HURRICANES

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Document Contents:

Category	Wind speed (mph)	Storm Surge (ft above normal)	Damage
Category 1	74-95	+ 4-5	only to vegetation & unanchered mobile homes
Category 2	96-110	+ 6-8	considerable vegatation damage, some roof & window damage
Category 3	111-130	+ 9-12	large trees blown down, smaller houses sustain structural damage
Category 4	131-155	+ 13-18	complete roof failure, complete destruction of mobile homes, extensive window & door damage, flooding becomes prevalent
Category 5	155+	18+	complete roof failure on industrial buildings, severe and extensive window & door damage, small buildings and utilities fail, evacuation within 500 yards of shoreline is necessary.

- Wind speed is the determining factor in the scale.

- Storm surge values are dependent on the slope of the continental shelf.

- The scale is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall.

Naming a Hurricane

2002	2003	2004	2005	2006	2007
Arthur	Ana	Alex	Arlene	Alberto	Andrea
Bertha	Bill	Bonnie	Bret	Beryl	Barry
Cristobal	Claudette	Charley	Cindy	Chris	Chantal
Dolly	Danny	Danielle	Dennis	Debby	Dean
Edouard	Erika	Earl	Emily	Ernesto	Erin
Fay	Fabian	Frances	Franklin	Florence	Felix
Gustav	Grace	Gaston	Gert	Gordon	Gabrielle
Hanna	Henri	Hermine	Harvey	Helene	Humberto
Isidore	Isabel	Ivan	Irene	Isaac	Ingrid
Josephine	Juan	Jeanne	Jose	Joyce	Jerry
Kyle	Kate	Karl	Katrina	Kirk	Karen
Lili	Larry	Lisa	Lee	Leslie	Lorenzo
Marco	Mindy	Matthew	Maria	Michael	Melissa
Nana	Nicholas	Nicole	Nate	Nadine	Noel
Omar	Odette	Otto	Ophelia	Oscar	Olga
Paloma	Peter	Paula	Philippe	Patty	Pablo
Rene	Rose	Richard	Rita	Rafael	Rebekah
Sally	Sam	Shary	Stan	Sandy	Sebastien
Teddy	Teresa	Tomas	Tammy	Tony	Tanya
Vicky	Victor	Virginie	Vince	Valerie	Van
Wilfred	Wanda	Walter	Wilma	William	Wendy

- Using people's names began in 1953 – they were easier to remember than lat/long coordinates.
- The list featured only women's named until 1979, now they alternate.
- There are only six lists. They repeat every six years.
- Names only change when a catastrophic (deadly or costly) hurricane occurs. Hurricane Mitch (1998) is an example. What name replaced Mitch?

Source: National Hurricane Center, NOAA

Hurricane Safety

Source: "Surviving the Storm - A Guide to Hurricane Preparedness"
Published by the U.S. Department of Homeland Security/Federal Emergency Management Agency

KNOW YOUR RISKS FOR HURRICANES

One of the most dramatic, damaging and potentially damaging weather events that occur in this country is a hurricane. Fortunately, there are measures that can be taken by individuals and communities before a hurricane strikes to reduce vulnerability to hurricane hazards.

During a hurricane, homes, businesses, public buildings, roads and power lines may be damaged or destroyed by high winds and floodwaters. Debris can break windows and doors. Roads and bridges can be washed away by flash flooding or blocked by debris.

The force of wind alone can cause tremendous devastation, toppling trees and power lines and undermining weak areas of buildings.

These storms cost our nation millions, if not billions, of dollars in damage annually. But there are ways to offset such destruction. Simple construction measures, such as placing storm shutters over exposed glass or installing hurricane straps on roofs, have proved effective in lessening damage when hurricanes strike.

Communities can reduce vulnerability to hurricanes by adopting and enforcing building codes for wind and flood resistance. Sound land-use planning also can ensure that structures are not built in high-hazard areas.

A goal of the U.S. Department of Homeland Security/FEMA is to help prevent future damage from disasters by providing information as well as direct, hands-on help when needed. Building disaster-resistant communities is an achievable goal. It requires action by individuals, businesses and local governments. Working together, we can reduce the number of lives, property and businesses lost the next time a hurricane strikes.

THE POWER OF HURRICANES

Walls torn from concrete buildings, 15-foot trees ripped from the earth, 20-foot waves crashing to shore. The power of hurricanes is awesome.

