Storm Signals

Houston/Galveston National Weather Service Office

Volume 62

2002 Hurricane Season Forecast and Storm Names

By Josh Lichter

The 2002 Atlantic basin hurricane season began on June 1st. A normal Atlantic hurricane season typically brings an average of ten tropical storms, of which six reach hurricane strength, with two classified as major (category 3, 4 or 5 on the Saffir-Simpson Hurricane Scale). The official end of the season is November 30th.

NOAA's (National Oceanic and Atmospheric Administration) hurricane season forecast issued on May 20th is calling for normal to slightly above normal levels of activity. The outlook calls for the potential of nine to thirteen tropical storms, with six to eight hurricanes, and two to three classified as major hurricanes. Above normal activity has been observed during six of the last seven Atlantic hurricane seasons, including last year when there were fifteen named storms, nine of which became hurricanes.

The key climate patterns guiding this year's expected activity are long-term patterns of tropical rainfall, air pressure and high temperatures of the Atlantic Ocean that are more conducive to hurricane development. These warmer ocean temperatures, combined with lower wind shear in the hurricane development region, have historically generated higher numbers of major hurricanes. However, NOAA is monitoring the potential development of a mature El Nino event. Increasing ocean surface temperatures throughout most of the equatorial Pacific Ocean, combined with observations of abnormally heavy rainfall in parts of South America, and the lack of it over Indonesia suggests that El Nino has developed and should continue to develop to a mature stage during the remainder of 2002. If El Nino continues to develop as expected, there is a possibility that fewer hurricanes than normal may form in the Atlantic basin during August to October, the peak of the Atlantic hurricane season. NOAA will update their 2002 Atlantic hurricane season outlook in early August.

The Upper Texas coast has now gone twelve straight seasons without being struck by a hurricane (Chantal and Jerry in 1989) and eighteen straight seasons without being struck by a major hurricane (Alicia in 1983). Our hurricane drought will come to an end. The next hurricane may end up being a weak, fast moving system that causes much less damage and death than last year's Tropical Storm Allison, or it may end up being a destructive Category 3, 4 or even 5 system that wreaks havoc on large communities, infrastructure and disrupts lives. Though some may say last year **was** our year, the next great hurricane that strikes the upper Texas Coast could make us realize that Allison was just the latest in a long history of weather disasters from the tropics. While most of us recovered from Allison within a year's time, our next destructive hurricane may require years of recovery. This could be our year.

In this Issue:

List of Names for the 2002 Season

Arthur
Bertha
Cristobal
Dolly
Edouard
Fay
Gustav
Hanna
Isidore
Josephine
Kyle
Lili
Marco
Nana
Omar
Paloma
Rene
Sally
Teddy
Vicky
Wilfred

Allison Is Retired

By Jim O'Donnel

"Allison" permanently retired from list of Atlantic tropical storm and hurricane names...first time ever for a tropical storm...

The World Meteorological Organization (WMO) in Geneva, Switzerland, the agency responsible for naming tropical cyclones in eleven regions worldwide, recently announced that the name "Allison" will be permanently retired from the list of Atlantic names. The Atlantic list covers tropical storms and hurricanes that form in the North Atlantic, Caribbean Sea and Gulf of Mexico. This decision was announced at the 24th Session of the WMO Hurricane Committee held in Orlando, Florida from April 3-10, 2002.

This marks the first time ever that a name has been retired from the Atlantic list for a tropical cyclone that only attained tropical storm intensity (winds 39-73 mph). Up until now, only hurricanes (winds 74 mph+) that resulted in significant damage or loss of life had names permanently retired. If a tropical storm or hurricane does not meet the above criteria, the name is recycled for use again six years later.

Tropical Storm Allison was the costliest natural disaster in history for the Houston/Galveston area surpassing even Hurricane Alicia in 1983 ($2 billion) and Hurricane Carla in 1961 ($408 million). Damage estimates for Allison are now near $5 billion which makes it the costliest tropical storm in U.S. history and the third costliest overall. Only Hurricane Andrew (1992) and Hurricane Hugo (1989) were more costly at $26.5 billion and $7 billion in damage, respectively. Allison was responsible for the loss of 22 lives...surpassing even Hurricane Alicia's death toll of 21 persons eighteen years earlier. Allison was also the second earliest landfalling tropical cyclone on the Upper Texas Coast (June 5, 2001) since a hurricane made landfall near Galveston on June 3, 1871.

Some parts of the Houston area received nearly 37 inches of rainfall over a six day period in early June 2001 resulting in the most widespread and catastrophic floods in the city's history. Even a year later, the flood relief efforts continue and it may be several years before a full recovery takes place.

Believe it or not, this was not the first time the Houston area has been affected by a storm named Allison. In June of 1989, the remnants of Eastern Pacific Hurricane Cosme emerged over the southern Gulf of Mexico and reformed as Tropical Storm Allison, eventually making landfall on the Upper Texas Coast. Yours truly was working at the National Weather Service Contract Meteorological Observatory (WSCMO) at Houston

Intercontinental Airport when the first Allison dropped 10.34 inches on June 26, 1989...a day I still remember vividly since John F. Kennedy Boulevard had over a foot of floodwater over it as I drove to work. Bad as that was, it paled in comparison to what happened with "Allison-2" last year.

