



Hurricane Information and Preparedness



Hurricane Preparedness

- Get informed.
- Make a plan.
- Assemble a kit.
- Maintain your plan and kit.



Ensure that you and your family is prepared for tropical cyclone activity

- Come to a decision about where you will shelter during a storm
- Ensure that travel documents and insurance policies are up to date
- Place all vital documents in a waterproof 'grab and go' container
- Service your generator if you have one
- Check your shutters, make sure that they fit and you have all the parts
- Remove debris from the yard
- Trim back trees
- Store non-perishable food and water

Water

Store water in clean plastic containers and use a permanent marker to date and identify the container as water. Avoid using containers that will decompose or break, such as glass bottles. A normally active person needs to drink at least 2 quarts (2.3 liters) of water each day. Hot environments and intense physical activity can double that amount. Children, nursing mothers, and ill people will need more.



If you have questions about the quality of the water, purify it before drinking. You can heat water to a rolling boil for 10 minutes. You can also use household liquid chlorine bleach. To purify water, use the following table as a guide:

WATER QUANTITY

1 Quart (1.13 liters)
1 Gallon (4.5 liters)
5 Gallons (22.7 liters)

BLEACH ADDED

4 Drops
16 Drops
1 Teaspoon



After adding bleach, shake or stir the water container and let it stand thirty (30) minutes before drinking.



Food



- Store at least a 3-day supply of nonperishable food. Select foods that require no refrigeration, preparation, or cooking and little or no water. If you must heat food, pack ‘Sterno’ – the small cans of fuel used by caterers.

Select food items that are compact and lightweight in your Disaster Supplies Kit, such



Ready-to-eat canned meats, and vegetables

Canned juices, long life and condensed milk

Staples, rice, flour, sugar, salt, pepper, high-energy foods- peanut butter, jam, crackers

Vitamins

Foods for infants, elderly persons or persons on special diets

Comfort/stress foods such cookies, candy, granola bars, sweetened cereals, lollipops,

instant coffee, tea bags



First Aid Kit

Assemble a first aid kit for your home and one for each car. A first aid kit should include:



- Sterile adhesive bandages in assorted sizes
 - 2-inch sterile gauze pads (4-6)
 - 4-inch sterile gauze pads (4-6)
 - Hypoallergenic adhesive tape
 - Triangular bandages (3)
 - Antiseptic
 - Assorted sizes of safety pins
 - Cleaning agent/soap
 - Latex gloves (2 pair)
 - 2-inch sterile roller bandages (3 rolls)
 - 3-inch sterile roller bandages (3 rolls)
 - Scissors
 - Tweezers
- Nonprescription Drugs*
- Aspirin or non-aspirin pain reliever
 - Anti-diarrhea medication
 - Antacid (for stomach upset)

Tools and Supplies



- Emergency preparedness manual
- Battery-operated radio and extra batteries
- Flashlight and extra batteries
- Cash

- Matches in a waterproof container
- Plastic storage containers
- Paper, pencil
- Toilet paper,
- Soap
- Feminine supplies

- Sturdy shoes or work boots
- Rain gear
- Blankets

- Can opener, utility knife
- Pliers, hammer, saw, cutlass/machete
- Nails (large)
- Tape, rope
- Raincoat, boots, gloves

- Personal hygiene items toiletries
- Plastic garbage bags, ties
- Plastic bucket with tight lid
- Disinfectant
- Household chlorine bleach

- Hats and working gloves
- Sheet or blanket



Special Items

Remember family members with special needs, such as infants and elderly or disabled persons.

- Important Family Documents. *Keep these records in a waterproof, portable container.*
- Will, insurance policies, contracts, deeds
- Passports, immunization records
- Bank cards and account numbers
- Important telephone numbers
- Family records (birth, marriage, death)

For Baby

- Formula
- Diapers
- Bottles
- Powdered milk
- Medications



For Adults

- Heart and high blood pressure medication
- Insulin
- Prescription drugs
- Denture needs
- Extra eye glasses



Where to store your kit

- Dry, cool location
- Keep covered if possible
- Familiar location to everyone who will use it
- Make sure open items are secure
- Inspect regularly for food/liquid spoilage

Hurricane Preparedness

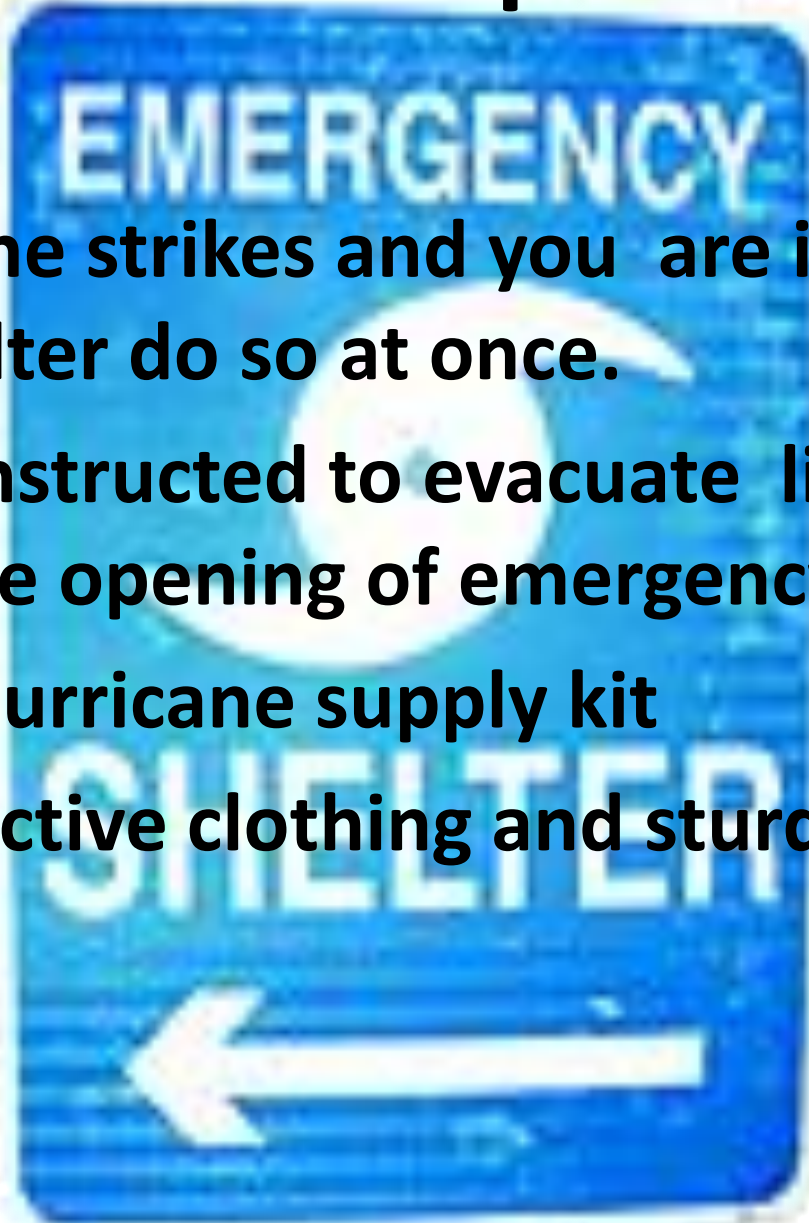
Maintain your plan.

