HURRICANES

The History, Structure, Development, and Destruction

Hurricane Hugo
2:44 p.m. EDT
September 21, 1989

Source: http://www.dc.peachnet.edu/~pgore/students/w97/matheson/hpage.htm
Hurricane Sandy was the deadliest and most destructive tropical cyclone of the 2012 Atlantic hurricane season, as well as the second-costliest hurricane in United States history.

Total fatalities: 285

Highest winds: 109 mph (175 km/h)

Lowest pressure: 940 mb

Date: October 22, 2012–October 29, 2012

Category: Category 3 Hurricane (SSHS)

Affected areas: Eastern Canada, Greater Antilles, Eastern United States, Bahamas
What is a hurricane?

- Violent cyclonic storm develops in tropical region
- Winds > 74 mph

Rotation and Pressure

Is the barometric pressure inside the hurricane high or low?
LOW

In which direction does a hurricane rotate?
COUNTERCLOCKWISE
Hurricane Season:

June 1\textsuperscript{st} through November 31\textsuperscript{st}
What is the role of the National Weather Service during hurricane season?

- Provides weather information, such as data from satellites
- Responsible for issuing watches and warnings to the media and general public
What is the difference between a Hurricane Watch and a Hurricane Warning?

- **Watch** – Tropical storm poses a threat to coastal areas with 36 hours
- **Warning** – Tropical storm conditions are expected in a coastal area within 24 hours
Hurricane Development Needs:

- Warm ocean temperatures (>80° F)
- mT
- Little to no wind shear
- Low pressure system at least 5° North or South of Equator
- Rotation caused by winds

Source: http://lwf.ncdc.noaa.gov/oaa/reports/fran/fran.html
Another look at the Structure

Source: http://hurricanes.noaa.gov/prepare/structure.htm
Compare the Following

Source: http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hurr/stages/home.rxml
By what two factors is hurricane strength measured?

Wind Speed

Barometric Pressure
What is the Scale Used to Categorize Hurricanes?

**Saffir-Simpson Scale**

<table>
<thead>
<tr>
<th>Category</th>
<th>Max Wind Speed (mph)</th>
<th>Min. Surface Pressure (mb)</th>
<th>Storm Surge (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>74-96</td>
<td>&gt; 980</td>
<td>1-1.7 (3-5)</td>
</tr>
<tr>
<td>2</td>
<td>97-111</td>
<td>979-965</td>
<td>1.8-2.6 (6-8)</td>
</tr>
<tr>
<td>3</td>
<td>112-131</td>
<td>964-945</td>
<td>2.7-3.8 (9-12)</td>
</tr>
<tr>
<td>4</td>
<td>132-155</td>
<td>944-920</td>
<td>3.9-5.6 (13-18)</td>
</tr>
<tr>
<td>5</td>
<td>&gt; 155</td>
<td>&lt; 920</td>
<td>&gt; 5.7 (&gt;19)</td>
</tr>
</tbody>
</table>

Source: [http://kids.earth.nasa.gov/archive/hurricane/saffir-simpson.html](http://kids.earth.nasa.gov/archive/hurricane/saffir-simpson.html)
What causes the damage in a hurricane?

- Winds
- Flooding
- Storm Surge
What is a storm surge?

- Large wall or dome of water that rushes into the coastline as a result of a hurricane making landfall.
- To the right are the areas affected by high storm surges.

Source: http://www.wkrg.com/hurricanecenter/surge/SE.jpg
What destroys a hurricane?

- Cold water
- Movement over land
  - Friction
  - Lack of moisture
- Strong vertical winds
What are the five costliest hurricanes in the United States?

1. Hurricane Sandy-2012
2. Hurricane Katrina – 2005
3. Hurricane Andrew – 1992
4. Hurricane Hugo – 1989
5. Hurricane Fran – 1996
Explain why the majority of the costliest storms are relatively recent

- Damage is a result of development
- There are more developed areas and possessions than in the past

What are the five deadliest hurricanes in the United States?

1. Galveston – 1900
2. Katrina-2005
3. Southeast Florida – 1928
4. Florida Keys – 1919
5. New England – 1938
Why were the deadliest storms long ago? What about Katrina

- Lack of instrumentation to predict and track storms
- People were not warned of the incoming danger

Source: http://www.internationaiaid.org/images/katrina-east%20new%20orleans.jpg
What are the names of the 2005 Hurricanes?

<table>
<thead>
<tr>
<th>Andrea</th>
<th>Humberto</th>
<th>Olga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barry</td>
<td>Ingrid</td>
<td>Pablo</td>
</tr>
<tr>
<td>Chantal</td>
<td>Jerry</td>
<td>Rebekah</td>
</tr>
<tr>
<td>Dorian</td>
<td>Karen</td>
<td>Sebastien</td>
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<td>Erin</td>
<td>Lorenzo</td>
<td>Tanya</td>
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<tr>
<td>Fernand</td>
<td>Melissa</td>
<td>Van</td>
</tr>
<tr>
<td>Gabrielle</td>
<td>Nestor</td>
<td>Wendy</td>
</tr>
</tbody>
</table>

Source: http://www.hurricanewarning.net/coordinates.html
Protection

- Listen to warnings
- Take all warnings seriously
- Follow evacuations
- Prepare Food and Water for extensive power outages