Hurricanes can spawn tornadoes. Floods and flash floods are generated by torrential rains that accompany hurricanes. Even more dangerous is the storm surge - a dome of ocean water that, at its peak, can be 25 feet high and 50-100 miles wide. The surge can devastate coastal communities as it sweeps ashore.

A hurricane is a tropical weather system with winds that have reached a sustained speed of 74 mph or more. Hurricane winds blow in a large spiral around a relatively calm center, known as

the "eye." The eye is generally 20-30 miles wide, and the storm may extend outward from it for 400 miles.

As a hurricane approaches, the sky darkens and winds strengthen. As it nears land, it can bring torrential rains, high winds and storm surges. A hurricane can stretch the entire length of the eastern seaboard. The 74-160 mph winds can extend inland for hundreds of miles.

Hurricanes are classified into five categories according to wind velocity. Category 1 is the mildest, with winds from 74-95 mph. Category 5 is the strongest, with winds above 155 mph.

August and September are peak months of hurricane season, which lasts from June 1 to November 30.

A M E S S A G E F R O M DHS UNDER SECRETARY MICHAEL D. BROWN

We can depend on hurricanes to arrive each year along our eastern, southern and Gulf coasts, but we cannot depend on luck or chance to protect us. The power and strength of hurricanes demands respect, as anyone who has seen up close the terrible devastation they can cause can attest.

Hurricane winds can topple trees, tear homes from their foundations and toss boats around like toys. But wind is often not the worst damage hurricanes bring. The ocean surge and flooding that follow in its wake can do even more harm. Storm surges have been known to go 25 miles inland, submerging cars and flooding houses in its path.

There is nothing we can do to prevent hurricanes from forming year after year, but there is a lot we can do to reduce or even prevent the damage they cause. This newsletter contains some helpful information on how to better prepare and protect your family and property from the ravages of a hurricane.

I hope you will assess the risks you face and take steps to limit those risks. These preventive measures are some of the best investments you can make, and they will allow you to face the next hurricane better prepared, knowing you are ready to weather the storm.

WEATHER TERMS USED FOR HURRICANE SEASON

Part of staying informed about weather conditions is understanding the different terms used by weather forecasters. Following are some of the most common terms:

Advisory: Hurricane and storm information is disseminated to the public every six hours.

Special Advisory: Information is disseminated when there is significant change in storm-related weather conditions.

Gale Warning: Sustained winds of 35-54 mph and strong wave action are expected.

Storm Warning: Sustained winds of 55-73 mph are expected.

Hurricane Watch: There is a threat of hurricane conditions within 24-36 hours.

Hurricane Warning: A hurricane is expected to strike within 24 hours or less, with sustained winds of 74 mph or more and dangerously high water.

Tropical Disturbance: A moving area of thunderstorms is in the tropics.

Tropical Depression: An area of low pressure, rotary circulation of clouds and winds up to 38 mph is identified.

Tropical Storm: A storm characterized by counterclockwise circulation of clouds and winds 39-73 is brewing.

PREPARE A FAMILY DISASTER PLAN NOW

A well-thought-out plan of action for you and your family can go a long way toward reducing potential suffering from any type of disaster that could strike. With hurricane season upon us, preparing your family disaster plan is the first step.

Household emergency plans should be kept simple. The best emergency plans are those that are easy to remember.

Maintaining a link to the outside can be crucial. Keep a battery-operated radio and extra batteries on hand as part of your disaster supply kit. Make sure family members know where the radio is kept. Be sure to include pets in your family disaster plan.

Post emergency numbers (fire, police, ambulance) by the phone. Teach children how to call 911 for help.

Teach responsible family members how to turn off the utilities in your home.

Identify family meeting places in case you are separated. Choose a place in a building or park outside your neighborhood. Everyone should be clear about this location. Develop an emergency communication plan. Ask an out-of-state relative or friend to serve as the family's contact. Make sure everyone knows the telephone number of this contact.

Be familiar with escape routes in case you need to evacuate your neighborhood. Plan several escape routes for different contingencies.

For more information visit www.ready.gov on the Internet or, for printed information, call 800-BE-READY.

ACTIONS TO TAKE BEFORE -- AND AFTER -- A HURRICANE

The hurricane warning system is increasingly effective in providing warnings in time for people to move inland when hurricanes threaten.

