



# Storm Signals



Houston/Galveston National Weather Service Office

Volume 72 Spring 2006

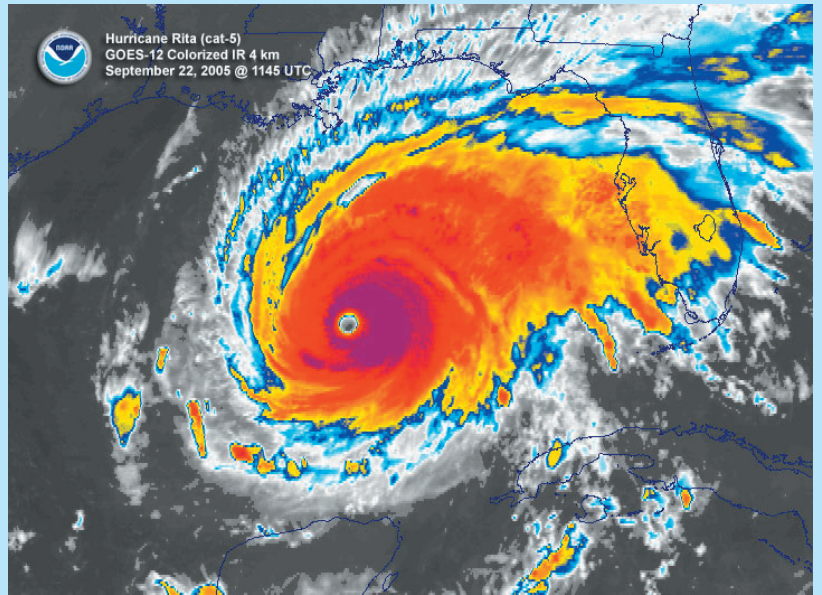
## 2006 Houston/Galveston Hurricane Workshop

The 2006 Houston/Galveston Hurricane Workshop has moved to a new location!

The 2006 Houston/Galveston Hurricane Workshop will take place on May 30<sup>th</sup> at the George R. Brown Convention Center from 4pm to 9pm. The workshop will again be sponsored by CenterPoint Energy in addition to the City of Houston. The theme of the 2006 workshop will be centered on the events during Katrina and Rita and what we have learned.

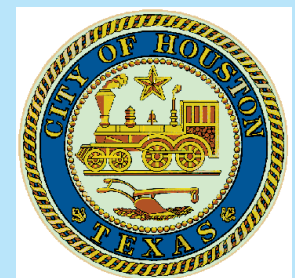
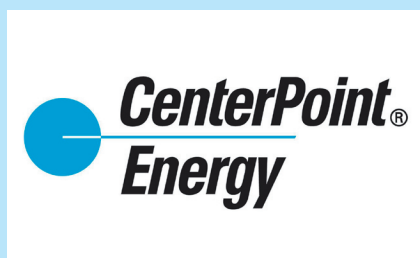
2005 was the most active hurricane season on record. Hurricane Rita made landfall in extreme Southeast Texas. The evacuation that resulted from the threat of Rita is an event that will not soon be forgotten. During the workshop, all of these topics will be discussed either in the main session or in one of the breakout sessions that is planned.

The 2006 Houston/Galveston Hurricane Workshop will be a very informative meeting. The George R. Brown Convention Center will provide the opportunity for more people to attend due to its location and size. The partnership of CenterPoint, the City of Houston and the Houston/Galveston National Weather Service will help provide the necessary ingredients for a successful workshop.



Please mark your calendars for this upcoming event. If you have any questions or ideas, please contact Gene Hafele at 281-337-5074 x 223 or [gene.hafele@noaa.gov](mailto:gene.hafele@noaa.gov).

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# 2005 Hurricane Season - A Record Breaking Year

The 2005 Hurricane Season was one for the records. Instead of summarizing each storm, here are a number of the many records broken during the season. Much of this information was obtained from the National Hurricane Center, the Tropical Meteorology Project out of Colorado State University and Wunderground.com.

## Season records include...

27 named storms is the most named storms in a single season, breaking the old record of 21 named storms set in 1933.

14 hurricanes are the most hurricanes in a single season, breaking the old record of 12 hurricanes set in 1969.

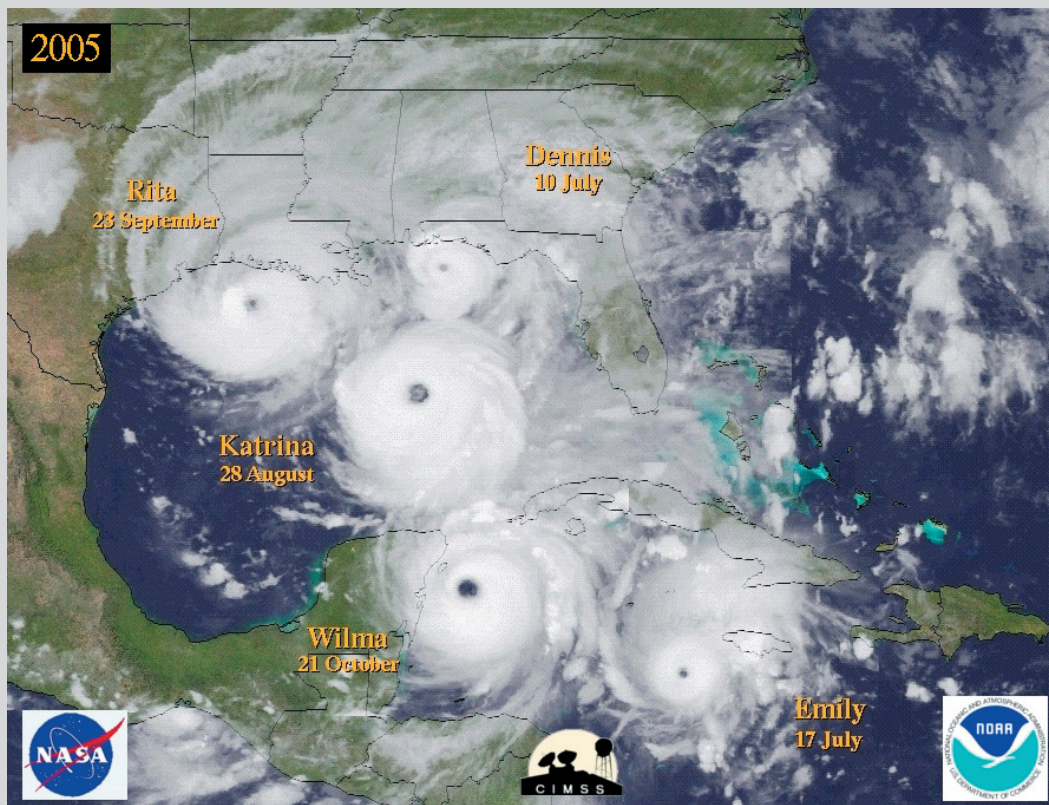
7 major hurricanes (Category 3 or higher on the Saffir-Simpson scale) ties the season record for major hurricanes, first set in 1950.