The WMO announced that they have chosen "Andrea" to replace Allison and will be first used in the year 2007. Two other names were also retired from the list in 2001...Iris and Michelle. They will be replaced by Ingrid and Melissa in 2007.

One other interesting highlight of the WMO meeting was the intense criticism it received for the use of the names "Adolph" and "Israel" for Eastern Pacific storms last year. Understandably so, yet in an unprecedented move, the WMO decided to replace both names even though neither would have qualified for retirement under the usual guidelines. Therefore, Adolph has become "Alvin" and Israel will become "Ivo" in 2007.

Since the naming of Atlantic tropical storms and hurricanes began in 1953, the names that have been permanently retired include:

Name	Year	Area(s) Worst Affected
Agnes	1972	Florida, Northeast U.S.
Alicia	1983	Texas
Allen	1980	Antilles, Mexico, Texas
Allison	2001	Texas, Louisiana, Eastern U.S.
Andrew	1992	Bahamas, Florida, Louisiana
Anita	1977	Mexico
Audrey	1957	Louisiana, Texas
Betsy	1965	Bahamas, Florida, Louisiana
Beulah	1967	Antilles, Mexico, Texas
Bob	1991	North Carolina & Northeast U.S.
Camille	1969	Louisiana, Mississippi and Alabama
Carla	1961	Texas
Carmen	1974	Mexico, Louisiana
Carol	1954	Northeast U.S.
Cesar	1996	Honduras
Celia	1970	Texas
Cleo	1964	Lesser Antilles, Haiti, Cuba, Florida
Connie	1955	North Carolina
David	1979	Lesser Antilles, Hispañiola, Florida and Eastern U.S.
Diana	1990	Mexico
Diane	1955	Mid-Atlantic & Northeast U.S.
Donna	1960	Bahamas, Florida and Eastern U.S.
Dora	1964	Florida
Edna	1954	Bahamas, North Carolina, New England
Elena	1985	Mississippi, Alabama, Florida
Eloise	1975	Antilles, Florida, Alabama
Fifi	1974	Yucatan Peninsula, Louisiana
Flora	1963	Haiti, Cuba
Floyd	1999	North Carolina, Eastern U.S.
Fran	1996	North Carolina
Frederic	1979	Alabama, Mississippi
Gilbert	1988	Lesser Antilles, Jamaica, Yucatan Peninsula, Mexico
Gloria	1985	North Carolina, Northeast U.S.
Hattie	1961	Belize, Guatemala
Hazel	1954	Antilles, North and South Carolina
Hilda	1964	Louisiana
Hortense	1996	Puerto Rico, Dominican Republic, Bahamas
Hugo	1989	Antilles, South Carolina
Inez	1966	Lesser Antilles, Hispañiola, Cuba, Florida, Mexico
Ione	1955	North Carolina
Iris	2001	Belize, Honduras, Guatemala
Janet	1955	Lesser Antilles, Belize, Mexico
Joan	1988	Curacao, Venezuela, Colombia, Nicaragua (Crossed into Pacific and became Miriam)
Klaus	1990	Martinique
Lenny	1999	Antilles
Luis	1995	Leeward Islands
Marilyn	1995	Bermuda
Michelle	2001	Cayman Islands, Cuba
Mitch	1998	Central America, Nicaragua, Honduras
Opal	1995	Florida Panhandle
Roxanne	1995	Yucatan Peninsula

Hurricane Talks

The Houston/Galveston National Weather Service Office offers informative hurricane talks to schools, businesses, and organizations. These talks include details on the dangers of tropical storms and hurricanes, the history of activity along the Southeast Texas coast, and ways to protect your life and property during a tropical threat. Brochures on hurricanes are also made available to all attendees.

If you are interested in having a meteorologist come to you and talk about hurricanes, please contact Gene Hafele or Joshua Lichter 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.

Heat Wave - A National Problem

Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. Among the large continental family of natural hazards, only the cold of winter - not lightning, hurricanes, tornadoes, floods, or earthquakes - takes a greater toll. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the disastrous heat wave of 1980, more than 1,250 people died.

And those are the direct causalities. No one can know how many more deaths are advanced by heat wave weather - how many diseased or aging hearts surrender, that under better conditions would have continued functioning.

North American summers are hot; most summers see heat waves in one section or another of the United States. East of the Rockies, they tend to combine both high temperatures and high humidity although some of the worst have been catastrophically dry.

NOAA's National Weather Service Heat Index Program
Considering this tragic death toll, the National Weather Service has stepped up its efforts to alert more effectively the general public and appropriate authorities to the hazards of heat waves - those prolonged excessive heat/humidity episodes.

Based on the latest research findings, the NWS has devised the "Heat Index" (HI), (sometimes referred to as the "apparent temperature"). The HI, given in degrees Fahrenheit, is an accurate measure of how hot it really feels when the relative humidity (RH) is added to the actual air temperature.