However, it is becoming more difficult to evacuate people from densely populated areas. Roads are easily overcrowded, particularly during summer tourist season. The problem is compounded by the complacency of people who do not understand the awesome power of the storm.

Complacency and delayed action could result in needless loss of life and damage to property.

Before a Hurricane Strikes:
Plan a safe evacuation route that will take you 20-50 miles inland. Contact your local emergency management office or Red Cross chapter and ask for the community preparedness plan.

Have disaster supplies on hand, including:

- Flashlight and extra batteries
- Portable battery-operated radio and extra batteries
- First-aid kit
- Emergency food and water
- Nonelectric can opener
- Essential medicines
- Cash and credit cards
- Sturdy shoes and a change of clothing
- Copies of important papers, including bank accounts, insurance and household inventory records

Make sure your family goes over the family disaster plan.

Make plans for protecting your house, especially the roof, windows and doors.

Trim dead or weak branches from trees.

Check into flood insurance. Homeowners policies do not cover damage from flooding that often accompanies hurricanes. Call your local insurance agent for information or the National Flood Insurance Program at 800-720-1090.

When a Hurricane Watch or Warning Is Issued
Listen to radio or television for hurricane progress reports. Follow instructions if ordered to evacuate.

Check your emergency supplies. Store drinking water in clean bathtubs, jugs, bottles and cooking utensils.

Bring in outdoor objects such as lawn furniture, toys and garden tools; anchor objects that cannot be brought inside but that could be wind-tossed. Remove outdoor antennas, if possible.

Secure your home by installing hurricane shutters or precut plywood.

Turn the refrigerator and freezer to the coldest settings if not instructed by officials to turn off utilities.

Fuel your car. Review evacuation routes and gather your disaster supply kit in case you are instructed to evacuate.

Store valuables and personal papers in a waterproof container.

After a Hurricane
Return home only after authorities say it is safe to do so. Keep tuned to your local radio or tv station for recovery information.

Beware of downed or loose power lines. Report them immediately to the power company, police or fire department.

Enter your home with caution. Open windows and doors to ventilate or dry your home. Do not use candles or open flames in doors. Use a flashlight to inspect for damage.

Check for gas leaks. If you smell gas or hear a blowing or hissing noise, quickly leave the building and leave the doors open. Call the gas company.

Look for electrical system damage. If you see sparks or frayed wires, turn off electricity at the main fuse box. If you have to step in water to reach the electric box, call an electrician for advice.

Check for sewage and water-line damage. If you suspect there is such damage, call the water company. Do not drink or prepare food with tap water until notified it is safe to do so.

Take pictures of the damage for insurance claims and contact your service agent.

If Evacuation Is Necessary
If officials order evacuation, leave as soon as possible. Avoid flooded roads and watch for washed-out bridges.

Secure your home. Unplug appliances and turn off electricity and the main water valve. If time permits, elevate furniture to protect it from flooding or move it to a higher floor.

Take your pre-assembled emergency supplies and warm, protective clothing.

STRENGTHENING YOUR HOME
After Hurricane Andrew, which caused large- scale destruction in parts of southern Florida in 1992, a team of experts examined homes that failed and ones that survived. They found four areas that should be checked for vulnerability to strong winds: the roof, windows, doors and garage doors. Measures can be taken to strengthen each of these areas of your home.

Roof
The roof of your house is most vulnerable to damage from high winds. Proper roof construction is essential. A small investment made before a storm hits can save thousands in future damage.

The connection between the roof and walls must be strong enough to resist the "uplift" effect of strong winds. Roof trusses or rafters should be tied properly to exterior walls with metal hurricane connectors or straps.

Have a building professional use specially designed metal connectors to attach the roof to wall plates, which are already well connected to wall studs.

You may choose instead to use metal strapping or connectors to tie the roof truss to both the wall top plate and the wall studs. Special connectors also are available to attach a roof to a masonry wall.

Gable-end roofs are more susceptible to damage from high winds than hip or flat roofs. Bracing for trusses and rafters can add protection to your home choosing the appropriate connectors for your walls, check with lumber-supply outlets, a building professional or local building and planning officials.

Windows
Installing storm shutters over all exposed windows and other glass surfaces is one of the easiest and most effective ways to protect your home. Cover all windows, French doors, sliding glass doors and skylights.