Three Category 5 hurricanes (Katrina, Rita, and Wilma) is the most Category 5 hurricanes recorded in a single season, breaking the old record of two set in 1960 and 1961.

Seven named storms made United States landfall (Arlene, Cindy, Dennis, Katrina, Rita, Tammy and Wilma). This puts the 2005 season in a tie for second place for landfalling storms behind the 1916 and 2004 seasons where eight named storms made landfall. An eighth 2005 storm (Ophelia) brushed the coast of North Carolina but did not make an official landfall.

The 2005 season was the most destructive for United States landfalling storms, largely due to Hurricanes Katrina and Rita. Damage estimates are well over \$100 billion.

2005 had two hurricanes (Katrina and Stan) that each killed more than 1000 people. The all-time record is three hurricanes in 1780.



**Monthly records include...****JUNE**

Two named storms formed (Arlene and Bret). Only 1957, 1959, 1968 and 1986 had two or more named storms form during the month of June.

**JULY**

Five named storms formed (Cindy, Dennis, Emily, Franklin and Gert). This is the most on record for the month.

Two major hurricanes formed (Dennis and Emily). This is the most on record.

**AUGUST**

Five named storms formed (Harvey, Irene, Jose, Katrina and Lee). Only 1990, 1995 and 2004 have had more than five named storms form during the month of August.

**SEPTEMBER**

Five hurricanes formed (Maria, Nate, Ophelia, Philippe and Rita). This ties 1955, 1969, 1981, 1998 and 2000 for the most hurricanes to form during the month of September.

**OCTOBER**

Six named storms formed (Stan, Tammy, Vince, Wilma, Alpha and Beta). This ties 1950 for the most named storm formations during the month of October.

Four hurricanes formed (Stan, Vince, Wilma and Beta). Only 1950 had more hurricanes develop during the month of October.

Two major hurricanes formed (Wilma and Beta). This ties 1950, 1961, 1964 and 1995 for the most intense hurricanes to form during the month of October.

**NOVEMBER**

Three tropical storms formed in November (Gamma, Delta and Epsilon). This breaks the record of two storms set in six years, most recently in 2001.

**DECEMBER**

Epsilon was the longest-lived (5.25 days) December hurricane on record. The previous record was just over four days set by an unnamed 1887 hurricane.

**JANUARY**

Zeta was the longest-lived January tropical storm on record (six days). Zeta surpassed Alice (1954) as the longest-lived tropical cyclone to form in December and cross over into the new year.

**Individual storm records include...****DENNIS**

Dennis became the most intense hurricane on record before August when a central pressure of 930 mb was recorded.

**EMILY**

Emily eclipsed the record previously set by Dennis for lowest pressure recorded for a hurricane before August when its central pressure reached 929 mb.

**KATRINA**

Katrina recorded the greatest storm surge (28 to 30 feet) from an Atlantic hurricane. The previous record was 24.6 feet in Hurricane Camille (1969).

Katrina's central pressure dropped to 902 mb. At the time, it was the fourth lowest pressure ever measured in the Atlantic basin.

Katrina's central pressure at landfall was 918 mb. This is the third lowest pressure recorded at landfall behind the Florida Keys storm of 1935 (892 mb) and Hurricane Camille of 1969 (909 mb).

Katrina became the most destructive storm on record with greater than \$100 billion damage. This shatters the old record of approximately \$50 billion (normalized to 2005 dollars) in insured damage set by Hurricane Andrew (1992).

**RITA**

Rita's central pressure dropped to 897 mb. At the time, it was the third lowest pressure ever measured in the Atlantic basin.

**VINCE**

Vince was the furthest north and east that a storm has ever developed in the Atlantic basin.

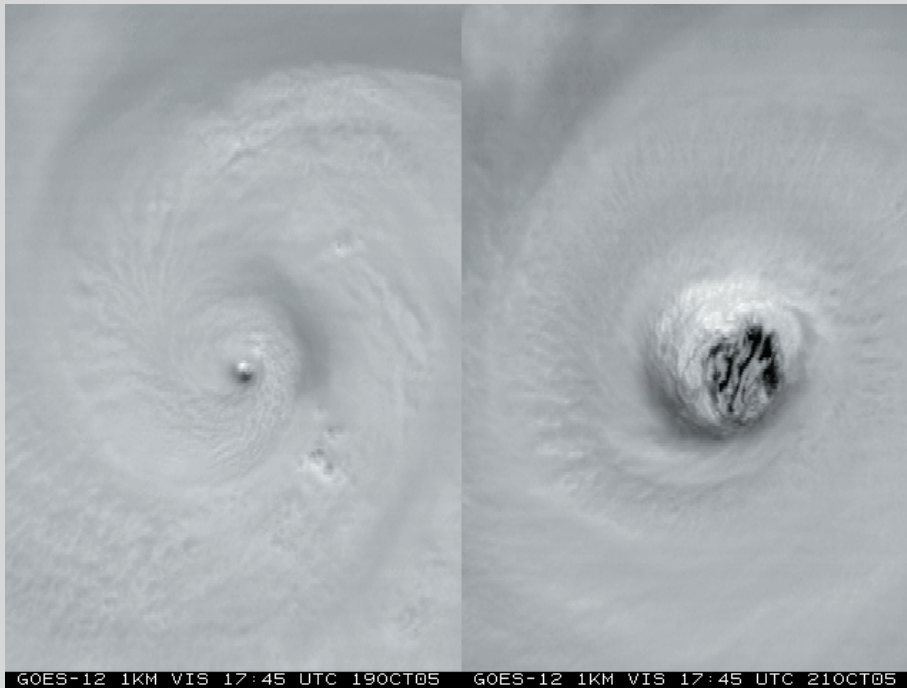
Vince was the first tropical cyclone in recorded history to strike the Iberian Peninsula.

**WILMA**

Wilma's central pressure dropped to 882 mb. It was the lowest pressure ever measured in the Atlantic basin, eclipsing the old record of 888 mb set by Hurricane Gilbert (1988).

Wilma had the fastest intensification ever by an Atlantic hurricane. Wilma's pressure dropped from 982 mb to 882 mb in 24 hours on Oct 19<sup>th</sup>, a rate of 4.2 mb/hour. The previous record was Gilbert (1988) whose pressure dropped 3 mb/hour over 24 hours. Wilma's pressure fell 9.7 mb/hour over six hours early on Oct. 19<sup>th</sup>, beating Hurricane Beulah's drop of 6.3 mb/hour in six hours in 1967.

Wilma had the smallest eye diameter ever measured in a hurricane - two nautical miles!



Visible satellite pictures of Hurricane Wilma on October 19<sup>th</sup> (left) and October 21<sup>st</sup> (right). The left picture shows Wilma's record breaking two nautical mile diameter eye.

**ALPHA**

Alpha became the 22nd named storm of the 2005 season. This broke the old record of 21 named storms set in 1933.

