International Center for Enterprise Preparedness (InterCEP)

Hurricane Season Outlook and Preparedness Strategies 2017

Web Forum

On May 11, 2017, **Bryan Norcross**, Senior Hurricane Specialist at the Weather Channel, discussed the outlook for this year's hurricane season and new preparedness tools and strategies.

Hurricane Trends

Hurricane Andrew was the last epic hurricane (the majority of Katrina's damage was due to an engineering failure) and it happened 25 years ago. Andrew can remind us of what hurricanes can be, and in this case it was sustained winds estimated at 165 miles per hour. It was similar to a very strong tornado but about 20 miles across, and it affected Miami, a major metropolitan area. The result was over $26.5 billion of damage. In 2017 dollars, that's over $46.5 billion.

Today there is much more wealth concentrated in that area, and a similar hurricane is projected to produce over $90 billion in damages. In 1992, Hurricane Andrew left 350,000 people homeless. Today, over 500,000 people would be left homeless with a similar storm. Hurricane Andrew did not hit the most densely populated part of the city. If it had hit the northern part of Miami-Dade County, about 1.6 million people could have been left homeless. More people live in all parts of Miami today than in 1992. This is a worst case scenario for emergency planning[1].

For reasons that are only partially understood, there are cycles with periods of low numbers of Category 3 or higher storms and periods with higher numbers. For the last couple of decades we have been lucky. We have been in a "busy" era, but relatively few category 3 or higher storms have hit the U.S. In the last 12 years we haven't had any category 3 storms making landfall. We don't know why there has been a general decline in storms making landfall.

What causes this oscillation in eras which may last 25-40 years? The current thinking is that it is related to salt content in the oceans. In addition to these longer-term cycles, the El Niño phenomenon takes place year to year and affects the conditions that lead to storms.

Yearly changes in the frequency of category 3 or above storms are highly dependent on El Niño and La Niña, ocean temperature changes in the Pacific that affect global weather patterns. When water in the tropical eastern Pacific Ocean is cool, it makes it a busier hurricane season. Upper-level winds over the

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[1] Additional information about Hurricane Andrew can be found in Bryan Norcross's new book, *My Hurricane Andrew Story: The story behind the preparation, the terror, the resilience, and the renowned TV coverage of the Great Hurricane of 1992*.

Atlantic are more favorable. So warm water in the Pacific has a negative effect for the formation of hurricanes in the Atlantic Ocean.

During "busy" eras, the probability of having a category three or higher storm on the East coast and the Florida peninsula in a given year is 30%. During a "non-busy" era the probability is about 15%. In the Gulf Coast the probabilities are about the same whether we are on a busy era or not.

Over the last 50 years or so there have been fewer Category 3 storms in Florida. We are not sure why, but when you look at atmospheric pressure in the eastern U.S, what we find is that the pressures have been lower than average near the East Coast, and this seems to have the effect of deflecting storms to the north.

The Arctic is warming much more rapidly than the tropics as a result of climate change. Whether this is a somewhat permanent change in pressure distribution due to warming in the north, or some other cycle, we don't know.

Hurricane Forecast for 2017

How good are Hurricane forecasts? Generally they are not too bad. 2013 was an exception. The actual number of storms was less than expected. But most years the expected number of storms is similar to the observed number, or at least the trend is right.

In 2017 the water in the Pacific Ocean is expected to be warm, and that has a negative effect on hurricanes. Water in the Atlantic is also expected to be warm and that tends to have a positive effect on the formation of hurricanes. But the minus effect from El Niño is the dominant effect. The El Niño forecast suggests a slightly below average or near average hurricane season, which means 10-12 named storms and 4-6 hurricanes. The current forecast is for two Category 3 or above hurricanes.

Fewer hurricanes tends to mean weaker hurricanes as well, but this is not always the case. Hurricane Andrew took place in a year of very few storms. Hurricane Alicia affected Houston in 1983, another El Niño year with few storms. And Hurricane Betsy affected Miami and New Orleans in 1965 in another El Niño year. But on average, when atmospheric conditions are not right for the formation of hurricanes we tend to observe fewer storms and storms with less intensity.