There are many types of manufactured storm shutters available. Before installing shutters, check with local building officials to find out whether or not a permit is required.

Plywood shutters that you make yourself, if installed properly, can offer a high level of protection from flying debris during a hurricane. Plywood shutters can be installed on all types of homes.

Doors
If you have double-entry doors, one is active and one is inactive. Check to see how the fixed half is secured top and bottom. The bolts or pins that secure most doors are not strong enough to withstand hurricane winds.

Check with your local building supplies retailer to find out what kind of bolt system will work for your door. Doors with windows will need additional protection from flying debris.

Garage Doors
Double-wide (two-car) garage doors can pose a problem during hurricanes. Because they are so large, they wobble as high winds blow and can pull out of their tracks or collapse from wind pressure.

Certain parts of the country have building codes requiring garage doors that withstand high winds. Some garage doors can be strengthened with retrofit kits. Check with your local building supplies dealer.

More detailed information on protecting your home from wind is available in the FEMA publication Against the Wind:Protecting Your Home from Hurricane Wind Damage. You will find it on the FEMA web site: www.fema.gov/pdf/hazards/agstwnd.pdf

MOBILE HOMES REQUIRE SPECIAL PRECAUTIONS

Mobile homes are particularly vulnerable to hurricane-force winds. Anchor the mobile home with over-the-top, or frame, ties. When a storm threatens, do what you can to secure your home, then take refuge with friends or relatives or at a public shelter.

Before you leave, take the following precautions:

- Pack breakables in boxes and put them on the floor.

- Remove mirrors and tape them. Wrap mirrors and lamps in blankets and place them in the bathtub or shower.

- Install hurricane shutters or precut plywood on all windows.

- Shut off utilities and disconnect electricity, sewer and water lines. Shut off propane tanks and leave them outside after anchoring them securely.

- Store awnings, folding furniture, trashcans and other loose outdoor objects.

MAKE PLANS FOR YOUR PETS

In planning for the hurricane season, do not forget your pets. If you evacuate your home, do not leave pets behind.

The Humane Society of the United States urges pet owners to make arrangements to evacuate their animals.

Be sure you have up-to-date identification tags, a pet carrier and a leash for them. Assemble a disaster kit that you can provide to whomever assumes care of your pet during a disaster.

Most emergency shelters will not accept pets. In the event of evacuation, make alternative arrangements for pets, such as with family friends, veterinarians or kennels in safe locations. Send medicine, food, feeding information and other supplies with them.

PLANNING COULD SAVE YOUR BUSINESS

If a hurricane is threatening the area where your business is located, you can take actions ahead of time that will save damage and lost productivity.

Clear out areas with extensive glass frontage as much as possible. If you have shutters, use them; otherwise, use precut plywood to board up doors and windows.

Remove outdoor hanging signs.

Bring inside or secure any objects that might become airborne and cause damage in strong winds.

Secure showcases. Use plywood to protect glass showcases or, if possible, turn the glass side toward an inside wall.

Store as much merchandise as high as possible off the floor, especially goods that could be in short supply after the storm.

Move merchandise that cannot be stored away from glass and cover it with tarps or heavy plastic.

Secure all goods in warehouses off the floor, and place sandbags in spaces where water could enter. Remove papers from lower drawers of desks and file cabinets and place them in plastic bags or containers on top of the cabinets.

Turn off water heaters, stoves, pilot lights and other burners.

DANGER: FLASH FLOODS
Nearly half of all flash flood fatalities are automobile related.

Water weighs 62.4 lbs. per cubic foot and typically flows downstream at 6 to 12 mph.

When a vehicle stalls in water, the water's momentum is transferred to the car. For each foot water rises, 500 lbs. of lateral force are applied to the car.

But the biggest factor is buoyancy. For each foot that water rises up the side of the car, the car displaces 1500 lbs. of water. In effect, the car weighs 1500 lbs. less for each foot water rises.

Two feet of water will carry away most automobiles.

Surviving the Storm is a special edition of the Recovery Times newsletter, developed by the U.S. Department of Homeland Security/FEMA.

Copies of Surviving the Storm are available on the FEMA Web site: www.fema.gov
Aileen Cooper, Editor, DHS/FEMA Office of Public Affairs.

Speed of Light

Source: http://www.what-is-the-speed-of-light.com/

What is the speed of light?

