National Hurricane Conference

Overview of the Record Breaking 2005 Atlantic Hurricane Season

April 12, 2006
Max Mayfield and Staff
NATIONAL HURRICANE CENTER
<table>
<thead>
<tr>
<th>NAME</th>
<th>DATES</th>
<th>MIN. PRESS (MB)</th>
<th>MAX. WINDS (MPH)</th>
<th>DIRECT DEATHS</th>
<th>U.S. DAMAGE ($ million)</th>
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<tr>
<td>TS ARLENE</td>
<td>8 - 13 JUN</td>
<td>989</td>
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<td>75</td>
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<td>994</td>
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SEASON HIGHLIGHTS

• Most active Atlantic hurricane season of record - **28 storms** developed including 27 named tropical storms and one subtropical storm. This breaks the old record of 21 set in 1933.

• **Fifteen** tropical storms became **hurricanes**, breaking the record of 12 set in 1969.

• **Seven** of the hurricanes became **major hurricanes**. This included the first time that four Category 5 hurricanes had been observed in a single Atlantic season and the first time that four major hurricanes hit the United States in one season.

• Hurricane **Wilma** had the lowest minimum central pressure ever observed in an Atlantic hurricane - **882 mb**. The central pressure of Wilma fell 88 mb in 12 hours.

• The “Accumulated Cyclone Energy” (ACE) for the season was 285% of median – the **highest** value of record for an Atlantic hurricane season.
SEASON HIGHLIGHTS

- Seven landfalls in the United States, including Hurricane Cindy, Dennis, Katrina, Rita, and Wilma along with Tropical Storms Arlene and Tammy. Hurricane Ophelia also struck the North Carolina coast, although the center stayed just offshore.

- Death toll near 1400, including around 1200 from Katrina in the United States - the deadliest U. S. hurricane since the Palm Beach-Lake Okeechobee hurricane of 1928. Additionally, a large area of disturbed weather affecting Central America at the time of Hurricane Stan may have caused 1000-2000 deaths.

- Total damage to property in the United States estimated near $104 billion - the costliest U. S. hurricane season of record. Katrina caused estimated damage of $75 billion, making it the costliest single hurricane in U. S. history.

- Track forecast verification indicates that the average forecast errors for 12-72 hr were near record low levels.
Hurricane Cindy
3 - 7 July 2005

75 mph  991 mb

Hurricane Cindy
3 - 7 July 2005
WSR-88D Shows Cindy Was A Hurricane Near Landfall

70-74 kt winds at 8000 ft suggests 65 kt at the surface
TS Cindy
July 4-7
33 TOR

Tornado locations and tropical cyclone paths are approximate. Consult NHC and SPC web sites for more detailed information.
Dennis’s Damage
Images of Katrina

August 23  
August 24  
August 25  
August 26  

August 27  
August 28  
August 29
Satellite Life Cycle of Katrina
NOAA “SLOSH” Maximum Envelope of Water Composite of Category 4 Storms Moving N at 15 mph

NOAA SLOSH Storm Surge Data First Provided to New Orleans Area in 1989. NOAA first provided guidance for forecasting storm surge along the open U.S. Gulf and east coasts from the precursor to SLOSH known as “SPLASH”, in 1972.
MULTIPLE FAILURES

From poor design, to construction not matching plans, to levees not high enough to withstand the storms they were designed for, man-made weaknesses in the hurricane protection system failed metro New Orleans on August 29.
Levee overtopping in Katrina

Picture by Don McCrosky, Entergy’s Michoud Power Plant Manager
Mainland Mississippi
The Hancock County EOC was flooded with 2 feet of Katrina’s storm surge.
Before and After Katrina: Mississippi Coast
Before and After Katrina: Mississippi Coast
The PSS Chemul, a 13,000-ton semi-submersible accommodation/maintenance vessel owned by PEMEX that broke loose during Hurricane Katrina is wedged under the Cochrane Bridge in Mobile, Alabama. (AFP/Stan Honda)
Dauphin Island, AL

Pre Ivan

Post Ivan

Post Katrina

July 17, 2001

September 17, 2004

August 31, 2005
Katrina Track Forecasts
1200 UTC 24 August
Katrina Track Forecasts
0000 UTC 27 August

FEMA Hurricane Liaison Team Leader Brock Long and NWS hydrometeorologist Keith Stellman keep FEMA and affected States informed.

President George W. Bush is handed a map by Deputy Chief of Staff Joe Hagin, center, during a video teleconference with federal and state emergency management organizations on hurricane Katrina from his Crawford, Texas ranch on Sunday August 28, 2005.
Dramatic 12-h change in Katrina Wind Profile: CAT5-CAT3

Doppler Wind Profile - 28 Aug 1725-1820 UTC

Doppler Wind Profile - 29 Aug 1000-1040 UTC

Dramatic 12-h change in Katrina Wind Profile: CAT5-CAT3
Hurricane Ophelia  
6 - 17 September 2005  
85 mph  976 mb
Ophelia Track Forecasts
1200 UTC 9 September
Hurricane Rita
18 - 26 September 2005

175 mph  897 mb
Satellite Life Cycle of Rita
Hurricane Rita Passing the Florida Keys

Radar Image from National Weather Service: KBYX  12:01 UTC  09/20/2005
Holly Beach, LA

June 16, 2001

before

Hurricane Rita

after

September 28, 2005

University of New Orleans

USGS
Satellite Life Cycle of Wilma
Wilma’s Damage
How were the forecasts?
Errors cut in half in 15 years

NHC Official Track Error Trend
Atlantic Basin

Forecast Error (n mi)

Year


- Red line: 24 h
- Green line: 48 h
- Orange line: 72 h
- Yellow line: 96 h
- Blue line: 120 h
No progress with intensity?

NHC Official Intensity Error Trend
Atlantic Basin

Year: 1990 to 2005
Forecast Error (kt):
0 to 30

- Red: 24 h
- Green: 48 h
- Orange: 72 h
- Yellow: 96 h
- Blue: 120 h
How do we change the outcome?
Mission Statement

The mission of the Joint (National Oceanic and Atmospheric Administration - NOAA, Navy, and National Aeronautics and Space Administration - NASA) Hurricane Test Bed is to transfer more rapidly and smoothly new technology, research results, and observational advances of the United States Weather Research Program (USWRP), its sponsoring agencies, the academic community and other groups into improved tropical cyclone analysis and prediction at operational centers.

WHAT'S NEW

Updated January 31, 2006:

• 2005-2007 Projects and Goals
• The 2005 Midyear Reports are available in the Project Table

Added February 10, 2006:

• The Joint Hurricane Testbed (JHT): Progress and Future Plans, Chris Landsea (TPC/NHC) - American Meteorological Society's Annual Meeting, February 2006 presentation, (PDF format)
National Hurricane Preparedness Week

May 21-27, 2006

HISTORY

HURRICANE HAZARDS

FORECAST

PREPARE

ACT

May 21

Hurricane Basics

Marine Safety

High Winds

Tornadoes

Inland Flooding

Forecast Process

Disaster Prevention

National Day of Family Preparedness

S

M

T

W

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F

S

MAY 21

MAY 22

MAY 23

MAY 24

MAY 25

MAY 26

MAY 27

www.nhc.noaa.gov
FROM THE PEOPLE OF WAVELAND

In appreciation and gratitude to all who gave of their time, energy, and money to help us recover from Hurricane Camille. On August 17, 1969 our city was devastated, but those who cared came to her rescue.