- Review your plan once a year.
- Conduct a evacuation drill
- Restock : Check food supply for expiration dates and discard
- Test smoke alarms and change batteries & fire extinguisher and follow manufacturer's instructions to recharge.



Hurricane Preparedness

- If a hurricane strikes and you are instructed to take shelter do so at once.
- If you are instructed to evacuate listen to the radio for the opening of emergency shelters
- Take your hurricane supply kit
- Wear protective clothing and sturdy shoes

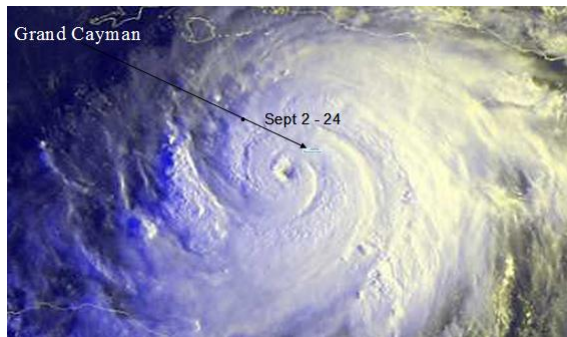


Remember

- By the start of the season on June 1st everyone should have the basics needed to survive a severe weather event.
- At the end of the season on November 30th re-evaluate what occurred and what additional supplies you will need in the future.
- **Being over prepared may cost money; being under prepared can cost lives.**

Before a Hurricane

- Know the risks of the area, the evacuation routes, and the location shelters.
- Have a home hurricane plan of action.
- Know what a hurricane “watch” and “warning” mean. [Note: A hurricane **watch** means a hurricane **may** hit your area. A hurricane **warning** means such a hurricane is **headed** for your area.]
- Have a portable radio and flashlight, as well as other supplies.
- Ensure that enough nonperishable food and water supplies are on hand to last for at least 2 weeks.
- Flood-proof your home.
- Keep trees and shrubbery trimmed.



Hurricane Preparedness

Plan for your pets take your pets with you if you evacuate. However, be aware that pets are not permitted in emergency shelters. Prepare a list of friends & boarding facilities that will shelter your pets.



Pets

- Food: use a brand the animal is used to
- Extra water separate from family supply
- Collars, tags, and identification forms
- Shot records
- Veterinarian information
- Medication
- Cleanser and disinfectant
- Leash
- Toys



Hurricane Watch Phase (48 hours before landfall):



- Board up all windows.
- Check batteries and stock up on canned food, medical supplies, and drinking water.
- Bring in outside objects (e.g., garbage cans, lawn furniture, bicycles).
- Listen to the advice of local officials, and evacuate if told to do so.

Warning Phase (36 hours or less before landfall):



- Listen to the advice of local officials, and evacuate if told to do so.
- If you are not advised to evacuate, stay indoors and away from windows.
- Stay away from flood waters; never drive through them.
- Be aware of the calm “eye”; the storm is not over.

After a Hurricane



- Wait until an area is declared safe before entering.
- Use a flashlight to inspect for damage including gas, water, and electrical lines and appliances
- Stay away from downed power lines.
- If you smell gas or if there is a fire, turn off the main gas valve. Switch off individual circuit breakers (or unscrew individual fuses), then switch off the main circuit breaker (or unscrew the main fuse).
- Do not use telephones except in emergencies.
- Use a portable radio for information.

Flood Watch Phase (2-3 days for flood)

- Sandbag windows and doors.
- Move furniture and other items to higher levels.
- Listen to the radio and television for up-to-the-minute information



Flood Warning Phase (24-48 hours for flood)



- Use telephones only for life-threatening emergencies.
- If necessary switch off electricity
- Evacuate, if necessary, and follow instructions.
- Do not walk or drive through flood waters.
- Heed barricades blocking roads.
- Keep away from waterways during heavy rain.
- Keep out of storm drains and gullies.

After a Flood



- Listen to a portable radio for information.
- Boil drinking water before using (*rolling boil for 10 minutes*).
- Use a flashlight to check for damage including gas, water, and electrical lines and appliances.
- If you smell gas or if there is a fire, turn off the main gas valve. Switch off individual circuit breakers (or unscrew individual fuses), then switch off the main circuit breaker (or unscrew the main fuse).
- Stay out of the disaster area.
- Do not use telephones except in emergencies.

Disaster Threats in the Cayman Islands



Hurricanes are considered to be the #1 threat in the Cayman Islands. Over the years many people have died in Cayman from these storms, a lot of them on schooners but some have also lost their lives in the storm surge and coastal flooding. In the great hurricane of November 8th 1932, 69 people were killed and hundreds of people were injured in Cayman Brac.

Some General Information about Hurricanes

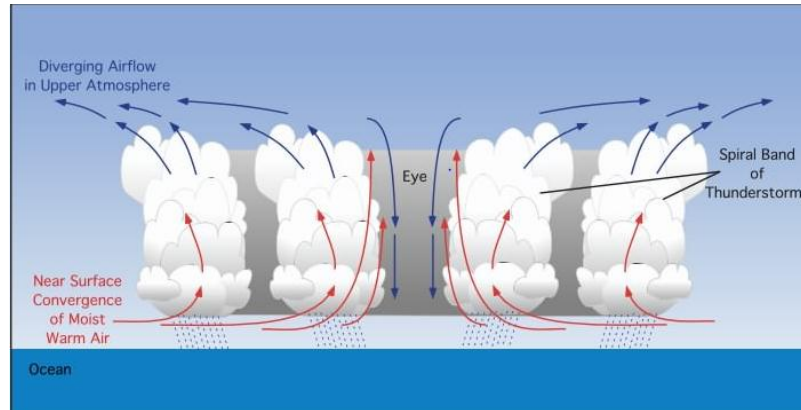
- Hurricane season is from June 1 until November 30.
- Hurricanes are on average 340 miles in diameter
- Winds blow in a counterclockwise spiral around the calm, roughly circular centre called the eye.
- The eye is the warmest part of the storm.
- Surrounding the eye is the eye wall, a wall of thunderclouds. The eye wall has the most rain and the strongest winds of the storm, gusting up to 225 miles per hour in severe hurricanes. The smaller the eye the stronger the winds.
- If you are facing in the direction that the hurricane is traveling, the right side of the storm generally has the fastest winds and the left side usually has the most rain.
- The air pressure is very low in a hurricane.

Air Pressure

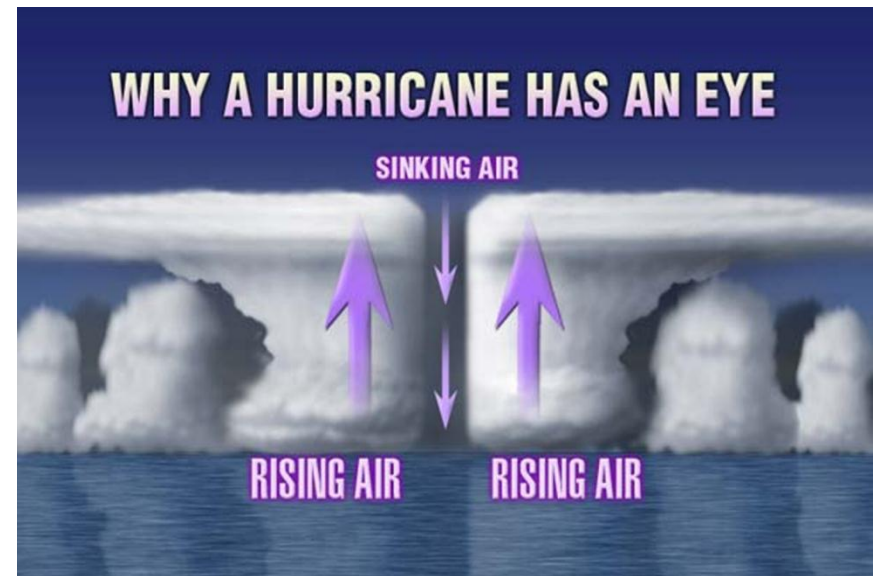


The weight of the column of air that extends from the ground (or water's surface) to the top of the atmosphere.