To find the Heat Index, look at the Heat Index Chart. As an example, if the air temperature is 95°F (found on the left side of the table), and the relative humidity is 55% (found at the top of the table), the HI - or how hot it really feels - is 110°F. This is at the intersection of the 95° row and the 55% column. Important: Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

Heat Index													
	Relative Humidity (%)												
°F	40	45	55	55	60	65	70	75	80	85	90	95	100
110	136												
108	130	137											
106	124	130	137										
104	119	124	131	137									
102	114	119	124	130	137								
100	109	114	118	124	129	136							
98	105	109	113	117	123	128	134						
96	101	104	108	112	116	121	126	132					
94	97	100	103	106	110	114	119	124	129	135			
92	94	96	99	101	105	108	112	116	121	126	131		
90	91	93	95	97	100	103	106	109	113	117	122	127	132
88	88	89	91	93	95	98	100	103	106	110	113	117	121
86	85	87	88	89	91	93	95	97	100	102	105	108	112
84	83	84	85	86	88	89	90	92	94	96	98	100	103
82	81	82	83	84	84	85	86	88	89	90	91	93	95
80	80	80	81	81	82	82	83	84	84	85	86	86	87

With Prolonged Exposure and/or Physical Activity
Extreme Danger
Heat stroke or sunstroke highly likely
Danger
Sunstroke, muscle cramps, and/or heat exhaustion likely
Extreme Caution
Sunstroke, muscle cramps, and/or heat exhaustion possible
Caution
Fatigue possible

Note on the HI chart the shaded zone above 105°F. This corresponds to a level of HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

The "Heat Index/Heat Disorders" table relates ranges of HI with specific disorders, particularly for people in the higher risk groups.

Heat Index / Heat Disorders

Heat Index	**Possible heat disorders for people in higher risk groups**
130°F or higher	Heatstroke/sunstroke highly likely with continued exposure.
105°-130°F	Sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.
90°-105°F	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
80°-90°F	Fatigue possible with prolonged exposure and/or physical activity.

Summary of Houston/Galveston NWS's Alert Procedures

The Houston/Galveston will initiate alert procedures (Heat Advisory) when the Heat Index (HI) is expected to have a significant impact on public safety. A guideline that has been established for the Houston Galveston County Warning Area is for the issuance of Heat Advisories when the maximum daytime HI is expected to equal or exceed 108 Degrees F for two or more consecutive days. No nighttime temperature minimum is required. The guidelines issued by the NWS is for the issuance of excessive heat alerts when the maximum daytime HI is expected to equal or exceed 105 degrees F and nighttime minimum of 80 degrees F or above for two or more consecutive days. Excessive heat alert thresholds are being tailored at major metropolitan centers based on research results that link unusual amounts of heat-related deaths to city-specific meteorological conditions.

The alert procedures are:

Include HI values in zone and city forecasts.

Issue Special Weather Statements and/or Public Information Statements presenting a detailed discussion of (1) the extent of the hazard including HI values, (2) who is most at risk, (3) safety rules for reducing the risk. Assist state and local health officials in preparing Civil Emergency Messages in severe heat waves. Meteorological information from Special Weather Statements will be included as well as more detailed medical information, advice, and names and telephone numbers of health officials. Release to the media and over NOAA's own Weather Radio all of the above information.

Heat Wave continued

How Heat Affects the Body

Human bodies dissipate heat by varying the rate and depth of blood circulation, by losing water through the skin and sweat glands, and - as the last extremity is reached - by panting, when blood is heated above 98.6 degrees. The heart begins to pump more blood, blood vessels dilate to accommodate the increased flow, and the bundles of tiny capillaries threading through the upper layers of skin are put into operation. The body's blood is circulated closer to the skin's surface, and excess heat drains off into the cooler atmosphere. At the same time, water diffuses through the skin as perspiration. The skin handles about 90 percent of the body's heat dissipating function.

Sweating, by itself, does nothing to cool the body, unless the water is removed by evaporation - and high relative humidity retards evaporation. The evaporation process itself works this way: the heat energy required to evaporate the sweat is extracted from the body, thereby cooling it. Under conditions of high temperature (above 90 degrees) and high relative humidity, the body is doing everything it can to maintain 98.6 degrees inside. The heart is pumping a torrent of blood through dilated circulatory vessels; the sweat glands are pouring liquid - including essential dissolved chemicals, like sodium and chloride - onto the surface of the skin.

Too Much Heat

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop.

Ranging in severity, heat disorders share one common feature: the individual has overexposed or over exercised for his/her age and physical condition in the existing thermal environment.

Sunburn, with its ultraviolet radiation burns, can significantly retard the skin's ability to shed excess heat.

Studies indicate that, other things being equal, the severity of heat disorders tend to increase with age - heat cramps in a 17-year-old may be heat exhaustion in someone 40, and heat stroke in a person over 60.

Acclimatization has to do with adjusting sweat-salt concentration, among other things. The idea is to lose enough water to regulate body temperature, with the least possible chemical disturbance.

Cities Pose Special Hazards

The stagnant atmospheric conditions of the heat wave trap pollutants in urban areas and add the stresses of severe pollution to the already dangerous stresses of hot weather, creating a health problem of undiscovered dimensions. A map of heat-related deaths in St. Louis during 1966, for example, shows a heavier concentration in the crowded alleys and towers of the inner city, where air quality would also be poor during a heat wave.