**BETA**

Beta became the 13th hurricane of the 2005 season. This broke the old record of 12 hurricanes set in 1969.

**DELTA**

Delta became extratropical shortly before it hit the Canary Islands, but was the first tropical cyclone on record to affect the islands.

# HURRICANE preparedness

## National Hurricane Awareness Week May 21-27, 2006

The 2005 Hurricane Season brought unprecedented death and destruction to the United States. Among the record breaking tropical cyclones were Hurricane Katrina and Hurricane Rita. These two hurricanes, which caused devastation across a large portion of the northern Gulf of Mexico all the way from the Beaumont, TX area to the Florida Panhandle, are a fresh reminder for Southeast Texans on how much we need to be prepared as the start of the 2006 Hurricane Season fast approaches.

In an effort to assist your preparation, National Hurricane Awareness Week will be held May 21-27. During each day of this week, information will be released by the National Hurricane Center and the National Weather Service which will cover a wide range of topics including...

**Hurricane Basics and Hurricane History (Sunday, May 21)** - Information on the formation of tropical storms and hurricanes, tropical storm stages, the Saffir-Simpson Hurricane Scale, upcoming hurricane names and some historic data.

**Storm Surge and Marine Safety (Monday, May 22)** - Information on storm surge, which has the greatest potential for loss of life related to a hurricane (historically, storm surge has claimed nine out of ten victims), and marine safety, which is needed as more merchant, fishing, and recreational sailors take to the sea.

**High Winds and Tornadoes (Tuesday, May 23)** - Information on hurricane force winds, which can destroy poorly constructed buildings and mobile homes (debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes), and tornadoes, which add to the storm's destructive power.

**Inland Flooding (Wednesday, May 24)** - Information on inland flooding, which in the last thirty years has been responsible for more than half the deaths associated with tropical cyclones in the U.S.

**Forecast Process (Thursday, May 25)** - Information on the products that the National Hurricane Center provides (which has an overall broad view of the hurricane and its potential impact), and what local National Weather Service Offices provide (which has more detailed information tailored to their community).

**Disaster Prevention (Friday, May 26)** - Information on both being prepared for tropical storms and hurricanes and reducing damages.

**National Day of Family Preparedness (Saturday, May 27)** - Information on how to develop a hurricane plan for the family.

The Houston/Galveston National Weather Service Office highly recommends everyone read the releases during National Hurricane Awareness Week. More information on this event can be found on the internet through the National Hurricane Center's website at [www.nhc.noaa.gov](http://www.nhc.noaa.gov).

## 2006 Hurricane Talks

The Houston/Galveston National Weather Service Office continues to offer our very informative and very popular hurricane presentations to schools, businesses and organizations. These talks include details on the dangers of tropical storms and hurricanes, the history of activity along the Upper Texas coast and ways to protect your life and property during a tropical threat. Brochures on hurricanes can also be made available to all attendees.

If you are interested in having a meteorologist come to you and talk about hurricanes, please contact Gene Hafele ([gene.hafele@noaa.gov](mailto:gene.hafele@noaa.gov)) or Joshua Lichter ([joshua.lichter@noaa.gov](mailto:joshua.lichter@noaa.gov)) at (281)337-5074. The more you know about tropical storms and hurricanes, the better you will be prepared to survive when the next one strikes.



# National Severe Weather Workshop 2006

*Learning and Growing Together: Expanding Severe Weather Horizons*

The 2006 National Severe Weather Workshop was held in Midwest City, OK on March 2-4, 2006. This workshop is a national forum for NOAA (National Oceanic and Atmospheric Administration), emergency management, and media to exchange information and techniques for public safety during severe weather. The nation's premiere severe weather experts were present to discuss the latest research and forecasting techniques.

Designed for emergency managers, storm spotters, and other weather enthusiasts, the workshop will offer a unique opportunity to expand your understanding of the role of the Storm Prediction Center, National Weather Service forecast offices, Emergency Managers, broadcast meteorologists, and others involved in severe weather events.

For more information, please see the Workshop website at [www.norman.noaa.gov/nsww2006/](http://www.norman.noaa.gov/nsww2006/).

## 2006 Severe Weather Awareness Week

Severe Weather Awareness Week for 2006 was February 26 - March 4. The Houston/Galveston National Weather Service encourages media, emergency managers and all other individuals involved in safety to use this information to promote severe weather safety. The Houston/Galveston National Weather Service issued Public Information Statements each day to promote a particular aspect of Severe Weather Awareness. On Wednesday, March 1<sup>st</sup>, the Houston/Galveston National Weather Service issued a test Tornado Warning. This test tornado warning gave schools and businesses an opportunity to practice their tornado drills. If you have any questions concerning Severe Weather Awareness Week, please contact Gene Hafele at [gene.hafele@noaa.gov](mailto:gene.hafele@noaa.gov) or 281-337-5074 x 223.

Date	Time/Release
Sunday February 26	AM....Introduction to Severe Weather Awareness Week
	PM....NWS Watch/Warning System and Terms
Monday February 27	AM....NOAA Weather Radio - Your Personal All-Hazards Warning System
	PM....Damaging Winds and Hail
Tuesday February 28	AM....Drought and Fire Weather
	PM....Tornadoes and Tornado Safety
Wednesday March 1	AM....Lightning Facts and the Safety Rules
	1000 AM....Southeast Texas TORNADO DRILL
	PM....Weather Safety for Mariners
Thursday March 2	AM....Turn Around...Don't Drown
	PM....The Dangers of Flash Flooding
Friday March 3	AM....Amateur Radio and Storm Spotters
	PM....Reporting Severe Weather to NWS - Phone Numbers and Websites

# 2005 - A Year In Review

By Charles Roeseler

**Much of the area remained significantly drier than normal  
Galveston ties record for warmest year on record  
College Station has its ninth warmest year on record**

As years go, 2005 was relatively quiet. Severe weather outbreaks were infrequent with only a handful of events worth mentioning. The tropics were very active with storms still developing into January 2006. Rita brought a great deal of excitement toward the end of September. She brought plenty of wind, but regrettably she didn't bring much rain. Around Southeast Texas, weather averages just don't seem to mean much. It is feast or famine or from floods to fires.

Rainfall was near to slightly above normal through March. This allowed a nice start to the growing season. Dry conditions started in June with a brief reprieve in July only to turn significantly drier during August and persisting through the end of 2005. Due to the low relative humidities and dry ground fuels, November and December 2005 will be remembered more for the threat from wildfires than from cold weather outbreaks or the usual November flood event.

At Intercontinental Airport, the average temperature for 2005 was 70.3 degrees. This is the 29<sup>th</sup> warmest year in recorded history. Rainfall for the year topped out at 41.21 inches. This is 6.63 inches below normal and the 42<sup>nd</sup> driest year in history.