The speed of light in vacuum is exactly 299,792,458 m/s (metres per second)

In 1983 the SI (Systeme International) defined a metre as:

- The metre is the length of the path travelled by light in vacuum during a time interval of 1/299,792,458 of a second.

When people refer to the speed of light, they refer to the definition above - the speed of light in a vacuum.

The speed of light is normally rounded to 300,000 kilometers per second or 186,000 miles per second.

The speed of light depends on the material that the light moves through - for example: light moves slower in water, glass and through the atmosphere than in a vacuum. The ratio whereby light is slowed down is called the refractive index of that medium.

In general, the difference in the speed of light in other mediums is ignored.

Speed of light: Historical timeline of measuring the speed of light

- **Earlier thoughts about the speed of light**

Hundreds of year ago people thought light travelled instantaneously. They thought so because after a military artillery fired at a large distance, they saw the flash immediately, but sound took a noticeable delay before you heard it.

Even in 1600 A.D. the famous Johann Kepler believed that the speed of light was instantaneous. According to him the vacuum of space did not slow the speed of light down.

Galileo was correct in saying that all this proved was that light moved faster than sound - not necessarily instantaneously.

- **Galileo - speed of light measured using lanterns**

Galileo Galilei suggested in 1638 and carried out experiments in 1667 to try measure the speed of light. (Pictures of Galileo Galilei)

Two people had to stand at least a mile apart. They both had covered lanterns. When one person uncovered his lantern, the other person had to uncover his lantern when he saw this. A third person measured the time between when the first and second lanterns where uncovered.

Repeated experiments failed to accurately measure any time interval between when the first and second lanterns were uncovered. They could only say that light travels at least ten times faster than sound.

- **Roemer - speed of light measured using the moons of Jupiter**

In 1676, Ole Roemer made the first accurate measurement of the speed of light using Jupiter's moons.

Roemer made a detailed study of the frequent eclipses of Io by Jupiter. This enabled him to accurately predict when the next eclipses will occur.

However, over a period of months, Roemer's predictions were steadily off by longer and longer intervals of time. His predictions were eventually off by eight minutes.

Even stranger was the fact that these predictions then became more accurate, till they were correct again. This strange cycle repeated itself again and again with great regularity.

Roemer realized that this time difference was caused by the difference between the distance between the Earth and Jupiter. When Jupiter was closest to Earth, the eclipses happened on time. The farther Jupiter was away from the Earth, the later the eclipses became - light had a longer distance to travel to Earth, and this took longer.

The size of the Earth's orbit and Jupiter's orbit around the sun was known at that time.

Roemer used these figures to determine the distance between the Earth and Jupiter for all his observations.

Roemer used these somewhat inaccurate distances (as it was known in 1675) to calculate the speed of light to be around 200,000 km/sec.

Mini-biography and picture of Ole Roemer

- **Bradley - speed of light measured using stellar aberration**

In 1728 James Bradley, an English physicist, estimated the speed of light in a vacuum to be around 301,000 km/s. He used stellar aberration to calculate the speed of light. Stellar aberrations cause the apparent position of stars to change due to the motion of the Earth around the sun.

The stellar aberration is approximately the ratio of the speed the Earth orbits the sun to the speed of light. He knew the speed of the Earth around the sun. He could also measure this stellar aberration angle. These two facts enabled him to calculate the speed of light in a vacuum.

- **Fizeau - speed of light measured using a rotating wheel**

To measure the speed of light using the lanterns Galileo suggested was just not practical enough. If the two people were ten miles apart, they would have been able to detect the time lag of one-ten thousandth of a second!!! (They also did not have electronic stop watches back then. They probably used buckets of water to measure time intervals.)

A more practical way had to be found to measure this very, very short time lag.

Two rivals, Fizeau and Foucault independently solved this problem in France.

He shone a light between the teeth of a rapidly rotating toothed wheel. A mirror reflected the beam back between the same gap between the teeth of the wheel.

There were over a hundred teeth in the wheel. The wheel rotated at hundreds of times a second - therefore thousandths of a second was easy to measure. Light was reflected from mirrors more than 5 miles apart. This also helped him make accurate measurements.

By varying the speed of the wheel it was possible to determine at what speed the wheel was spinning too fast for the light to pass through the gap between the teeth and back through the same gap.