Is there any way to know the direction storms will take? In general, there is so much uncertainty that it is not possible to accurately forecast that. We are seeing a preponderance for storms to be deflected north, due to the trend of lower pressure along the East Coast, but we don't know enough to be able to say whether that will be the case over a longer period of time.

New Products from the National Hurricane Center

Starting this year, the National Hurricane Center will put out a cone and warnings before a storm has a circulation, if the system is threatening land. In previous years, they did not put out a cone until it was at least a tropical depression. Now they will put out a cone and systems will be called a potential tropical cyclone. This is being done to give advance warning.

In addition, the cone will have a bubble extending from the starting point to show the current area of winds of 40 mph or higher. This is shown in Figure 1. As forecasts for the center of a storm have gotten better, the size/width of the cone has gotten smaller. This reflects less uncertainty about the path of a center of the storm. But strong winds can still prevail outside the cone which leads to some confusion, as people may think that if they are outside the cone that means they are safe. Now this new information, added in yellow in Figure 1, for example, shows the extent of strong tropical storm wind (40 miles per hour or more) associated with a storm.

Figure 1. New Hurricane Watch/Warnings from the National Hurricane Center

Source: National Hurricane Center.

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The Hurricane Center is also putting out a Timing Graphic that gives you the earliest reasonable time you can expect a storm to reach a location. This allows for adequate planning and preparation. Figure 2 shows an example.

Figure 2. National Hurricane Center Time Graphic (Hurricane Mathew)

Source: National Hurricane Center.

In addition, the Storm Surge Watch and Warning will be fully operational this year. The reason for having this additional graphic is that a storm surge can occur outside of the region where hurricane conditions are recorded. Figure 3 shows what this tool looks like.

Figure 3. National Hurricane Center Storm Surge Watch/Warning
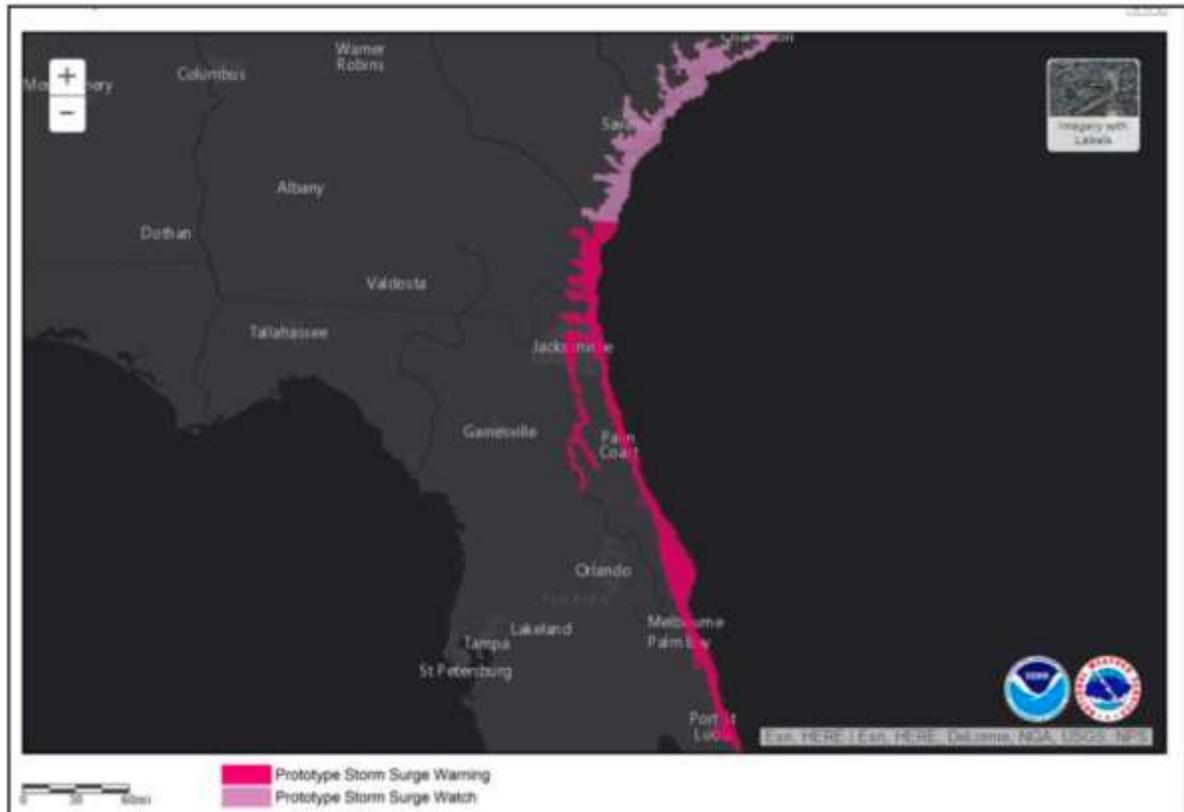
Source: National Hurricane Center.