Galveston and College Station were warmer and drier than normal. At Galveston, the 2005 average temperature was 72.3 degrees. This ties the previous warmest years of 1933, 1994 and 1999. The 2005 rainfall was 31.19 inches. This is 12.65 inches below normal and is the 15<sup>th</sup> driest year on record. College Station had a 2005 average temperature of 69.8 degrees. This is the 9<sup>th</sup> warmest year on record. The 2005 rainfall total was 28.98 inches. This is 10.69 inches below normal and is the 13<sup>th</sup> driest year on record.

The greatest 2005 rainfall total noted in Southeast Texas was 50.17 inches at Houston Heights. The lowest 2005 rainfall total noted in Southeast Texas was 26.71 inches in Bellville.

## January...

Rainfall was near to slightly below normal near the coast, with heavier monthly totals in the Brazos Valley. Temperatures were well above normal averaging 2.5 to 4.5 degrees above normal. Hazardous weather was limited to a few dense fog events.

## February...

Rainfall was above normal during the month. Monthly totals were one to three inches above normal. It was another warm month as temperatures averaged another 2.0 to 4.0 degrees above normal. Thunderstorms on the 13<sup>th</sup> and 23<sup>rd</sup> produced baseball sized hail across parts of Montgomery and Waller counties.

## March...

Rainfall continued to remain above normal with totals averaging around an inch greater than normal. The heaviest rain this month was focused toward the Matagorda Bay area. In a reversal from the previous two months, March averaged between 0.5 and 1.0 degrees cooler than normal. On March 7<sup>th</sup>, marginally large hail fell on parts of Harris County. On the 19<sup>th</sup>, one inch diameter hail fell over parts of Burleson, Brazos, Montgomery and Polk counties.

## April...

A trend toward drier conditions developed in April. Monthly rainfall totals were two to three inches below normal. Temperatures varied greatly across the area. Monthly temperatures were about a degree warmer than normal along the coast and about a degree below normal inland. Hazardous weather was confined to a few hail reports in Brazos, Grimes and Houston counties on the 5<sup>th</sup>.

**May...**

Temperatures were near to slightly below normal during May. Monthly temperatures were about a half degree below normal. Rainfall varied greatly depending on your location. Overall, rainfall was below normal except along the U.S. Highway 59 corridor. A significant hazardous weather outbreak occurred on Mother's Day (May 8<sup>th</sup>). Widespread wind damage and one inch diameter hail occurred over parts of Harris, Fort Bend, Brazoria and Galveston counties. Another round of thunderstorms on the 28<sup>th</sup> and 29<sup>th</sup> produced large hail across parts of Walker, Colorado, San Jacinto and Liberty counties.

**June...**

Dry! Dry!! Dry!!! Rainfall was well below normal during the month. Most areas received less than an inch of rain for the entire month. At Intercontinental Airport in Houston, rainfall for the month tallied 0.08 inches. This is the driest June in recorded history. Galveston received only 0.24 inches of rain which is the 8<sup>th</sup> driest June in recorded history. Temperatures were warmer than normal averaging 1.5 to 2.5 degrees above normal. Hazardous weather was limited to large hail in Montgomery and Harris counties on the 14<sup>th</sup> and wind damage in Bellaire on the 15<sup>th</sup>.

**July...**

Dry conditions came to an abrupt end in July. Rainfall was well above normal averaging two to three inches above normal. At Hobby Airport in Houston, the monthly rainfall total was 12.96 inches. Temperatures were about a degree warmer than normal. Thunderstorms produced wind damage on the 7<sup>th</sup>, 14<sup>th</sup> and 29<sup>th</sup>.

**August...**

Rainfall came to an abrupt end in August and rainfall totals averaged two to three inches below normal. Temperatures were 1.0 to 2.5 degrees above normal with the higher values near the coast. Thunderstorms on the 14<sup>th</sup> and 15<sup>th</sup> produced wind damage. Swells from Hurricane Katrina produced some minor coastal flooding in Brazoria county.

**September...**

One word - Rita. Hurricane Rita moved into the Gulf of Mexico and made a slow but steady approach toward the northwestern Gulf of Mexico coastline. Rita quickly strengthened into a category 5 hurricane. As it crossed the southern Louisiana coast, Rita decreased in intensity to category 3 strength. Strong to hurricane force winds pounded parts of Chambers, Liberty, San Jacinto, Polk, Trinity and Houston counties. Numerous trees and power lines were down. Power was out between four and six days in some locations. Beach erosion occurred over parts of Chambers, Galveston and Brazoria counties. On the west side of Rita, subsidence helped boost temperatures into the upper 90s and lower 100s. Unseasonably warm temperatures prevailed through the end of the month with many locations exceeding 100 degrees.

**October...**

October was again dry with monthly rainfall totals two to three inches drier than normal. Temperatures were near to slightly above normal. A fast moving squall line on Halloween produced wind damage from Brazos to Harris counties.

**November...**

Rainfall was again below normal with monthly totals between 1.5 and 2.5 inches below normal. The threat from wild fires began to grow as drought conditions worsened. To further complicate the fire weather threat, temperatures were well above normal averaging 1.5 to 4.0 degrees warmer than normal.

**December...**

Temperatures were cooler than normal averaging between 0.5 and 1.5 degrees below normal. Rainfall for the month was generally below normal except along the U.S. 59 corridor where very heavy rain occurred. There were two significant weather events during the month. The first occurred on the 7<sup>th</sup> and 8<sup>th</sup> and affected parts of Washington, Burlleson, Brazos, Grimes, Madison and Houston counties. A winter storm warning was issued due to expected ice accumulations of around a quarter inch.

On the 14<sup>th</sup>, parameters came together for a brief but heavy rain event. Minor flooding was reported over parts of Fort Bend, Harris, Montgomery and Liberty counties. 5.64 inches of rain fell on the 14<sup>th</sup> at Intercontinental Airport. This was a 24 hour rainfall record for the date and was also the greatest 24 hour rainfall record for the month. Between 80 and 90 percent of the monthly rainfall fell on the 14<sup>th</sup>. College Station was extremely



dry during the month (only 1.00 inch of rain/ice) and suffered it's 10<sup>th</sup> driest December in recorded history. Dry and breezy conditions prevailed through the end of the month increasing fire weather concerns. By the end of December, several grass and wild fires dotted the state.

Below is a table with the monthly temperature and rainfall data for several sites across southeast Texas.