The high inner-city death rates also can be read as poor access to air-conditioned rooms. While air-conditioning may be a luxury in normal times, it can be a lifesaver during heat wave conditions.

The cost of cool air moves steadily higher, adding what appears to be a cruel economic side to heat wave fatalities. Indications from the 1978 Texas heat wave suggest that some elderly people on fixed incomes, many of them in buildings that could not be ventilated without air conditioning, found the cost too high, turned off their units, and ultimately succumbed to the stresses of heat.

Preventing Heat-Related Illness

Elderly persons, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), and persons with weight and alcohol problems are particularly susceptible to

Heat Disorder	Symptons	First Aid
Sunburn	Redness and pain. In severe cases, swelling of skin, blisters, fever, headaches.	Ointment for mild cases if blisters appear. If breaking occurs, apply dry sterile dressing. Serious, extensive cases should be seen by a physician.
Heat Cramps	Painful spasms usually in muscles of legs and abdomen possible. Heavy sweating.	Firm pressure on cramping muscles, or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue use.
Heat Exhaustion	Heavy sweating, weakness, skin cold, pale and clammy. Pulse thready. Normal temperature possible. Fainting and vomiting.	Get victim out of sun. Lay down and loosen clothing. Apply cool wet cloths. Fan or move victim to air conditioned room. Sips of water. If nausea occurs, discontinue use. If vomiting continues, seek immediate medical attention.
Heat Stroke or Sunstroke	High body temperature (106°F, or higher). Hot dry skin. Rapid and strong pulse. Possible unconsciousness.	Heat stroke is a severe medical emergency. Summon medical assistance or get the victim to a hospital immediately. Delay can be fatal. Move the victim to a cooler environment. Reduce body temperature with cold bath or sponging. Use extreme caution. Remove clothing, use fans and air conditioners. If temperature rises again, repeat process. Do not give fluids.

heat reactions, especially during heat waves in areas where moderate climate usually prevails.

Heat Wave Safety Tips

- **Slow down.** Strenuous activities should be reduced, eliminated, or rescheduled to the coolest time of the day. Individuals at risk should stay in the coolest available place, not necessarily indoors.
- **Dress for summer.** Lightweight, light-colored clothing reflects heat and sunlight, and helps your body maintain normal temperatures.
- **Put less fuel on your inner fires.** Foods (like proteins) that increase metabolic heat production also increase water loss.
- **Drink plenty of water or other nonalcoholic fluids.** Your body needs water to keep cool. Drink plenty of fluids even if you don't feel thirsty. Persons who (1) have epilepsy or heart, kidney, or liver disease, (2) are on fluid restrictive diets, or (3) have a problem with fluid retention should consult a physician before increasing their consumption of fluids. Do not drink alcoholic beverages.
- **Do not take salt tablets unless specified by a physician.** Persons on salt restrictive diets should consult a physician before increasing their salt intake.
- **Spend more time in air conditioned places.** Air conditioning in homes and other buildings markedly reduces danger from the heat. If you cannot afford an air conditioner, spending some time each day (during hot weather) in an air conditioned environment affords some protection.
- **Don't get too much sun.** Sunburn makes the job of heat dissipation that much more difficult.

Ozone in Southeast Texas

By Josh Lichter

What is ozone?

Ozone is a gas that is formed in the atmosphere when three atoms of oxygen combine. Naturally occurring ozone is found high in the stratosphere (6 to 30 miles above the surface) surrounding the earth. This "good ozone" shields people, trees, property, crops and microorganisms from the harmful effects of the sun's untraviolet light. Ozone also forms in ground-level air when certain substances emitted by trees and other vegetation, soil microorganisms and lightning react together. This low-level ozone can become "bad ozone" when everyday human activities such as transportation, energy production and some industrial and commercial operations result in emissions of additional chemical compounds called precursors. This "bad ozone" is the pollution that is the most widespread air quality problem in the United States.

What conditions favor high ozone levels?

Ozone pollution is mainly a daytime problem during the summer months. Strong sunlight and hot weather causes ground level ozone to form in harmful concentrations in the air. This concentration is determined not only by the precursors, but also by weather and climate factors. Intense sunlight, warm temperatures, stagnant high pressure weather systems and low wind speeds cause ozone to accumulate in harmful amounts.

What can high ozone levels do to us?

When concentrations of ozone become elevated, they can act as a lung irritant. Individuals with chronic lung disease (such as asthma and emphysema) and the elderly and small children are particularly sensitive to ozone and should attempt to avoid exposure. To avoid exposure, one should minimize exertion outdoors during the midday to early evening hours or stay indoors in an air conditioned area during this time.

What is an ozone watch or warning and when are they issued?

When atmospheric conditions are expected to become favorable for producing high levels of ozone pollution in the Houston-Galveston-Brazoria areas, the Texas Natural Resources Conservation Commission (TNRCC) issues an ozone watch. If air pollution levels are detected at unhealthy levels, the TNRCC will issue an ozone warning. When a watch or warning is issued, the Houston/Galveston National Weather Service Office then issues a statement (internet address below) with the information. Residents across Southeast Texas are urged to monitor ozone level forecasts this summer and take the appropriate precautions to avoid exposure.