Fizeau calculated the speed of light to be 313,300 km/sec. (He knew how short a time the light had to get through that gap and back, and he knew how far the light had traveled. By dividing the distance by the time he got the speed of light.)

- **Foucault - speed of light measured using a rotating mirror**

Leon Foucault bounced light from a rotating mirror back to a stationary mirror. The light from the rotating mirror bounced back at an angle slightly different from the angle at which it hit the mirror because the mirror was rotating. By measuring this angle it was possible to measure the speed of the light.

Foucault continually increased the accuracy of this method over the next 50 years. His final measurement in 1926 determined that light travelled at 299,796 Km/s.

- **Michelson - speed of light measured using Foucault's method**

Michelson was an instructor in physics. He had to do a lecture demonstration of how Foucault measured the speed of light.

It had been years since Foucault made his measurements.

When Michelson was setting up his demonstration, he saw how he could make improvements to give a much more accurate measurement.

The distance between the wheel that Foucault used and his mirror was 60 feet.

Michelson put the very high quality (expensive) mirror 2,000 feet from the toothed wheel. He also had very high quality lenses with which to focus the beam onto the mirror.

His final measurement was 186,355 miles per second. This measurement had a possible error of around 30 miles per second. Foucault's speed of light had an accuracy of about 1,000 miles per second.

- **Morley - speed of light measured using an interferometer**

In 1887 Albert Michelson and Edward Morley determined whether there was any difference in the speed of light based on the direction in which it traveled.

They built an interferometer that send out two light beams: one beam of light was pointed along the direction of the earth's motion, the other light beam was pointed at a 90 degree angle relative to the first light beam. The beams were reflected by mirrors and focused at a common point where they could interfere with each other. The light beam traveling along the direction of the earth's motion around the sun was expected to travel at a speed different from that of the light beam traveling at 90 degrees and that of this light beam.

They did not encounter any interference that suggested these two beams of light traveled at even slightly different speeds. They would have been able to measure a difference in speed if there was one. They could not detect any difference in speed between these two light beams.

In 1958 Froome used a microwave interferometer and a Kerr cell shutter to measure the speed of light to be 299,792.5 km/s.

- **Systeme International defines the standard for metre**

Since 1970 lasers and caesium clocks made even more accurate measurements possible. This soon reached the point where the speed of light was known more accurately to the nearest metre per second than the definition of a metre itself. It made sense to define a standard metre by fixing the speed of light.

Systeme International define a metre in 1983

In 1983 scientists defined a meter as 1/299,792,458 the distance light travels in one second. They did this because they knew the distance light travels in one second more accurately than the definition of the standard meter.

Since 1983, the speed of light is not measured in any way. It has been defined as a standard.

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Now might be an appropriate time to try out the Speed of Light Quiz.

La vitesse de lumière (French)

Geschwindigkeit des Lichts (German)

Glossary of NHC/TPC Terms

(http://www.nhc.noaa.gov/aboutgloss.shtml)

Advisory:
Official information issued by tropical cyclone warning centers describing all tropical cyclone watches and warnings in effect along with details concerning tropical cyclone locations, intensity and movement, and precautions that should be taken. Advisories are also issued to describe: (a) tropical cyclones prior to issuance of watches and warnings and (b) subtropical cyclones.

Best Track:
A subjectively-smoothed representation of a tropical cyclone's location and intensity over its lifetime. The best track contains the cyclone's latitude, longitude, maximum sustained surface winds, and minimum sea-level pressure at 6-hourly intervals. Best track positions and intensities, which are based on a post-storm assessment of all available data, may differ from values contained in storm advisories. They also generally will not reflect the erratic motion implied by connecting individual center fix positions.

Center:
Generally speaking, the vertical axis of a tropical cyclone, usually defined by the location of minimum wind or minimum pressure. The cyclone center position can vary with altitude. In advisory products, refers to the center position at the surface.

Center / Vortex Fix:
The location of the center of a tropical or subtropical cyclone obtained by reconnaissance aircraft penetration, satellite, radar, or synoptic data.

Central North Pacific Basin:
The region north of the Equator between 140W and the International Dateline. The Central Pacific Hurricane Center (CPHC) in Honolulu, Hawaii is responsible for tracking tropical cyclones in this region.