**2005 Temperature And Rainfall Data Across Southeast Texas**

Average High Temperature												
Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IAH	65.2	66.2	72.0	78.3	85.9	93.5	93.7	94.1	93.2	83.3	75.4	64.0
GLS	64.6	64.7	70.2	77.0	82.3	89.7	91.7	92.0	90.2	80.8	73.3	63.3
CLL	63.3	64.6	71.2	78.1	85.0	94.4	95.3	94.4	96.7	83.5	75.6	62.9
HOU	66.5	66.5	72.5	78.6	85.8	92.6	92.6	93.7	93.2	82.9	75.8	65.2
PSX	65.5	66.4	72.6	79.1	83.4	89.9	92.0	93.0	93.0	84.0	76.6	66.7
CXO	63.8	64.8	71.4	78.0	85.4	94.3	94.1	94.9	95.1	82.6	75.2	63.1
UTS	64.0	65.5	71.5	78.2	86.5	96.3	95.4	94.8	94.2	81.9	74.2	62.2
LBX	66.9	66.4	72.2	77.8	84.4	90.8	92.3	93.6	93.3	82.8	76.0	66.0
LVJ	65.9	66.2	72.3	78.2	85.3	92.3	93.2	93.7	92.1	82.4	75.2	65.0
SGR	66.5	67.4	73.2	79.7	86.5	93.7	94.2	93.7	93.5	83.4	76.0	64.7
DWH	64.2	65.9	72.0	78.2	85.4	93.6	94.2	94.9	94.9	84.2	76.8	64.2
HGX	65.6	65.4	71.4	76.1	83.7	90.7	91.6	92.2	90.9	80.9	74.2	64.5

Average Low Temperature												
Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IAH	47.3	51.3	51.4	57.1	64.7	73.0	75.2	75.1	73.6	58.9	53.5	42.1
GLS	51.9	54.4	57.2	64.7	70.9	79.8	80.5	81.2	78.9	67.3	60.3	49.5
CLL	45.9	49.6	49.5	55.7	64.7	73.3	74.4	74.6	73.2	58.5	51.7	39.3
HOU	49.0	52.9	53.3	59.1	66.7	74.7	75.5	76.9	75.8	62.4	55.5	45.0
PSX	48.6	53.2	54.8	60.1	67.7	75.2	76.5	78.2	77.5	63.1	55.9	44.7
CXO	44.7	47.9	47.3	52.1	60.9	69.0	72.5	71.8	69.4	53.5	48.3	36.4
UTS	46.2	49.1	50.1	56.0	64.3	73.1	73.7	74.1	71.6	55.9	51.5	38.8
LBX	48.3	52.1	51.3	56.0	63.9	71.3	73.8	73.3	72.9	59.1	50.8	41.7
LVJ	48.8	52.8	52.7	57.8	65.5	74.0	75.9	76.1	74.7	61.0	53.8	44.0
SGR	48.6	52.8	51.9	57.5	65.5	72.7	74.4	73.9	73.1	59.1	51.8	40.8
DWH	46.6	50.1	49.9	55.5	64.0	71.5	73.8	73.7	72.2	57.3	52.1	40.1
HGX	47.7	51.1	50.5	56.1	64.6	72.6	74.0	74.3	73.4	59.4	52.9	42.9

Average Daily Temperature												
Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IAH	56.3	58.8	61.7	67.7	75.3	83.3	84.4	84.6	83.4	71.1	64.4	53.1
DEPART	+4.5	+3.4	-0.6	-0.8	-0.5	+2.0	+0.8	+1.3	+4.5	+0.7	+3.5	-0.6
GLS	58.3	59.5	63.7	70.8	76.6	84.7	86.1	86.6	84.6	74.0	66.8	56.4
DEPART	+2.5	+1.5	-0.4	+0.8	-0.3	+2.5	+1.8	+2.2	+3.5	-0.1	+1.4	-1.7
CLL	54.6	57.1	60.3	66.9	74.9	83.9	84.8	84.5	85.0	71.0	63.7	51.1
DEPART	+4.4	+2.6	-1.3	-1.0	-0.4	+2.3	+0.2	-0.2	+5.3	+0.5	+3.7	-1.1
HOU	57.8	59.7	62.9	68.8	76.2	83.6	84.1	85.3	84.5	72.6	65.7	55.1
DEPART	+3.5	+2.0	-1.3	-1.2	-0.8	+1.3	-0.4	+0.9	+4.0	+0.4	+2.7	-1.0
PSX	57.0	59.8	63.7	69.6	75.5	82.5	84.3	85.6	85.2	73.5	66.3	55.7
DEPART	+4.1	+4.0	+1.6	+1.1	-0.2	+1.4	+0.9	+2.6	+6.2	+2.2	+4.1	+0.6
CXO	54.2	56.3	59.3	65.1	73.2	81.7	83.3	83.3	82.2	68.1	61.8	49.8
UTS	55.1	57.3	60.8	67.1	75.4	84.7	84.5	84.5	82.9	68.9	62.8	50.5
LBX	57.6	59.3	61.7	66.9	74.1	81.1	83.1	83.5	83.1	70.9	63.4	53.9
LVJ	57.3	59.5	62.5	68.0	75.4	83.2	84.5	84.9	83.4	71.7	64.5	54.5
SGR	57.6	60.1	62.6	68.6	76.0	83.2	84.3	83.8	83.3	71.2	63.9	52.8
DWH	55.4	58.0	61.0	66.8	74.7	82.6	84.0	84.3	83.6	70.7	64.5	52.1
HGX	56.7	58.2	60.9	66.1	74.1	81.6	82.8	83.2	82.1	70.1	63.5	53.7

DEPART = Departure from normal

Rainfall													
Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2005 Totals
IAH	3.41	6.10	4.05	1.28	6.06	0.08	5.30	1.52	2.63	1.69	2.72	6.37	41.21
GLS	2.16	2.76	3.92	1.85	2.63	0.24	4.02	1.00	3.88	2.51	3.86	2.36	31.19
CLL	3.92	5.07	3.81	1.26	2.48	0.45	4.63	3.26	T	2.11	0.99	1.00	28.98
HOU	0.96	4.22	3.62	0.88	2.18	0.29	12.96	2.54	1.47	1.41	2.91	2.27	35.71
PSX	1.42	2.89	6.06	1.04	7.93	0.80	6.93	0.35	4.12	4.24	1.23	0.96	37.97
CXO	3.48	5.54	2.83	1.91	1.30	1.50	5.27	1.58	0.36	2.08	1.64	2.24	29.73
UTS	2.27	4.74	2.84	3.31	1.59	0.11	3.06	5.68	0.66	2.64	0.86	1.67	29.43
LBX	2.79	2.75	4.44	1.54	2.91	0.32	4.17	0.86	1.97	4.85	4.40	1.20	32.20
LVJ	2.11	4.16	3.34	1.48	3.50	0.41	7.74	1.17	1.83	1.50	3.23	3.81	34.28
SGR	1.91	6.02	2.82	1.13	4.70	0.79	5.15	4.59	0.94	2.38	1.72	3.46	35.61
DWH	3.69	5.25	3.18	1.73	2.58	0.53	7.14	1.82	1.07	1.89	1.76	3.11	33.75