Q&A

Are probabilities used to generate the cone? Yes those cones are based on probabilities. The National Hurricane Center looks at all their tracks and estimates how accurate they've been in estimating the circle around a point so that 2/3 of the time they would be accurate. These probabilities are based on past forecasts.

What are some important lessons learned in terms of preparedness? The main thing is that every organization needs to look harder than ever at their single points of failure in terms of being able to function, which generally means being able to communicate. Today we rely extensively on the Internet and mobile phones and these are two relatively vulnerable systems. As I look at organizations, they have more single points of failure now than we did in previous decades. I would advise that everyone look at that, and to think about what they would do if such communications fail. You may need multiple back-up systems. For example, an organization may have an underground system of cables for their

communications system, but segments of it may go above ground if there are canals or waterways, and that can make such systems vulnerable.

Is a three-day forecast the best NOAA can do? The farther out into the future you go, the poorer the forecast. These days, a five day forecast is much better than a three-day forecast was twenty years ago. Today we think differently about forecasts than we did twenty years ago. Hurricane Andrew became a hurricane two days before it hit Miami. Any hurricane plan that requires more than a 36 hour forecast is not a real hurricane plan. If it takes 48 or 72 hours to get your business ready then that's not really a hurricane plan, that's a "get ready just in case" plan. A hurricane plan should take 24-36 hours to execute.

Does an El Niño year mean that drought will return to California? Exactly why it rained as much as it did in California is not well understood at this point. The El Niño that is expected is a mild El Niño but it is unclear what impact it will have on rainfall in California.

Are new products at the Hurricane Center under review or are they final products? The National Hurricane Center typically makes new products available on an experimental basis for two years and then releases them for use. So the new storm surge watch/warning tool has been out for two years in prototype/experimental mode, then they approved it and now it's out. The timing graphic is new and is currently in experimental mode, so it may change before actually being adopted.

Are there any standard triggers that are typically applied by a county to invoke their emergency hurricane plans? Most jurisdictions are triggered by the National Hurricane Center's watches and warnings, but they have to prepare before that, and the National Hurricane Center has conference calls multiple times a day with every jurisdiction that is affected.

Will timing and frequency of surge storm watch be similar to hurricane and cone formation forecasts? Yes, the storm surge warnings will come out on the same advisory cycle. The only thing that is a little bit different is another map called a potential storm surge map that displays the highest reasonable possible storm surge at various locations and reasonable worse case of the forecast, and that won't come out until about an hour and half after the hurricane advisory.

Additional Resources:

- National Oceanic and Atmospheric Administration (NOAA) – National Hurricane Center: http://www.nhc.noaa.gov/
- National Oceanic and Atmospheric Administration (NOAA) – National Hurricane Center - Potential Storm Surge Flooding Map: http://www.nhc.noaa.gov/surge/inundation/
- National Oceanic and Atmospheric Administration (NOAA) – National Hurricane Center - Prototype Storm Surge Watch/Warning Graphic: http://www.nhc.noaa.gov/experimental/surgewarning/
- Bryan Norcross, 2017. *My Hurricane Andrew Story: The story behind the preparation, the terror, the resilience, and the renowned TV coverage of the Great Hurricane of 1992*. Available at amazon.com