Hurricane Development



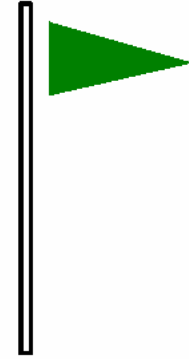
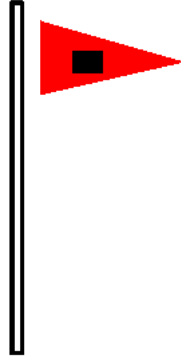
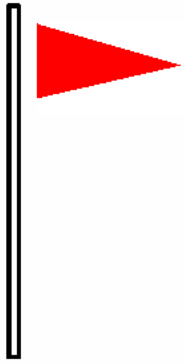
- Hurricanes typically form in the tropics between latitudes 8 degrees and 20 degrees.
- To form and develop hurricanes must be supplied with a constant supply of warm humid air and this air only exists over oceans with a temperature greater than 80 degrees Fahrenheit.
- Further, for a hurricane to form this warm surface water must exist in a layer that is at least 600 feet deep.
- Hurricanes are actually powered by the (latent) heat energy released from condensation.



Initially a hurricane begins as a group of unorganized thunderstorms. To develop into a hurricane, significant cyclonic circulation must occur around the disturbances. This circulation provides additional moisture and (latent) heat energy and this in turn enhances and intensifies the development of the thunderstorms. The thunderstorms also begin to organise themselves into spiral bands that swirl cyclonically towards the centre of the storm.



A hurricane goes through many stages as it develops. It starts as a tropical wave (typically a westward moving area of low air pressure). As the warm, moist air over the ocean rises in the low air pressure area, cold air from above replaces it. This produces strong gusty winds, heavy rain and thunderclouds that is called a tropical disturbance

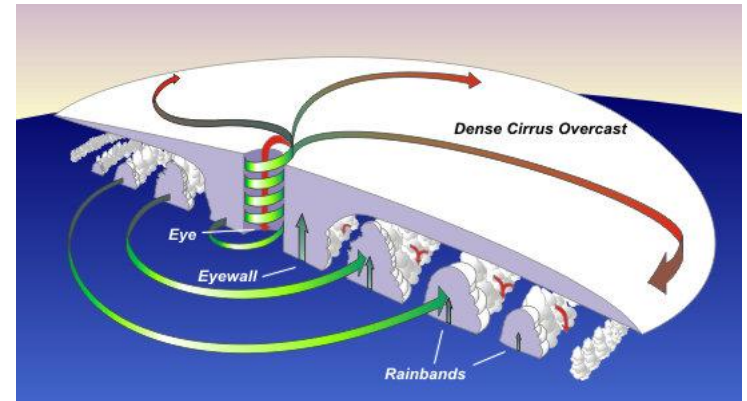


If the sustained wind speed around the disturbance increases to between 23 to 38 miles per hour the storm becomes classified as a Tropical Depression. Tropical Depressions can continue to intensify and officially become known as a Tropical Storm at 39 miles per hour. Finally, tropical storms become hurricanes when their sustained wind speed reaches 74 miles per hour.

Hurricanes end (disintegrate) when they travel over land or cold water. Its energy source (warm water) is gone and the storm quickly weakens.



The Eye



Mature hurricanes usually develop a cloud free eye at their centre. In the eye, air is descending creating clear blue skies. The eye of a hurricane is typically between 12 to 31 miles in diameter. Surrounding the eye are bands of organised thunderstorm clouds and the strongest winds and heaviest precipitation are found in the area next to the eye.

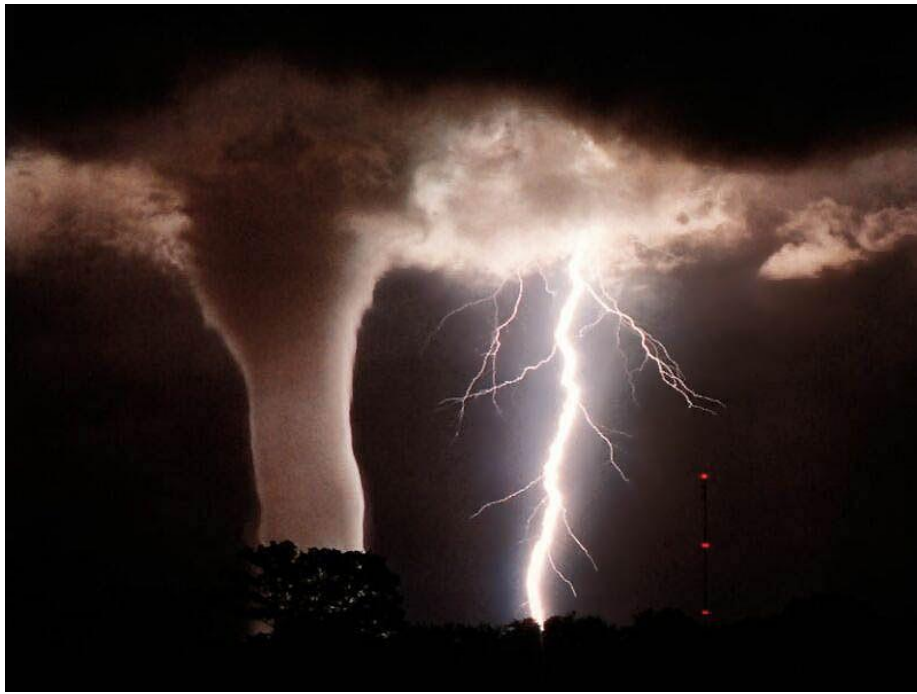
What is it about a hurricane that causes damage?

The damage that hurricanes inflict is usually caused by: high winds, heavy rainfall, storm surge, and tornadoes.