Below Is A Table Incorporating CO-OP Data Across Southeast Texas

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2005 Totals
Baytown	1.77	6.59	3.15	0.78	4.57	0.46	11.49	4.18	3.71	0.80	4.07	2.91	44.48
Bellville	3.43	3.57	1.98	0.84	2.29	0.61	5.96	1.70	0.19	1.01	2.77	2.36	26.71
Brenham	4.43	4.45	2.33	0.69	4.89	2.45	6.90	1.23	1.12	3.91	2.37	2.20	36.97
Caldwell	4.35	3.31	3.60	1.59	4.23	0.28	3.17	3.93	0.45	2.10	0.80	0.95	28.76
Cleveland	2.83	6.73	1.88	1.43	4.93	0.21	4.85	3.59	0.99*	0.93	4.68	3.93	35.99
Clodine	2.16	9.20	3.26	1.13	4.69	2.54	3.56	2.65	1.43	0.77	2.90	5.31	39.60
Columbus	5.27	2.97	3.12	1.00	6.70	0.00	7.16	1.63	0.45	3.68	1.66	1.35	34.99
Corrigan	3.63	7.92	4.96	2.69	4.22	0.82	6.33	5.27	2.05	0.33	2.24	1.89	42.35
Crockett	4.53	4.66	3.72	0.36	3.16	0.30	6.11	3.51	1.93	0.13	1.39	0.87	30.67
Cypress	3.03	6.62	2.53	1.68	2.48	0.00	4.90	9.97	0.28	0.00	3.88	3.89	39.26
Dacus	3.86	6.72	4.53	2.53	2.25	0.11	4.79	2.72	0.99	2.70	2.15	2.15	35.50
Danevang	1.88	6.44	3.30	1.35	5.19	1.18	4.98	0.99	1.41	2.14	3.93	1.30	34.09
Edna	4.10	5.48	3.07	0.97	6.77	1.80	3.90	1.22	1.75	4.94	2.64	0.50	37.14
Freeport	3.39	2.99	3.99	1.81	1.87	0.19	7.95	4.24	3.81	2.22	4.59	1.05	38.10
Houston Heights	1.53	7.23	3.17	1.31	6.90	0.07	12.29	6.25	1.61	0.58	3.29	5.94	50.17
North Houston	2.08	8.36	3.00	1.40	4.72	0.15	8.12	2.13	0.49	0.79	2.66	4.90	38.80
Houston - Port	1.04	7.43	1.43	0.58	3.06	0.12	13.50	1.36	3.58	0.50	0.64	2.23	35.47
Houston - Westbury	2.02	6.77	3.34	1.08	3.97	2.47	8.25	3.84	1.83	0.57	2.94	3.16	40.24
Jamaica Beach	2.62	3.67	6.64	1.30	3.32	0.66	4.16	0.88	7.87	2.45	3.68	3.10	37.25
Katy	1.15	6.25	2.81	0.67	3.96	0.82	3.52	1.13	0.90	0.85	1.36	3.48	26.90
Livingston	4.40	6.75	4.70	4.29	2.28	0.22	6.01	3.58	5.84	0.00	1.89	2.66	42.62
Madisonville	4.02	6.33	4.14	1.21	3.09	0.88	3.42	5.10	0.67	0.79	1.70	0.74	32.09
Matagorda	0.11	4.15	4.85	1.25	3.89	1.05	2.94	0.57	2.72	6.80	1.34	0.31	27.26
New Caney	1.84	7.66	2.51	1.80	3.36	0.06	5.60	0.74	5.38	0.73	3.84	6.52	40.04
Richards	3.00	3.50	1.79	3.26	2.66	0.80	5.00	6.71	1.85	1.50	2.40	2.05	34.52
Lake Somerville	3.41	4.93	2.83	0.61	3.03	0.33	4.28	3.08	0.12	2.15	1.53	1.16	27.46
Thompsons	1.47	6.12	3.34	1.09	5.04	0.24	5.86	3.53	2.56	1.96	4.55	3.73	39.49
Washington	3.08	3.62	2.98	1.33	2.75	0.20	4.47	2.20	2.11	2.85	1.50	2.11	29.20
West Columbia	1.74	3.37	3.57	1.27	4.72	0.28	7.47	1.52	2.70	5.18	4.37	1.72	37.91
Wharton	2.25	4.90	4.34	1.68	4.56	0.28	4.12	3.69	3.59	2.85	3.73	1.40	37.39

\* September Rainfall Incomplete

IAH = Houston Intercontinental Airport  
 GLS = Galveston Scholes Field  
 CLL = College Station Easterwood Field  
 HOU = Houston Hobby Airport  
 PSX = Palacios Municipal Airport  
 CXO = Conroe - Lone Star Executive Airport

UTS = Huntsville Municipal Airport  
 LBX = Brazoria County Airport  
 LVJ = Pearland Regional Airport  
 SGR = Sugarland - Hull Airport  
 DWH = Tomball - David Wayne Hooks Memorial Airport  
 HGX = League City - National Weather Service Office

# Pasadena And La Porte Are Our Newest StormReady Communities

On February 8<sup>th</sup>, 2006 the Houston/Galveston National Weather Service recognized the City of Pasadena with the StormReady certification. On February 27<sup>th</sup>, La Porte was also recognized as a StormReady community.



Pasadena and La Porte are the second and third communities in the Houston/Galveston National Weather Service area of responsibility to receive this recognition. StormReady is a program sponsored by the National Weather Service that is designed to equip communities with the communication and safety skills necessary to save lives and property. StormReady encourages communities to take a proactive approach to improve local hazardous weather operations and public awareness.

To be certified as StormReady, a StormReady advisory board reviews a community's application and inspects the applicant's emergency management operations. A StormReady community must:

- Establish a 24 hour warning point and emergency operations center
- Have more than one way to receive severe weather forecasts and warnings and to alert the public
- Have a system in place that monitors local weather conditions
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

For further information, please feel free to contact Gene Hafele at the Houston/Galveston National Weather Service at 281-337-5074 x 223 or through e-mail at [gene.hafele@noaa.gov](mailto:gene.hafele@noaa.gov). For more information on the StormReady program, visit <http://www.stormready.noaa.gov>.

## 2006 Houston International Boat and Travel Show

The 2006 Houston International Boat and Travel Show was held at the Reliant Center from January 6<sup>th</sup> through January 15<sup>th</sup>. Similar to the past several years, the Houston/Galveston National Weather Service Office set up a booth among the other guides, boat vendors, marine products and services. Though numbers are not yet currently available, an estimated 150,000 people attended the ten day event. This was a great opportunity for the Houston/Galveston staff to meet with the marine community as they passed by the National Weather Service booth.

We had a wireless internet connection at our booth once again this year which allowed visitors to see what weather data is available on our website. The onsite internet connection, along with magnets, pens and pencils given away with our office's web address written on them was an excellent way to show people



where to obtain the latest National Weather Service information. Many positive comments were received about the local forecasts and products. We really enjoyed meeting those that stopped by, and we hope to see everyone again next year.

# Lightning Safety Awareness Week

## June 18-24, 2006.

In the United States, there are an estimated 25 million cloud-to-ground lightning flashes each year. While lightning can be fascinating to watch, it is also extremely dangerous. In the United States, an average of 73 people are killed each year by lightning. In 2003, there were 44 deaths. That's more than the annual number of people killed by tornadoes or hurricanes. However, because lightning usually claims only one or two victims at a time, and because lightning does not cause the mass destruction left in the wake of tornadoes or hurricanes, lightning generally receives much less attention than the more destructive weather-related killers. While documented lightning injuries in the United States average about 300 per year, undocumented injuries caused by lightning are likely much higher.