The following are some ozone information websites:

The ozone watch or warning statement from the Houston/Galveston National Weather Service Office can be found at...
http://www.srh.noaa.gov/data/SAT/OPU/SATOPUHOU.1.TXT

A map of current ozone levels and ozone monitor locations can be found at...
http://www.tnrcc.state.tx.us/cgi-bin/monops/select_curlev?region12_cur_gif#map1

Today's ozone forecast can be found at...
http://www.tnrcc.state.tx.us/cgi-bin/monops/ozone_actionday

(note: much of the information in this article was obtained from the TNRCC)

Local Emergency Manager, Terry Byrd, Receives National Award

David Tait, Executive Director with the National Hurricane Conference, notified the City of Friendswood that **Fire Marshal/Emergency Management Coordinator Terry Byrd** won an award for **Outstanding Achievement for Local Emergency Management**. Terry received his award at the National Hurricane Conference in Orlando, Florida on April 4.

This is not an annual award; there have been only four recipients in 13 years - two from Florida, one from Mississippi, and Friendswood's own Terry Byrd. Terry was nominated as a result of his work during Tropical Storm Allison by Friendswood residents Lew Fincher and Gene Hafele. Gene is the Warning Coordination Meteorologist with the Houston/Galveston National Weather Service and Lew is a Hurricane Preparedness Specialist with Hurricane Consulting and Chairperson of the National Hurricane Conferences - Private Industry Committee. These comments are taken from Mr. Fincher's nomination submitted to the NHC:

Only five days into the official 2001 Hurricane season, Tropical Storm Allison struck the greater Houston/Galveston Area as no other tropical storm had done before in history. By the time the remnants of Allison moved off, the damages totaled over $5 billion dollars. Though Friendswood suffered one of the highest rainfall totals and its creeks ran over its banks throughout the city, most never heard about the efforts of the Friendswood EOC and its Office of Emergency Management under its coordinator, Terry Byrd. Terry's successful effort at laying the emergency ground work, using mitigation and preparedness programs as well as his foresight in putting together a very workable recovery program became the basis for Friendswood being able to stand against the forces of Tropical Storm Allison. Terry's skill and foresight influenced the outcome of Allison upon the City of Friendswood and made it possible for the citizens and businesses of Friendswood to recover quickly from the nation's worst tropical storm in history. The City's Emergency Management Plan worked so smoothly that many really didn't know that Terry's office served as the hub of the outreach of safety and health during the crisis.

Tropical Prediction Center Director Max Mayfield (L) congratulates Terry Byrd (R)

Please join in congratulating Terry for his outstanding service to the City of Friendswood and to the entire Friendswood community. He is a leader in emergency management in the city, the region, the state, and now as evidenced by this award, the nation.

Half Year Climate Summary and New Climate Normals

By Charles Roeseler

The first half of 2002 was drier and slightly warmer than normal over most of Southeast Texas and the Upper Texas Coast. 2002 started out warmer than normal with January temperatures averaging about two degrees warmer than normal. Temperatures took a plunge in February and March with temperatures averaging three to five degrees below normal. Warmer than normal conditions redeveloped over the region in March and April with temperatures averaging three to four degrees warmer than normal. Temperatures in June were generally near normal across the region. The average temperature for the first six months of 2002 was just about two degrees above normal.

Although pockets of heavy rain made an occasional foray into Southeast Texas, most climate sites across the region reported below normal rainfall for the first six months of the year. Coastal regions fared the best with rainfall totals averaging about five inches below normal. Areas further inland were not as fortunate. Rainfall over inland portions of Southeast Texas averaged 10 to 12 inches below normal for the first half of the year.

Here is a month by month breakdown of temperatures, rainfall and significant weather which occurred across Southeast Texas during the first half of 2002.

January - The month started out on a rare wintry note. A Winter Storm Watch was issued for a large part of the region. A rare snow and sleet event was expected. Light sleet and snow developed but no accumulations or hazardous conditions developed. Toward the end of the month, periods of dense sea fog affected the area wreaking havoc with marine navigation. Average temperatures were about a half degree warmer than normal near the coast and two degrees warmer than normal inland. Rainfall was well below normal, averaging one to three inches below normal.

February - A mid-month cold front produced a squall line which brought dime size hail to Madison and Harris counties. Wind damage was also reported in Galveston County. An arctic cold front raced through the region at the end of the month bringing record cold temperatures to the region. Average temperatures were well below normal averaging four to six degrees colder than normal.

March - The month came in like a lamb and left like a lion. The first half of the month was quiet with no significant weather. On the 19th, a squall line grazed the northern fringe of the region. This system uprooted trees, tore roofs off buildings and destroyed several barns. Another cold front crossed the region on the 30th producing widespread damage. Tornadoes were reported in Wharton, Fort Bend and Polk counties. Straight line winds damaged property from Madisonville to Eagle Lake to Galveston. Large hail also pelted the region. Baseball size hail fell near El Campo with golf ball size hail falling in Sugar Land and Friendswood. Temperatures averaged one to two degrees cooler than normal. Despite the storms at the end of the month, most areas suffered a rainfall deficit of one to two inches.