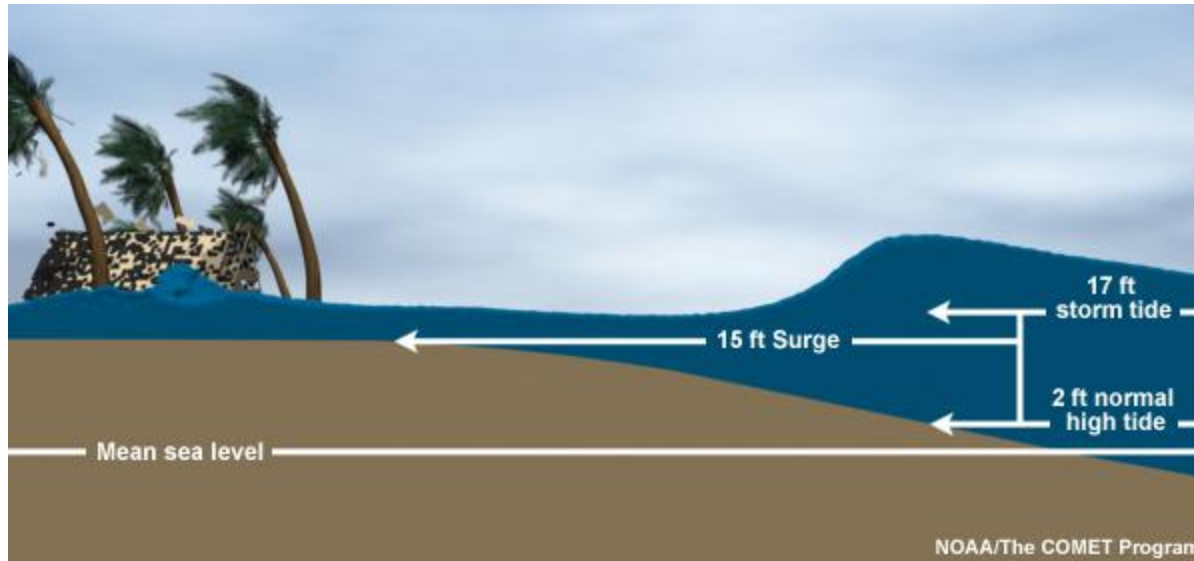


- **High winds** cause damage by blowing down objects, creating choppy waves and high seas which can inundate coastal areas with seawater. Wind speed in a hurricane is usually directly related to atmospheric pressure. The lower the pressure the faster the winds blow.
- **Rainfall** within a hurricane can exceed 24 inches in a 24-hour period and if this rainfall occurs on land, flooding often occurs.
- **Storm surge** is an increase in the height of the ocean's surface. It occurs when low atmospheric pressure causes the ocean surface to expand, and because the hurricanes cyclonic winds blow water towards the eye. Some hurricanes have produced storm surge of more than 24 feet.



Tornadoes are known to occur in about 25 percent of the hurricanes that make landfall and they can cause a considerable amount of damage. Some scientists also suspect that the thunderstorms that occur near the eye of a hurricane can produce very strong downbursts (vertical downward movements of air).

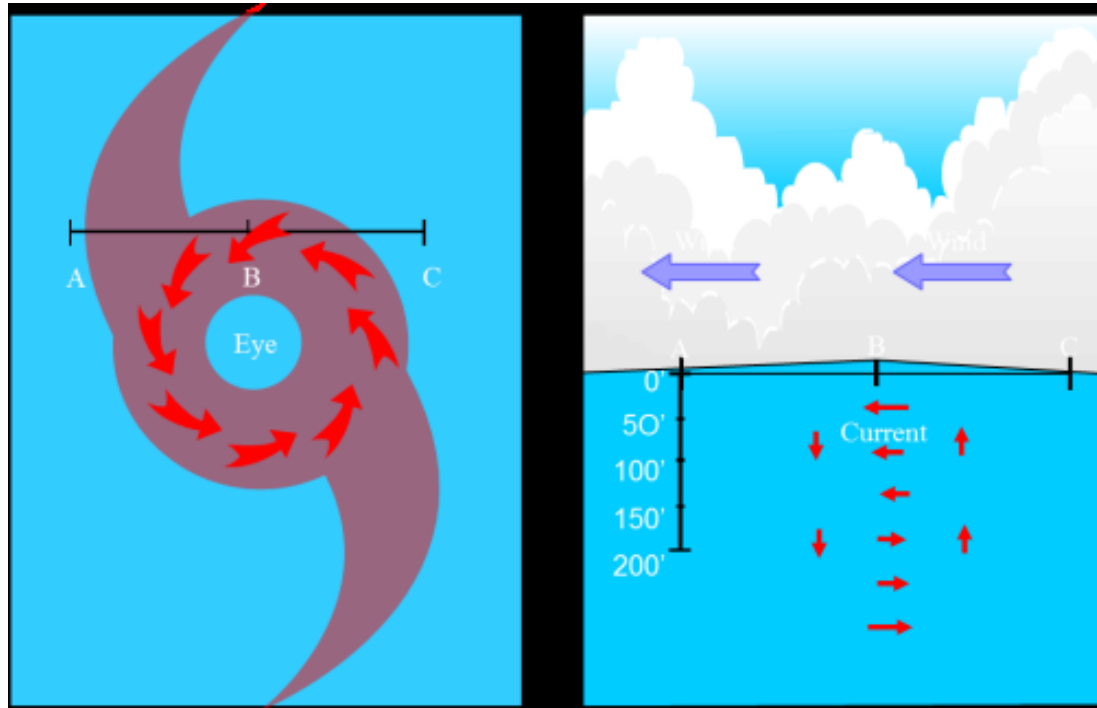
What is Storm Surge?



Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tide.

What Causes Storm Surge?

Storm surge is caused primarily by the strong winds in a hurricane or tropical storm. The low pressure of the storm has minimal contribution!



Factors that Influence Storm Surge

- **Low** pressure
- Size of storm
- High winds
- Relief / gradient of the coast line

Hazard and Vulnerability Map of Grand Cayman 2009



Angle of Approach to Coast

The angle at which a storm approaches a coastline can affect how much surge is generated. A storm that moves onshore perpendicular to the coast is more likely to produce a higher storm surge than a storm that moves parallel to the coast or moves inland at an oblique angle.

Hurricane Classification

Category	Winds	Summary
1	74-95 mph 64-82 kt 119-153 km/h	Very dangerous winds will produce some damage
2	96-110 mph 83-95 kt 154-177 km/h	Extremely dangerous winds will cause extensive damage
3	111-129 mph 96-112 kt 178-208 km/h	Devastating damage will occur
4	130-156 mph 113-136 kt 209-251 km/h	Catastrophic damage will occur
5	157 mph or higher 137 kt or higher 252 km/h or higher	Catastrophic damage will occur