A large number of people who are victims of lightning strikes do survive. However, they often report a variety of long-term, debilitating symptoms, including memory loss, attention deficits, sleep disorders, numbness, dizziness, stiffness in joints, irritability, fatigue, weakness, muscle spasms, depression and an inability to sit for long.

### Lightning Safety Awareness: An Educational Problem

Few people really understand the dangers of lightning. Many people don't act to protect their lives, property and the lives of others promptly because they don't understand all the dangers associated with thunderstorms and lightning. The first step in solving this problem is to educate people so that they become aware of the behavior that puts them at risk of being struck by lightning, and to let them know what they can do to reduce that risk. Coaches and other adults who make decisions affecting the safety of children must understand the dangers of lightning.

### Beware of a Developing Thunderstorm

Thunderstorms are most likely to develop on warm summer days and go through various stages of growth, development and dissipation. On a sunny day, as the sun heats the air, pockets of warmer air start to rise in the atmosphere. When this air reaches a certain level in the atmosphere, cumulus clouds start to form. Continued heating can cause these clouds to grow vertically upward in the atmosphere into "towering cumulus" clouds. These towering cumulus may be one of the first indications of a developing thunderstorm.

### The Lightning Discharge: Don't Be A Part of It

During a thunderstorm, each flash of cloud-to-ground lightning is a potential killer. The determining factor on whether a particular flash could be deadly depends on whether a person is in the path of the lightning discharge. In addition to the visible flash that travels through the air, the current associated with the lightning discharge travels along the ground. Although some victims are struck directly by the main lightning stroke, many victims are struck as the current moves in and along the ground. While virtually all people take some protective actions during the most dangerous part of thunderstorms, many leave themselves vulnerable to being struck by lightning as thunderstorms approach, depart, or are nearby.

### An Approaching Thunderstorm: When Should I Seek Safe Shelter?

Lightning can strike as much as ten miles away from the rain area in a thunderstorm; that's about the distance that you are able to hear the thunder from the storm. In some instances when a storm is ten miles away, it may even be difficult to tell that a storm is nearby. However, **IF YOU CAN HEAR THE THUNDER FROM A STORM, CHANCES ARE THAT YOU ARE WITHIN STRIKING DISTANCE OF THAT STORM.** Also, remember that each thunderstorm has a first stroke of lightning, which is just as deadly as any other stroke. If the sky looks threatening, take shelter before hearing thunder.

### Outdoor Activities: Minimizing The Risk Of Being Struck

The greatest number of lightning deaths and injuries in the United States occur during the summer months when the combination of lightning and outdoor summertime activities reaches a peak. During the summer, people take advantage of the warm weather to enjoy a multitude of outdoor recreational activities. Unfortunately, those outdoor recreational activities can put them at greater risk of being struck by lightning. Those involved in activities such



as boating, swimming, fishing, bicycling, golfing, jogging, walking, hiking, camping or working outdoors all need to take the appropriate actions in a timely manner when thunderstorms approach. Where organized sports activities are taking place, coaches, umpires, referees or camp counselors must protect the safety of the participants by stopping the activities sooner, so that the participants and spectators can get to a safe place before the lightning threat becomes significant. To reduce the threat of death or injury, those in charge of organized outdoor activities should develop and follow a plan to keep participants and spectators safe from lightning.

### **Indoor Activities: Things To Avoid**

Inside homes, people must also avoid activities which put their lives at risk from a possible lightning strike. As with the outdoor activities, these activities should be avoided before, during and after storms. In particular, people should stay away from windows and doors and avoid contact with anything that conducts electricity. People may also want to take certain actions well before the storm to protect property within their homes, such as electronic equipment.

### **If Someone is Struck, What Do I Do?**

In the unfortunate event that a person is struck by lightning, medical care may be needed immediately to save the person's life. Cardiac arrest and irregularities, burns and nerve damage are common in cases where people are struck by lightning. However, with proper treatment, including CPR if necessary, most victims survive a lightning strike, although the long-term effects on their lives and the lives of family members can be devastating.

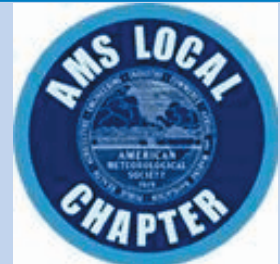
### **Have A Safe Summer!**

Lightning is a dangerous threat to people in the United States, particularly those outside in the summer. With common sense, we can greatly reduce the number of lightning deaths. When thunderstorms threaten, get to a safe place, stay there longer than you think you need to, stay away from windows and doors and avoid contact with anything that conducts electricity. Have a safe and enjoyable summer!

Much more information, including the science of this phenomena, indoor and outdoor safety, medical aspects, survivor stories, photos, and tools for teachers can be found on the internet at the National Weather Service's Lightning Safety webpage at [www.lightningsafety.noaa.gov/week.htm](http://www.lightningsafety.noaa.gov/week.htm).

## **The American Meteorological Society Houston Chapter 2005 - 2006 Season**

**By Patrick Blood**



During all of the years of the American Meteorological Society (AMS) Houston Chapter's existence, this may be the one that exceeds expectations in terms of offering the most interesting, fresh, out-of-the-box topics and speakers to date. This professional gathering of all disciplines and those interested in the sciences have found, and will discover, that our meetings are much more than just "weather." For instance, during the course of this season, we will have invited a wide spectrum of speakers to share their expertise to our chapter, from oceanographers to allergists. We have already had the opportunity to hear from world-famous climatologists and Tropical Prediction Center forecasters. If you still think this isn't eclectic enough, this past month's meeting addressed the local area's sinking, or subsidence, problem. Yes, Galveston Island and the Houston area are sinking which only exacerbates the flooding and storm surge problems severe weather and hurricanes, respectively, introduce to our Gulf Coast region. So, as you can see, one of the largest and most active AMS Chapters in the country is at it again to continue our local mission of disseminating atmospheric and related earth science information by focusing on what is most important to our community; the understanding that we all have a role on this stage we call Earth.

It has been said that there are more meteorologists here in Houston and the surrounding area, per capita, than anywhere else in the U.S.! Combine this fact with the numerous local professionals in all of the other sciences, engineering, university systems, and people of all walks of life that simply have an interest in understanding why our weather here in southeast Texas is so unique (45 inches of average annual rainfall, all types of severe weather, seasonal hurricane threat) and you have the ingredients for many more intriguing and thought-provoking meetings in the coming years. We are excited to be members of such a group and hope to see our future members coming aboard bringing new ideas on how to continue making our Houston Chapter the best in the country!

# THE SPRING STORM SEASON



Often in Southeast Texas, the most active season for severe weather is the collection of the spring months of March, April and May.