Cyclone:
An atmospheric closed circulation rotating counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Direct Hit:
A close approach of a tropical cyclone to a particular location. For locations on the left-hand side of a tropical cyclone's track (looking in the direction of motion), a direct hit occurs when the cyclone passes to within a distance equal to the cyclone's radius of maximum wind. For locations on the right-hand side of the track, a direct hit occurs when the cyclone passes to within a distance equal to twice the radius of maximum wind. Compare indirect hit, strike.

Eastern North Pacific Basin:
The portion of the North Pacific Ocean east of 140W. The National Hurricane Center in Miami, Florida is responsible for tracking tropical cyclones in this region.

Eye:
The roughly circular area of comparatively light winds that encompasses the center of a severe tropical cyclone. The eye is either completely or partially surrounded by the eyewall cloud.

Eyewall / Wall Cloud:
An organized band or ring of cumulonimbus clouds that surround the eye, or light-wind center of a tropical cyclone. Eyewall and wall cloud are used synonymously.

Explosive Deepening:
A decrease in the minimum sea-level pressure of a tropical cyclone of 2.5 mb/hr for at least 12 hours or 5 mb/hr for at least six hours.

Extratropical:
A term used in advisories and tropical summaries to indicate that a cyclone has lost its "tropical" characteristics. The term implies both poleward displacement of the cyclone and the conversion of the cyclone's primary energy source from the release of latent heat of condensation to baroclinic (the temperature contrast between warm and cold air masses) processes. It is important to note that cyclones can become extratropical and still retain winds of hurricane or tropical storm force.

Fujiwhara Effect:
The tendency of two nearby tropical cyclones to rotate cyclonically about each other.

Gale Warning:
A warning of 1-minute sustained surface winds in the range 34 kt (39 mph or 63 km/hr) to 47 kt (54 mph or 87 km/hr) inclusive, either predicted or occurring and not directly associated with tropical cyclones.

High Wind Warning:
A high wind warning is defined as 1-minute average surface winds of 35 kt (40 mph or 64 km/hr) or greater lasting for 1 hour or longer, or winds gusting to 50 kt (58 mph or 93 km/hr) or greater regardless of duration that are either expected or observed over land.

Hurricane / Typhoon:
A tropical cyclone in which the maximum sustained surface wind (using the U.S. 1-minute average) is 64 kt (74 mph or 119 km/hr) or more. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline.

Hurricane Local Statement:
A public release prepared by local National Weather Service offices in or near a threatened area giving specific details for its county/parish warning area on (1) weather conditions, (2) evacuation decisions made by local officials, and (3) other precautions necessary to protect life and property.

Hurricane Season:
The portion of the year having a relatively high incidence of hurricanes. The hurricane season in the Atlantic, Caribbean, and Gulf of Mexico runs from June 1 to November 30. The hurricane season in the Eastern Pacific basin runs from May 15 to November 30. The hurricane season in the Central Pacific basin runs from June 1 to November 30.

Hurricane Warning:
A warning that sustained winds 64 kt (74 mph or 119 km/hr) or higher associated with a hurricane are expected in a specified coastal area in 24 hours or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force.

Hurricane Watch:
An announcement for specific coastal areas that hurricane conditions are possible within 36 hours.

Indirect Hit:
Generally refers to locations that do not experience a direct hit from a tropical cyclone, but do experience hurricane force winds (either sustained or gusts) or tides of at least 4 feet above normal.

Landfall:
The intersection of the surface center of a tropical cyclone with a coastline. Because the strongest winds in a tropical cyclone are not located precisely at the center, it is possible for a cyclone's strongest winds to be experienced over land even if landfall does not occur. Similarly, it is possible for a tropical cyclone to make landfall and have its strongest winds remain over the water. Compare direct hit, indirect hit, and strike.

Post-storm Report:
A report issued by a local National Weather Service office summarizing the impact of a tropical cyclone on its forecast area. These reports include information on observed winds, pressures, storm surges, rainfall, tornadoes, damage and casualties.

Preliminary Report:
Now known as the "Tropical Cyclone Report". A report summarizing the life history and effects of an Atlantic or eastern Pacific tropical cyclone. It contains a summary of the cyclone life cycle and pertinent meteorological data, including the post-analysis best track (six-hourly positions and intensities) and other meteorological statistics. It also contains a description of damage and casualties the system produced, as well as information on forecasts and warnings associated with the cyclone. NHC writes a report on every tropical cyclone in its area of responsibility.