April - A large thunderstorm complex developed late on April 7th. This system brought widespread wind damage over the southern half of the region. In addition to the strong winds, heavy rain produced flooding over a large portion of the area. Five to six inches of rain fell early on the 8th flooding parts of Brazoria, southern Harris and Galveston counties. Temperatures were much warmer than normal, averaging three to five degrees above normal. Despite the heavy rain which occurred on the 7th and 8th, rainfall for the month was near normal over the south and one to two inches below normal over the north.

May - Numerous temperature records were established over the first half of the month. The first 12 days of the month averaged almost ten degrees warmer than normal. Mother Nature has a way of finding balance. Temperatures plunged during the middle of the month and averaged almost seven degrees below normal. 31 temperature and rainfall records were established during May 2002. Thunderstorms dropped one to two inches of rain across the region on May 17th. Other thunderstorms erupted quickly on the 30th. These storms produced nickel to quarter size hail across the cities of Houston, Texas City and Galveston.

June - Temperatures and rainfall were generally near normal across the area. A band of thunderstorms brought some severe weather to the region on the 16th. Straight line winds toppled power poles, uprooted trees and tore roofs from buildings. Afternoon and evening thunderstorms prevailed toward the end of the month.

Houston Intercontinental Airport - 2002 Data

Month	Average High	Average Low	Average Daily	Departure	Rain	Departure
January	66.0	43.1	54.5	+2.7	+1.24	-2.44
February	63.0	38.4	50.7	-4.7	0.88	-2.10
March	71.8	50.7	61.3	-1.0	2.36	-1.00
April	81.8	65.2	73.5	+5.0	3.79	+0.19
May	85.4	68.6	77.0	+1.2	1.78	-3.37
June	90.1	73.2	81.6	+0.3	4.54	-0.81

Galveston Scholes Field - 2002 Data

Month	Average High	Average Low	Average Daily	Departure	Rain	Departure
January	63.1	49.7	56.4	+0.6	2.20	-1.88
February	61.1	47.5	54.3	-3.7	0.71	-1.90
March	68.8	55.6	62.2	-1.9	1.85	-0.91
April	77.3	68.5	72.9	+2.9	2.36	-0.20
May	82.2	72.1	77.1	+0.2	3.63	-0.07
June	86.3	76.3	81.3	-0.9	5.31	+1.27

College Station Easterwood Field - 2002 Data

Month	Average High	Average Low	Average Daily	Departure	Rain	Departure
January	64.5	40.1	52.3	+2.1	1.60	-1.72
February	62.1	35.8	48.9	-5.6	1.63	-0.75
March	71.1	47.5	59.3	-2.3	0.85	-1.99
April	81.7	63.9	72.8	+4.9	1.43	-1.77
May	87.7	65.2	76.4	+1.1	0.89	-4.16
June	92.8	71.0	81.9	+0.3	3.04	-0.75

Climate Summary continued

The 30 year climate normals were updated this year. The following table will list the 30 year averages for 1961-1990 and then the new 30 year averages for 1971-2000. The table will list the average monthly high temperature (High), average monthly low temperature (Low), average monthly temperature (Month) and average rainfall (Rain). Temperatures are in degrees Fahrenheit and rainfall is in inches.

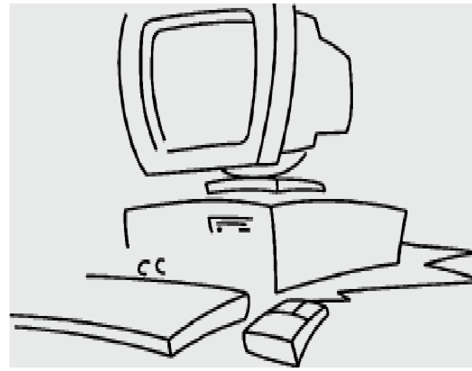
Houston Intercontinental Airport								
	1961-1990				1971-2000			
	High	Low	Month	Rain	High	Low	Month	Rain
January	61.0	39.7	50.4	3.29	62.3	41.2	51.8	3.68
February	65.3	42.6	53.9	2.96	66.5	44.3	55.4	2.98
March	71.1	50.0	60.6	2.92	73.3	51.3	62.3	3.36
April	78.4	58.1	68.3	3.21	79.1	57.9	68.5	3.60
May	84.6	64.4	74.5	5.24	85.5	66.1	75.8	5.15
June	90.1	70.6	80.4	4.96	90.7	71.8	81.3	5.35
July	92.7	72.4	82.6	3.60	93.6	73.5	83.6	3.18
August	92.5	72.0	82.3	3.49	93.5	73.0	83.3	3.83
September	88.4	67.9	78.2	4.89	89.3	68.4	78.9	4.33
October	81.6	57.6	69.6	4.27	82.0	58.8	70.4	4.50
November	72.4	49.6	61.0	3.79	72.0	49.8	60.9	4.19
December	64.7	42.2	53.5	3.45	64.6	42.8	53.7	3.69
Total	78.6	57.3	67.9	46.07	79.4	58.2	68.8	47.84