2013 Hurricane Names



**Andrea
Barry
Chantal
Dorian
Erin
Fernand
Gabrielle
Humberto
Ingrid
Jerry
Karen
Lorenzo
Melissa
Nestor**

**Olga
Pablo**

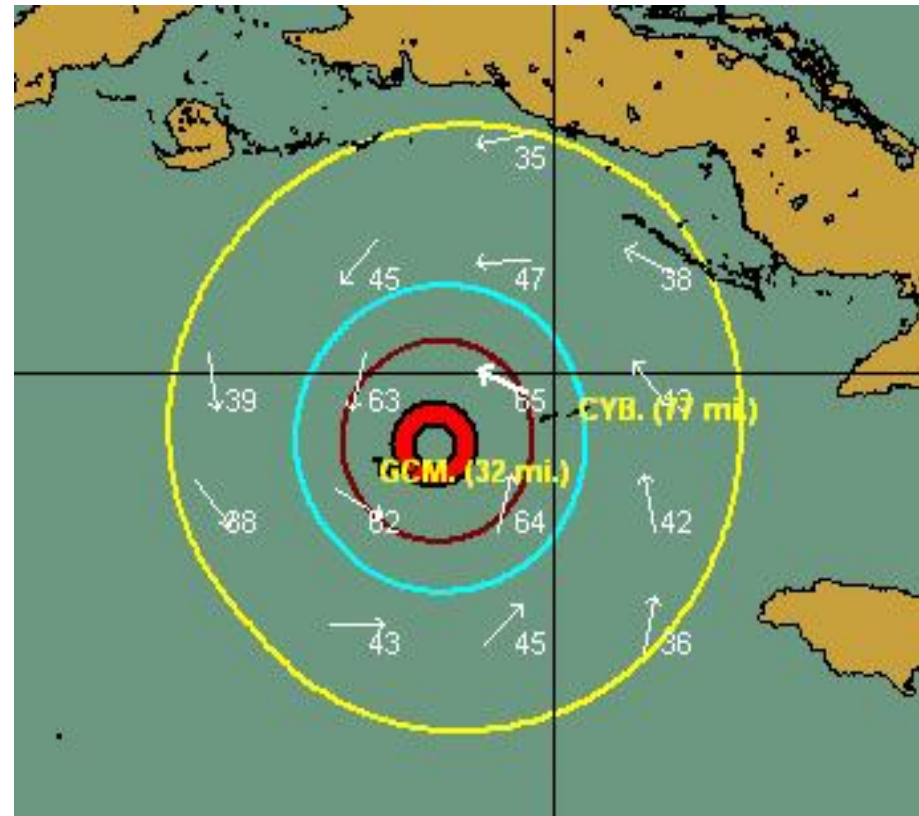
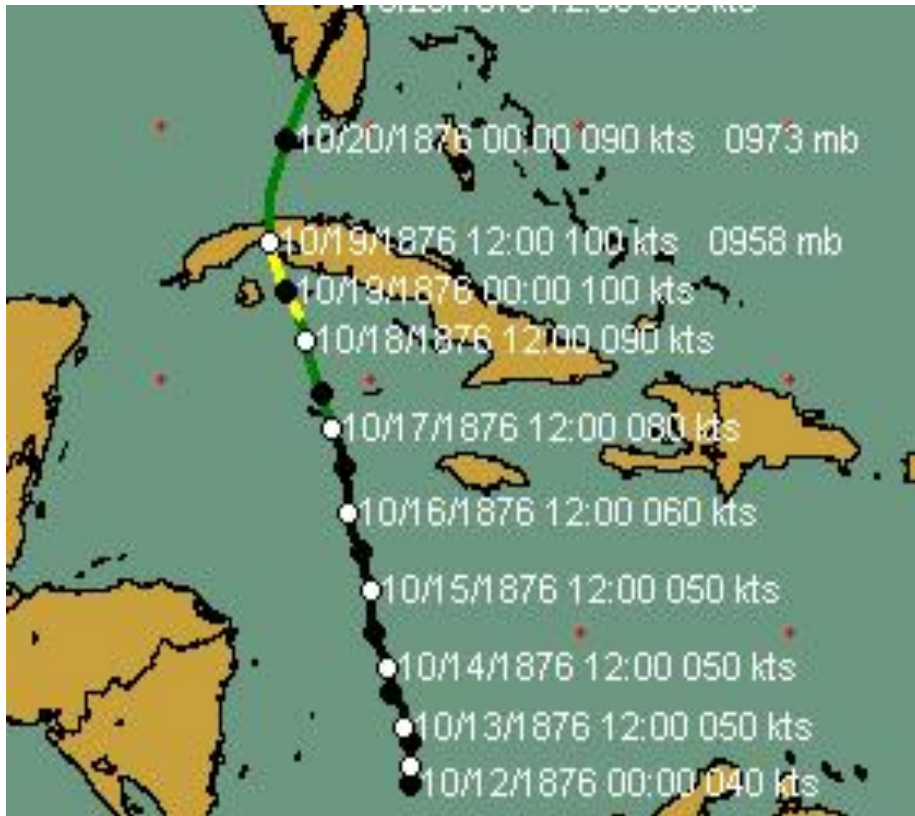
**Rebekah
Sebastien**

**Tanya
Van Wendy**

Looking Back at Past Hurricanes

1876 Hurricane

“Capt. Bremer reports the severest hurricane ever experienced at Grand Cayman Island. One hundred and seventy houses destroyed. A portion of the Island was submerged and many cattle washed away. The inhabitants are left in a destitute condition.” (Source - Jamaica Gleaner)



1903 Hurricane

“At 8 o’clock the cyclone burst upon the land in all its fury, and continued in full force carrying and destroying everything before it’s determined will. Then came the dawn of day – sad and distressing to behold” (Source - Jamaica Gleaner)



The Schooners Peerless and Polonia were lost. The Schooner Active capsized on the West End of Cayman Brac and two brothers named Yates and Customs Officer William Hurlston drowned.





1912 Hurricane



“In addition to the fierce wind, the seas around the Islands rose mountains high – the highest ever witnessed in the memory of living men. The sea pitched completely over the Cayman Brac bluff, a height of over 150 feet.



As to the cocoanut nut industry – the principal industry of the Dependency – a staggering blow has been dealt to the present crop. The ground is strewn with millions of nuts in all stages of development.” (Gleaner)

