes develop, sea surface temperatures and vertical wind shear act together to either enhance or hinder hurricane intensification.

“During periods of greater hurricane activity, the sea surface temperatures are warmer and the wind shear is weaker in the tropical Atlantic,” says Kossin. “Likewise, during periods of low activity, the sea surface temperatures are cooler and the wind shear is stronger there. But, the opposite is true when we look near the U.S. coast. When conditions in the tropical Atlantic are good for hurricane intensification, they are bad for it near the coast and vice versa.”



Credit: NOAA NCEI

So, when the environment is good for making strong hurricanes in the tropics, those hurricanes crash into more hostile conditions if they approach the U.S. coast, which weakens them. In this way, the pattern creates a hurricane buffer zone along the coast during periods of high activity. According to historical records from 1947 to 2015, hurricanes were roughly twice as likely to intensify along the U.S. East Coast when the buffer zone wasn’t present. And, they were two to three times more likely to rapidly intensify—by 15 knots or more in 6 hours—without the wind shear and ocean temperature buffer.

The absence of the buffer zone had an even greater impact on major hurricanes. Without it, major hurricanes were two to four times more likely to intensify and three to six times more likely to intensify rapidly. This presents major implications for forecasters, as rapid intensification near the coast is difficult to predict and shortens public warning time.

The period of high Atlantic hurricane activity over the past 20 years and the accompanying development of the buffer zone may help explain the present “drought” of major hurricane landfalls in the United States. The buffer also may have come into play when Hurricane Matthew headed toward the country. While Matthew’s rains were devastating for some areas, the buffer zone helped weaken the storm from a Category 4 as it advanced on Florida to a Category 1 when it officially made landfall in South Carolina. By keeping higher wind speeds at bay, the buffer zone likely helped prevent further compounding damages from Matthew.

In light of how the buffer zone affects coastal communities, scientists aim to further study its relationship with hazard risk in these areas.

For more information, see:

- National Hurricane Center Data Archive
- Record-Breaking Hurricane Matthew Causes Devastation
- Historical Hurricane Tracks Map Viewer
- International Best Track Archive for Climate Stewardship (IBTrACS)