Galveston Scholes Field								
	1961-1990				1971-2000			
	High	Low	Month	Rain	High	Low	Month	Rain
January	58.3	47.1	52.7	3.26	61.9	49.7	55.8	4.08
February	60.5	49.9	55.2	2.26	64.4	51.5	58.0	2.61
March	66.7	56.7	61.7	2.23	70.0	58.2	64.1	2.76
April	73.5	65.0	69.3	2.43	75.2	64.7	70.0	2.56
May	79.8	71.8	75.8	3.59	81.4	72.3	76.9	3.70
June	85.0	77.2	81.1	4.44	86.6	77.8	82.2	4.04
July	87.3	79.2	83.5	3.96	88.7	79.8	84.3	3.45
August	87.7	79.2	83.5	4.47	89.3	79.5	84.4	4.22
September	84.5	75.4	80.0	5.93	86.5	75.6	81.1	5.76
October	77.5	68.0	72.8	2.84	79.7	68.4	74.1	3.49
November	69.3	59.0	64.2	3.37	71.3	59.4	65.4	3.64
December	61.9	50.9	56.4	3.50	64.3	51.8	58.1	3.53
Total	74.3	65.0	69.7	42.28	76.2	65.7	71.2	43.84

College Station Easterwood Field								
	1961-1990				1971-2000			
	High	Low	Month	Rain	High	Low	Month	Rain
January	58.4	38.7	48.5	2.65	60.6	39.8	50.2	3.32
February	62.9	41.9	52.4	2.62	65.5	43.4	55.0	2.38
March	71.0	49.7	60.3	2.58	72.6	50.5	61.6	2.84
April	78.3	58.0	68.2	3.38	78.8	56.9	67.9	3.20
May	84.0	65.0	74.6	4.80	85.3	65.3	75.3	5.05
June	90.3	71.0	80.7	3.68	91.7	71.5	81.6	3.79
July	93.8	73.4	83.6	2.29	95.6	73.6	84.6	1.92
August	94.8	73.2	84.0	2.42	96.2	73.2	84.7	2.63
September	88.4	68.7	78.6	4.87	90.9	68.5	79.7	3.91
October	80.2	58.6	69.4	3.81	82.0	59.0	70.5	4.22
November	70.1	49.4	59.8	3.15	70.9	49.1	60.0	3.18
December	61.5	41.2	51.4	2.83	62.8	41.5	52.2	2.83
Total	77.8	57.4	67.6	39.08	79.4	57.7	68.6	39.27

Information Technology Advancements in the NWS

By Mark Keehn



Over 8,000 lives were lost when the Great Storm of 1900 made its landfall just south of Galveston. At the time, the only resources available to observers in the Galveston Weather Bureau Office were the telegraph used to communicate with the Weather Bureau Headquarters in Washington D.C., the telephone, and an assortment of weather instruments located on the roof of the office. Forecasts and warnings were disseminated to the Galveston public through a combination of telephone and personal weather briefings, signal flags flown from the roof of the office, and by information published in the local newspaper.

Today, meteorologists at the Houston/Galveston National Weather Service (NWS) office have numerous resources available that would not have been imaginable to meteorologists a century ago. The Advanced Weather Information Processing System (AWIPS) is the communications backbone of the modern forecast office, providing instant access to satellite, radar, surface, marine, and upper-air observations. During severe or tropical weather events, the local NWS office can call for field reports from a network of volunteer weather observers and law enforcement agencies that provide them with real-time feedback from areas directly affected by the inclement weather. Data from AWIPS combined with the weather spotter reports allows meteorologists to quickly pinpoint the location and short-term motion of storm systems that threaten the upper Texas Coast. In addition to displaying observed data, the AWIPS also ingests and displays the output from a multitude of computer forecast models, providing guidance out to ten days in advance.

The NWS has also made tremendous progress in product dissemination since 1900. Today, when a warning is issued, it is immediately transferred through a central telecommunications gateway where it is relayed to all other NWS offices, local and federal government agencies, the media, and the public. Simultaneous to a warning product being transmitted over computer networks, it is automatically broadcast on the NOAA weather radio, published on the Internet, and disseminated to a local digital pager network. With the expanding number of dissemination options available to the NWS it is becoming increasingly difficult for the informed public to be caught off guard by changing weather conditions.

There is little doubt that the Upper Texas Coast will once again play host to a hurricane as strong, if not stronger, than the Great Storm of 1900. However, it can safely be argued that the loss of life will never be so great as it was a century ago. This is largely a result of the many advancements made in the fields of meteorology and information technology that allow the NWS and media to provide the public with adequate lead time and the necessary information to seek safe shelter in advance of an approaching storm.

The Rats That Left the Ship (and One Who Came Back!)

By Wendy Wong

So far, 2002 has been quite a year of change for the NWS Hoston/Galveston office. We have said good-bye and, in one case, hello to some familiar faces.