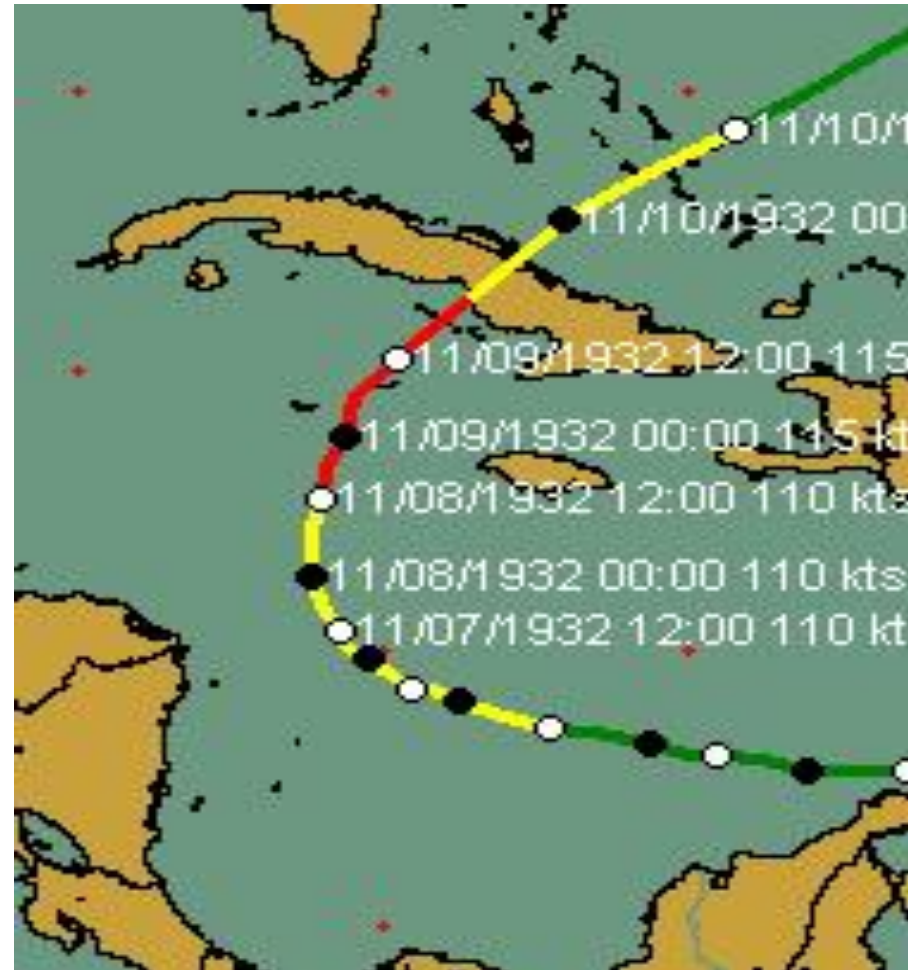
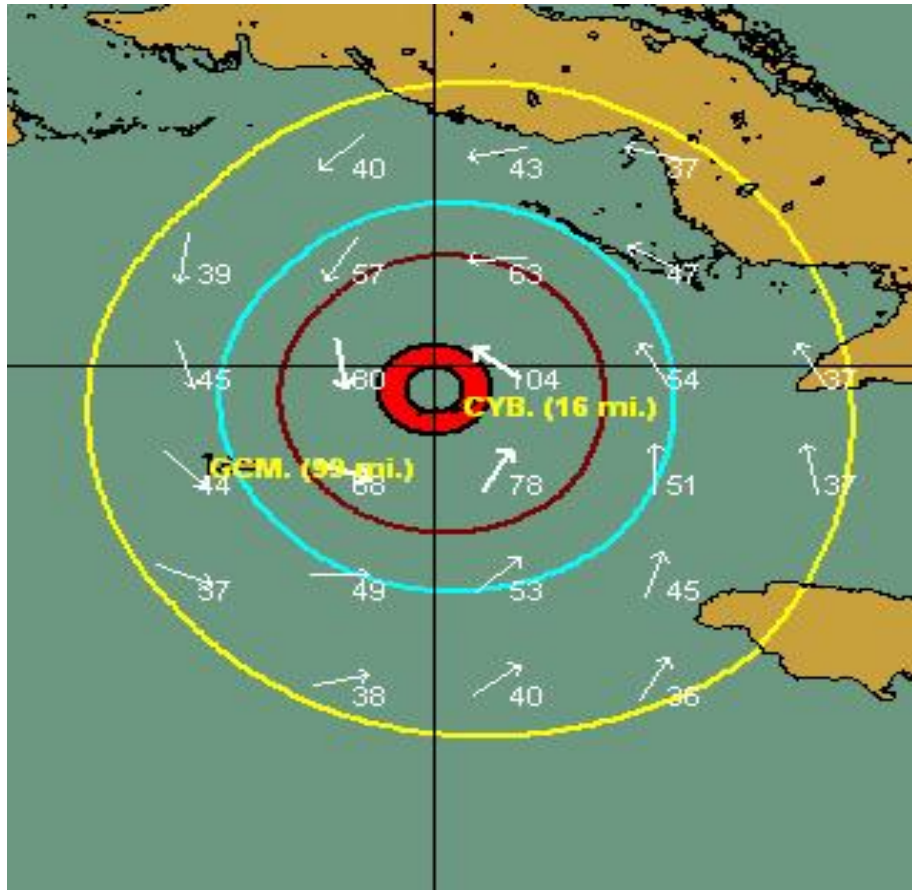
1917 Hurricane

“Captain Hunter who is a young, able and experienced mariner, confirmed the reports (to the Gleaner) as to the great havoc wrought in the little dependency, all the vessels at Grand Cayman were either driven ashore or sunk. Capt. Hunter said the wind started to grow violent driving in a tide, the water in some places previously cultivated being from one to twelve feet deep.”



1932 Hurricane

The storm surge was estimated to be 32 feet on Cayman Brac and 29 feet on Grand Cayman. 108 people died.

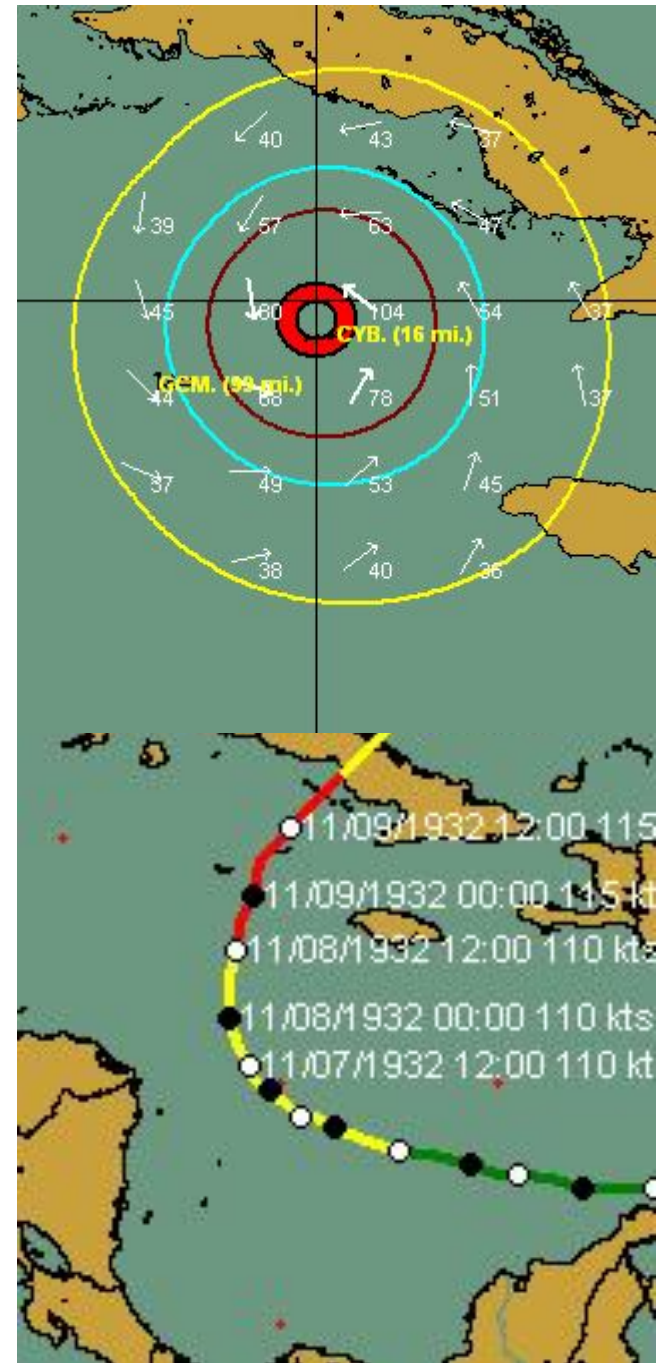


1932 Hurricane

- “The 1932 Hurricane is described as being one of the most intense tropical cyclones ever recorded anywhere in the world.”