Present Movement:
The best estimate of the movement of the center of a tropical cyclone at a given time and given position. This estimate does not reflect the short-period, small scale oscillations of the cyclone center.

Probability of Tropical Cyclone Conditions:
The probability, in percent, that the cyclone center will pass within 50 miles to the right or 75 miles to the left of the listed location within the indicated time period when looking at the coast in the direction of the cyclone's movement.

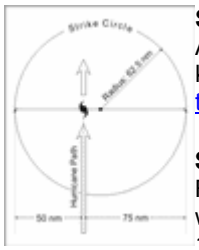
Radius of Maximum Winds:
The distance from the center of a tropical cyclone to the location of the cyclone's maximum winds. In well-developed hurricanes, the radius of maximum winds is generally found at the inner edge of the eyewall.

Rapid Deepening:
A decrease in the minimum sea-level pressure of a tropical cyclone of 1.75 mb/hr or 42 mb for 24 hours.

Relocated:
A term used in an advisory to indicate that a vector drawn from the preceding advisory position to the latest known position is not necessarily a reasonable representation of the cyclone's movement.

Storm Surge:
An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic high tide from the observed storm tide.

Storm Tide:
The actual level of sea water resulting from the astronomic tide combined with the storm surge.



Storm Warning:
A warning of 1-minute sustained surface winds of 48 kt (55 mph or 88 km/hr) or greater, either predicted or occurring, not directly associated with tropical cyclones.

Strike:
For any particular location, a hurricane strike occurs if that location passes within the hurricane's strike circle, a circle of 125 n mi diameter, centered 12.5 n mi to the right of the hurricane center (looking in the direction of motion). This circle is meant to depict the typical extent of hurricane force winds, which are approximately 75 n mi to the right of the center and 50 n mi to the left.

Subtropical Cyclone:
A non-frontal low pressure system that has characteristics of both tropical and extratropical cyclones.

The most common type is an upper-level cold low with circulation extending to the surface layer and maximum sustained winds generally occurring at a radius of about 100 miles or more from the center. In comparison to tropical cyclones, such systems have a relatively broad zone of maximum winds that is located farther from the center, and typically have a less symmetric wind field and distribution of convection.

A second type of subtropical cyclone is a mesoscale low originating in or near a frontolyzing zone of horizontal wind shear, with radius of maximum sustained winds generally less than 30 miles. The entire circulation may initially have a diameter of less than 100 miles. These generally short-lived systems may be either cold core or warm core.

Subtropical Depression:
A subtropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 kt (38 mph or 62 km/hr) or less.

Subtropical Storm:
A subtropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 34 kt (39 mph or 63 km/hr) or more.

Synoptic Track:
Weather reconnaissance mission flown to provide vital meteorological information in data sparse ocean areas as a supplement to existing surface, radar, and satellite data. Synoptic flights better define the upper atmosphere and aid in the prediction of tropical cyclone development and movement.

Tropical Cyclone:
A warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere. In this they differ from extratropical cyclones, which derive their energy from horizontal temperature contrasts in the atmosphere (baroclinic effects).

Tropical Cyclone Plan of the Day:
A coordinated mission plan that tasks operational weather reconnaissance requirements during the next 1100 to 1100 UTC day or as required, describes reconnaissance flights committed to satisfy both operational and research requirements, and identifies possible reconnaissance requirements for the succeeding 24-hour period.

Tropical Depression:
A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 kt (38 mph or 62 km/hr) or less.

Tropical Disturbance:

A discrete tropical weather system of apparently organized convection -- generally 100 to 300 nmi in diameter -- originating in the tropics or subtropics, having a nonfrontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.

Tropical Storm:

A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 kt (39 mph or 63 km/hr) to 63 kt (73 mph or 118 km/hr).

Tropical Storm Warning:

A warning that sustained winds within the range of 34 to 63 kt (39 to 73 mph or 63 to 118 km/hr) associated with a tropical cyclone are expected in a specified coastal area within 24 hours or less.

Tropical Storm Watch:

An announcement for specific coastal areas that tropical storm conditions are possible within 36 hours.

Tropical Wave:

A trough or cyclonic curvature maximum in the trade-wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere.

Tropical Cyclone, Tropical Weather, & TPC Information Topics:
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