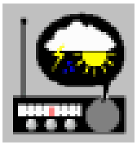
This year we said good-bye to one of the more august members of our staff as he retired after 47 years of federal service. Jim Nelson, our former Port Meteorological Officer (PMO), officially jumped ship in April 2002. He will be spending his golden years with his wife in southeast Texas as they enjoy the extra time in watching their 4 grandkids grow up. Taking over for Jim as our new PMO will be Chris Fakes. Chris started in his new position in June and comes to us via the U.S. Navy.

On the meteorological side of the office, fond farewells were said to Carolyn Levert, Jon Zeitler and Daniel Huckaby. Carolyn was an intern that began her NWS career with our office during her junior year at Northeast Louisiana University (now Louisiana State University at Monroe) as a summer aide. She moved on back home this past January as a Hydrometeorological Analysis and Support (HAS) forecaster in the NWS River Forecast Center in Slidell, LA. Senior Forecaster Jon Zeitler, who has blasted up the ranks from an intern at the Ag Weather Center (in College Station) and journeyman forecaster in Rapid City (SD), has moved onto the Austin/San Antonio NWS office this past May. Jon will be serving as their new Science and Operations Officer. Our final good-bye (so far this year) goes to Daniel Huckaby, another intern who will be moving up the ranks. Dan, who kicked off his NWS career as a summer co-op in Fort Worth (while a student at Texas A&M), returned home to the Fort Worth NWS Office as a journeyman forecaster in July. As sad we are all to see them go, we want to wish all the best to our former co-workers!

However, these losses were balanced with some gains. In addition to Chris, other new staff members added to our roster this year include Mark Keehn and Lance Wood. Mark was hired this past January as our very first Information Technology Officer (ITO). During his NWS career, Mark worked as an intern in Brownsville and a Techniques Development Meteorologist at the Spaceflight Meteorology Group here at NASA's Johnson Space Center. Lance, a rat who jumped ship two years ago, returned to the fold this June as a Senior Forecaster. His resume includes an internship at the NWS El Paso office, a journeyman position at the NWS Lake Charles office and a stint as a meteorologist with Duke Energy.

While staff changes at weather offices are quite normal, 2002 will go down as a very busy year for the Houston/Galveston office should we continue at this rate!

Voice Improvement Processor



Earlier this year we received a Voice Improvement Processor (VIP) for our NOAA Weather Radio system. After several weeks of work fine tuning the pronunciation dictionaries, the new "voices" are on the air. Donna and Craig, as they are referred to, are the result of a much improved text-to-speech process. This process is run on a separate computer that is networked with the original Console Replacement System (CRS) and our AWIPS. As text products such as forecasts, tide information or warnings are transmitted, a "voice ready" version is produced and sent to the CRS and VIP. The VIP converts the text to a wave file and it is then scheduled to play in the cycle or, in the case of a severe weather warning, broadcast immediately.

The new voices, while not perfect, are much less machine sounding than the original and come closer to replicating the human voice. Work will continue on the system to improve pronunciation and to make the voices more pleasant to listen to. As always, your feedback is welcome.

Staff Spotlight — Dave Schwertz

Name: Dave Schwertz
Position: Service Hydrologist
Favorite Movie: "200 Motels"
Born: Chicago, IL / **Raised:** San Antonio, TX

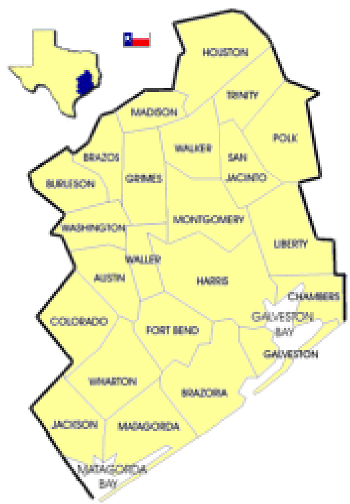
NWS BACKGROUND
1982-1984..........Meteorological Technician, NWSO Midland, TX
1984-1985..........Meteorological Technician, NWSO Waycross, GA
1985-1990..........Meteorological Technician, NWSO Galveston, TX
1990-1992..........Meteorological Technician, NWSO Medford, OR
1992 to present...Service Hydrologist, NWSFO Houston/Galveston, TX

HIGHLIGHTS/DUTIES/OTHER TIDBITS
•Primarily responsible for managing the hydrological program for southeast Texas. This includes coordinating with local officials in establishing flood levels on area bayous, rivers and creeks and the associated impacts; training the staff on the various hydrological applications and programs
•Certified radar and upper-air technician
•Served in the Navy from 1975 to 1980. While in the Navy, participated in Operation Deep Freeze which entailed taking upper air soundings and obs in Antarctica along with ice recon flights.
•Favorite authors include: Michael Moorcock and Roger Zelazny

If you could have any super power, what would it be?
To fly.

Most memorable flood events?
October '94 - It was the first major widespread flood event that I worked. It affected a large portion of southeast Texas. The period from September '98 to November '98 was also busy. It included Tropical Storm Frances, the flooding along the Colorado River in October and November '98 was very similar to October '94. And finally, Tropical Storm Allison in June 2001. I don't think we need to add anything else to what has already been said.

Houston/Galveston
National Weather Service
1620 Gill Road
Dickinson, TX 77539



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