2011 Hurricane Season Outlook (and a brief review of 2010)
April 24-27 Tornado Outbreak – A record number of tornadoes

- 312 tornadoes in 24 hrs
- 376 tornadoes in 4 days
- 342+ fatalities
- 24 min. average warning

Damage in Tuscaloosa, Alabama
3-D Doppler radar view of the Tuscaloosa, AL Tornado
Modern Doppler radar allowed a 3-D view of the violent tornadoes
Joplin, MO tornado was the deadliest in over 60 years

- 38 tornadoes in 24 hrs
- 125+ fatalities
- 24 min. warning
What about Houston? Do we get large tornadoes here?

Channelview, TX (east Houston) tornado 11/21/92 was an F4 with a path 12 miles long and up to 3/4 mile wide (6 tornadoes struck Harris County area that day)
Same pattern responsible for TX drought is causing tornadoes.
2011 tornado trend most closely matches the trend in 2008

*Preliminary tornadoes from NWS Local Storm Reports (LSRs)
Annual average is based on preliminary LSRs, 2005-2010
2010 – A very active season but no U.S. landfalling hurricanes
3 Hurricanes (2 intense) active at one time on Sept. 16th

Karl (75 mph)
Igor (140 mph)
Julia (115 mph)
2010 Season: 3rd Place Tie for the Most Active Hurricane Season

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Storms</th>
<th>Hurricanes</th>
<th>Intense Hurricanes</th>
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<tr>
<td>2005</td>
<td>28</td>
<td>15</td>
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<tr>
<td>1887</td>
<td>19</td>
<td>11</td>
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</table>
Alex (110 mph) – second strongest June hurricane on record (behind Audrey ’57)
Our initial advisory day 5 point was within 15 miles of actual position.
Error cone is really made up of a series of circles along the path of the hurricane.

- **2010 - 75% 5-Day Error**
  - Ø 330 mi. Diameter Circle
Big change for 2011 – cone size at days 4 and 5 much smaller
La Niña Conditions Prevailed in 2010 Favorable for Atlantic Development

Tropical Pacific Niño 3.4 SST Anomalies

- El Niño
- 2010 Season
- La Niña
“Neutral” conditions forecast, but will El Niño rear its head?

Heart of 2011 Season
“Neutral”

Current

El Niño
Neutral
La Niña
2011 Tropical Pacific ocean temperatures most closely resemble 2008.
The Atlantic Ocean goes through warm and cool cycles lasting 25-40 years.
Salinity and temperature drive the ocean circulation in the North Atlantic.
Above normal ocean temperatures will make hurricanes more intense in 2011.
Last Year’s July-September Pressure Values (European model)

- **Atlantic Basin Lower Pressures** (rising air)
- **Eastern Pacific Higher Pressures** (sinking air)
- **U.S.**
- **South America**
2010 Pattern – Weak Bermuda High – U.S. Spared
Predicted low pressures northern Gulf may indicate landfall danger there

Forecast for 2011
Analog years indicate an active season is quite likely

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<th>Year</th>
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Analog Years: 1989, 1996, 2000, 2001 and 2008 indicate areas that may be threatened in 2011
Track Pattern Suggested by Analog Years and European Model
### Our 2011 Outlook

<table>
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<tr>
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<th>Named Storms</th>
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<th>Intense Hurricanes</th>
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