-Mr. C.A “Sammy”

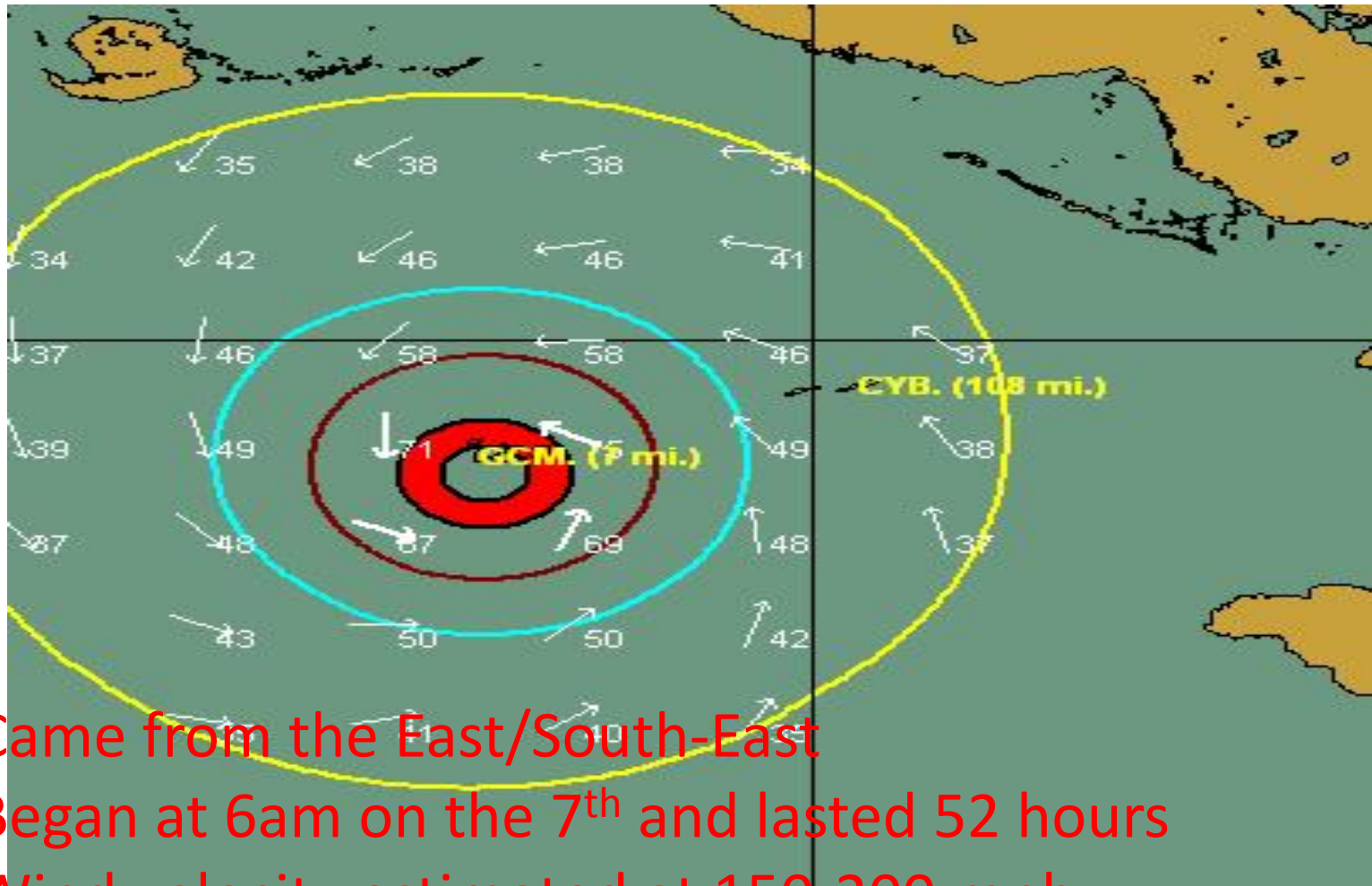
Jackson, MBE



Track of 1932 Hurricane



1932 Hurricane



- Came from the East/South-East
- Began at 6am on the 7th and lasted 52 hours
- Wind velocity estimated at 150-200 mph
- Many homes lost, roads damaged
- Health problems arose

IMPACT ON GRAND CAYMAN

- Storm surge of 29.9 ft
- Worst effect on Spotts and Savannah
- One house was moved inland 157 ft
- After storm:
 - 800 cases of Gastrointestinal disorders
 - Ranging from mild gastro-ent to colitis
 - 40 cases of Typhoid fever

IMPACT ON CAYMAN BRAC

- Storm surge of 32 ft
- Winds were at 200 mph
- ALL HOUSES DEMOLISHED
- After the storm:
- 109 casualties
 - 400-500 cases of gastrointestinal disorders (usually 40-50 reported yearly)
 - Increase in cases of typhoid fever