With warm, moist air returning from the Gulf of Mexico and active frontal systems from the north and west, the Upper Texas Coast and Southeast Texas often experience numerous showers and thunderstorms.

There are mainly two big weather phenomena during the spring-thunderstorms and tornadoes. Tornadoes are associated with thunderstorms, but not every thunderstorm is capable of producing a tornado. However, thunderstorms can still produce significant damage without the presence of tornadoes. By definition, a thunderstorm produces lightning which is the number two weather related killer in the United States. The number one killer is flash floods which are also associated with thunderstorms. Despite the popularity or notoriety of hurricanes and tornadoes, the two main weather related killers can occur on a frequent basis. There are ways to help reduce the chances of suffering injury or damage during thunderstorms.

The best defense for spring thunderstorms is preparation. Try to keep updated to forecasts that might suggest severe weather. There are several signs that suggest a thunderstorm approaching. Thunder is often the best warning signal. Temperature changes and breezy winds also offer a clue to approaching weather. If you can hear thunder or feel cool breezes, you are close enough to the thunderstorm to be affected. If at all possible, take shelter in a sturdy building away from windows. Use phones only in case of an emergency. If a shelter is not available, find a hard top automobile and keep the windows up. A common myth about automobiles is that the rubber tires insulate the car. This is false as lightning can still strike the vehicle. But the vehicle will provide significantly more protection than the open ground. Stay away from towers, hills, and tall trees as objects protruding into the air are the ones most likely to be struck. The only time to move to higher ground is if flood waters have been seen or reported in your area. If at the lake or on the coast, get off and away from water. If caught in the open ground, find a low spot in the terrain away from trees and fences. Squat low to the ground and lean on the balls of your feet. As lightning strikes the ground, it often spreads in several directions and can strike any object in the vicinity. By eliminating the area of ground that your are in contact with, you minimize your chance of being struck. If at all possible, stay informed by listening to advisories from commercial radio and television or to the National Weather Service's All Hazards NOAA Weather Radio. With proper information and preparation, you can reduce the damage of severe thunderstorms to you, your family, and your property.

Tornadoes offer different problems, but many safety rules from thunderstorms apply. The best defense is again preparation. Practice tornado drills so that all members of the family or employees of businesses know the appropriate locations of tornado shelters. Don't panic. Move to an interior room away from windows. If at all possible, cover yourself with blankets, pillows, or other soft objects. If driving, find a suitable low spot on the ground as quick as possible and abandon your vehicle. Do not try to outrun a tornado. If you reside in a mobile home, leave and find appropriate shelter as mobile homes offer little, if any, protection from tornadoes. Stay informed with the changing weather conditions.

By following these basic rules, one can minimize the risk, and thus the damage, posed by the variety of spring severe weather over Southeast Texas.

## Definitions:

**Severe Thunderstorm Watch** - Conditions are favorable for the development of severe thunderstorms (severe thunderstorms are possible in the area).

**Severe Thunderstorm Warning** - Severe thunderstorms are imminent or are occurring in the area.

**Tornado Watch** - Conditions are favorable for the development of tornadoes (tornadoes are possible in the area).

**Tornado Warning** - Tornadoes are imminent or are occurring in the area.

# Staff Spotlight: Mike Rehbein

**Name:** Mike Rehbein  
**Position:** Forecaster  
**Favorite Movie:** "Varsity Blues"

**Personal Information**

**Hometown:** Tulsa, OK  
**Status:** Single, one dog

**NWS Background**

1991-1994 NWSFO Brownsville (BRO), TX; Meteorological Intern  
1994-2002 National Severe Storms Forecast Center/Storm Prediction Center (NSSFC/SPC); Norman, OK; Outlook Forecaster  
2002-2006 NWSFO Houston/Galveston (HGX), Texas; Journeyman Forecaster  
2006-???? NWSFO Juneau, AK (AJK); Journeyman Forecaster

**Career Highlights / Achievements / Duties / Other Tidbits**

- Duties: public forecasts, aviation forecast, marine forecasts, severe weather operations, fire weather forecasts
- Focal Point duty at HGX: Flash flood
- Co-wrote computer program at SPC that helped log storm reports into the SPC database
- Best bowling score: 177 (while at OU in 1988)
- Provided Sugar Burn Forecasts while at BRO

**Favorite Color:** Crimson, or Sooner Red  
**Favorite Dessert?** Cherry cheesecake

**Favorite high school memory?** I drove the school bus in the morning during my senior year for the Catholic high school that I attended and got the bus stuck in the snow in Gilcrease Hill (in northwest Tulsa). Seniors regularly drove the school buses for the high school as a part of our school duties. We had to be certified by the state to operate the bus and a state trooper rode shotgun to make sure everything was alright.

**Most memorable weather event?**

Hurricane Rita - I was scared spitless about losing my house!

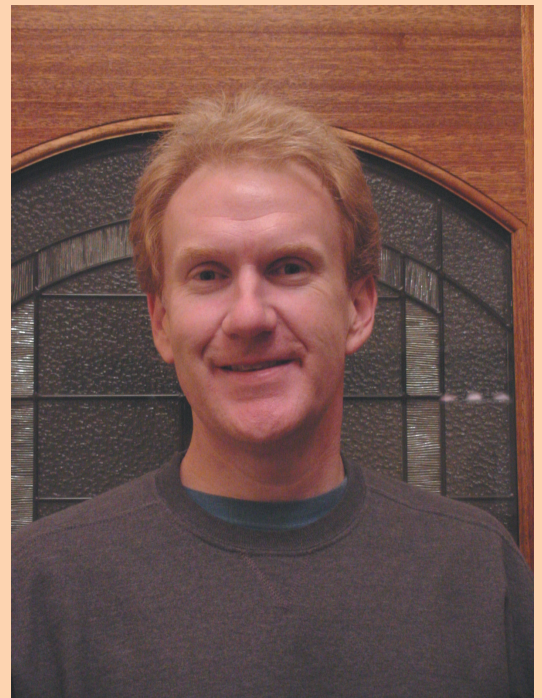
**What are the differences between SPC operations and WFO operations?**

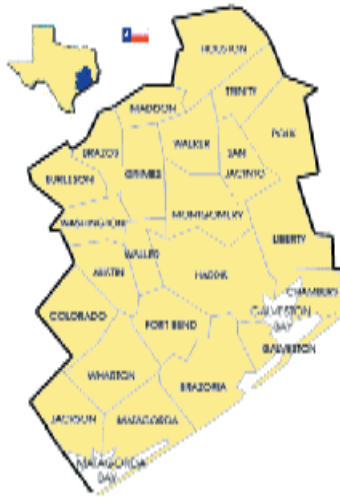
WFOs are much more 'customer' oriented. There is also a more diverse customer base as we deal with agricultural, marine and general public issues.

**What are you looking forward to in Alaska?**

The lack of 70F dewpoints!

\*\*\*Note: Mike is leaving our warm/humid climates and headed toward the Klondike this month. All the Best in Alaska, Mike!\*\*\*





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