RELIEF EFFORTS

- **After 3 days relief came:**

- **HMS Dragon**

- **SS Lockatrine**

- **SS Husvic**

- **MS Nunoca**

- **SS Cimboco**

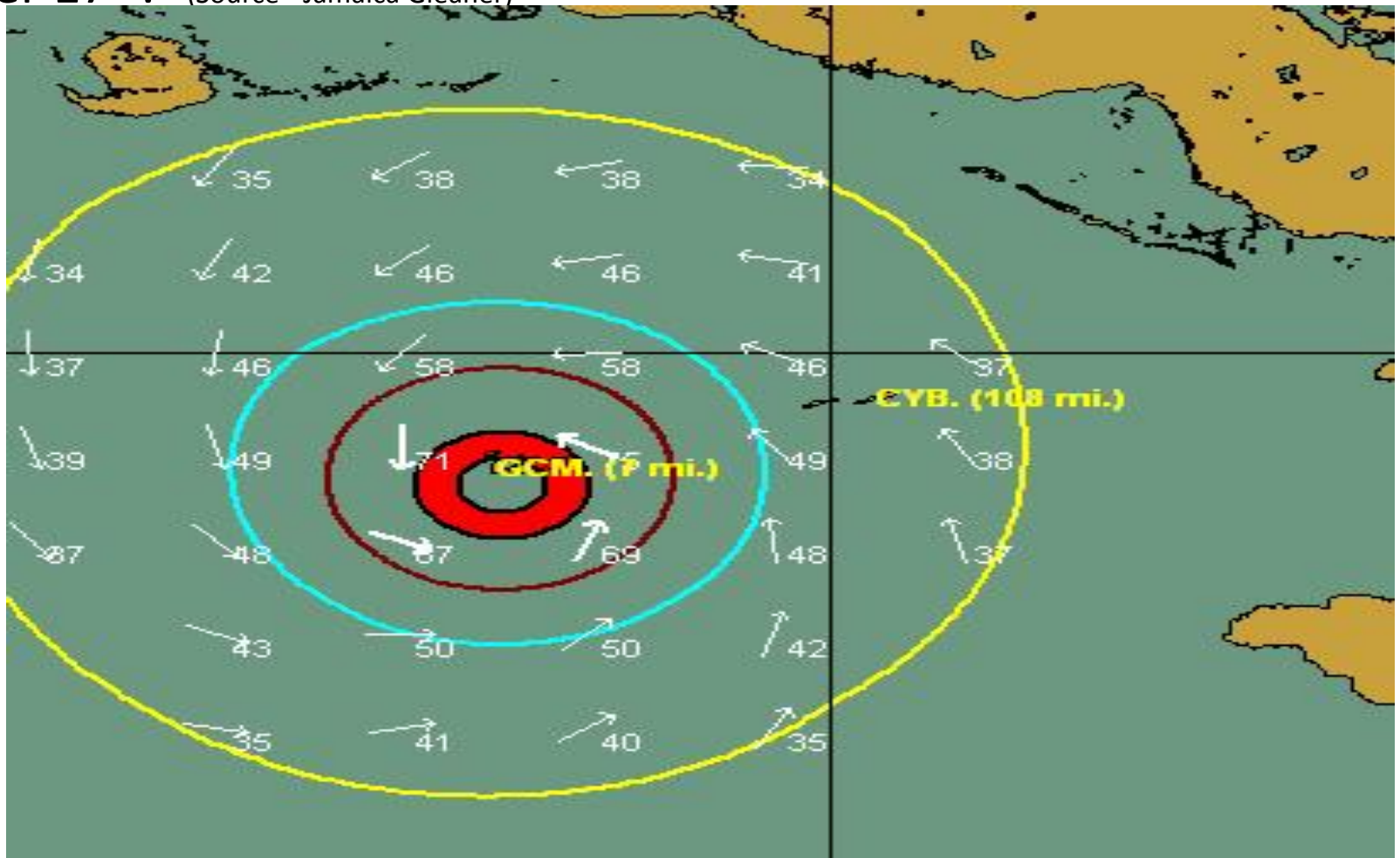


IMPACT IN 1933

- 25 infants and 46 people over the age of 75 died
- 52 took refuge in Jamaica

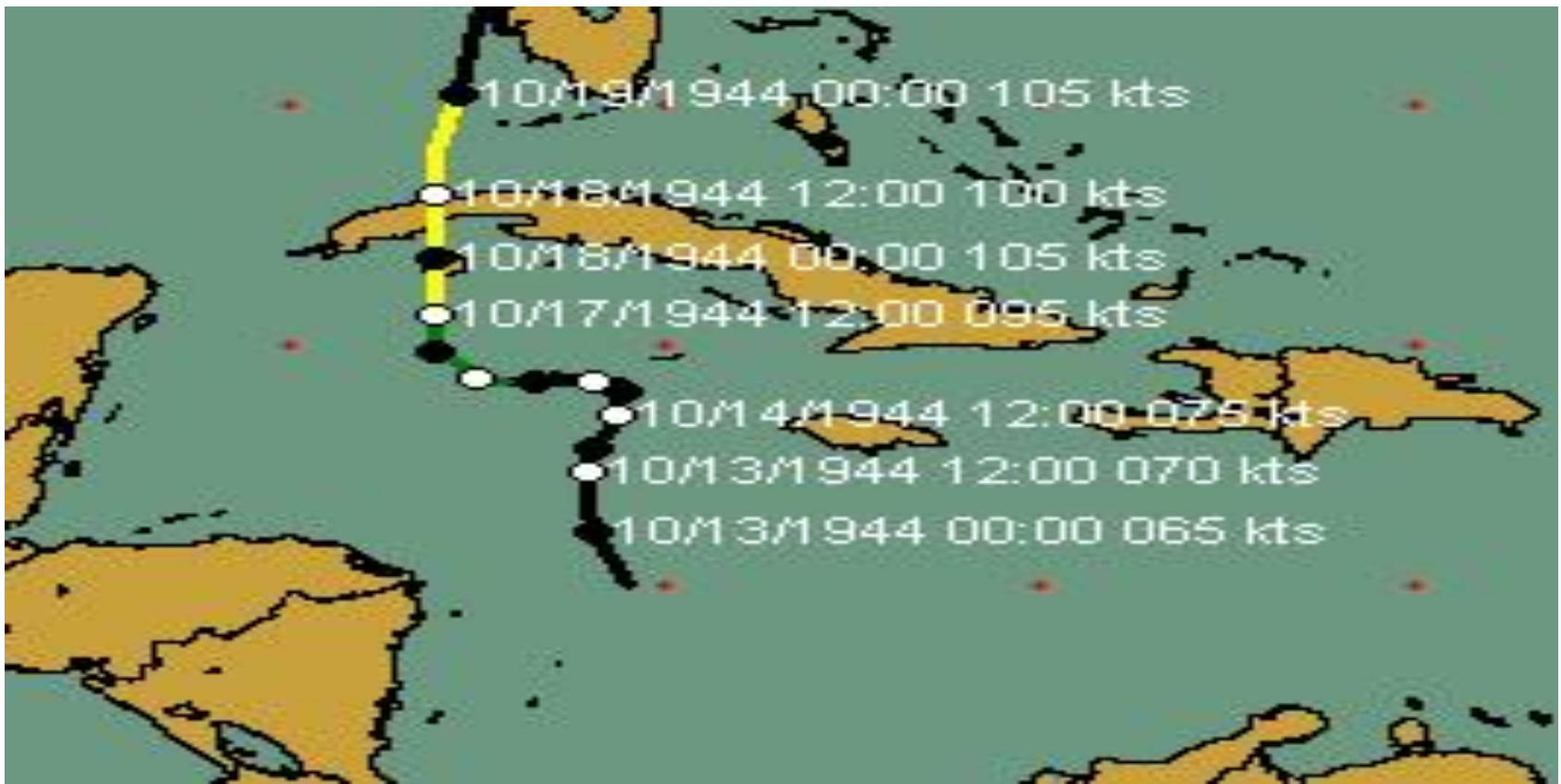
1944 Hurricane

“The Government Wharf at West Bay was destroyed and great destruction wrought to the front streets of West Bay, George Town and Bodden Town. 30.5 inches of rain fell between October 13th and October 17th.” (Source - Jamaica Gleaner)



1944 Hurricane

“It is evident that the main street in George Town requires a substantial sea wall and also at Sandy Ground, Savannah where once the sea breaks over a portion of Pedro Bluff, it flows into the lands, causing great destruction to cultivations, pastures and stock.” (Source - Jamaica Gleaner)



Hurricane Mitch



In November 4, 1998, Hurricane Mitch passed more than 180 miles away from Grand Cayman, but huge waves caused beach erosion and property damage along the South Coast. Many docks were destroyed.

Hurricane Michelle



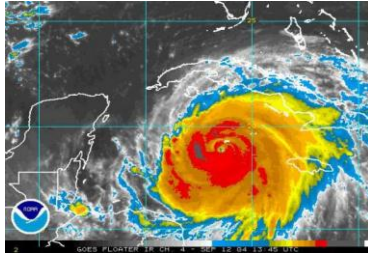
November 4th 2001 Turtle Farm was hit by the waves generated by Hurricane Michelle churning 90 miles away off to the South West of Grand Cayman. Although there was little wind, waves inundated most of the facility near the sea, washing 600 pound turtles out of their tanks. Some turtles were recovered on the road and on the ironshore, and some washed out to sea unharmed. 75% of the breeders were lost and for several months after the hurricane tagged adults from the breeding pond could be seen swimming free around the Island.

September 12 2004

Remembering Ivan



Hurricane Ivan



- Impacted Grand Cayman from Saturday Sept 11 to Monday September 13, 2004)
- It was a Cape Verde Storm (originated off the coast of Africa) and it brought sustained winds of 130 knots and gust of 149 knots (official National Met Office Statistics)
- Caused two deaths in the Cayman Islands. 83 % of total housing stock damaged (US\$ 1.6 billion)
- US\$ 1.3 billion - Financial Impact on the Productive Sector (Businesses, tourism etc)
- Overall the average financial impact of Hurricane Ivan on each Cayman Islands resident was estimated at US\$90,000.

Hurricane Ivan from an altitude of about 230 miles looking out the window of the International Space Station on Sept. 11th, 2004. (NASA)



Hurricane Ivan took the lives of two persons on Grand Cayman and 402 people were treated for lacerations, wounds, removal of foreign bodies, fractures and burns.





Huge Wave!



- U. Naval Research Laboratory ocean-floor pressure sensor detected a freak wave caused by Hurricane Ivan. The wave was around 91 feet high from peak to trough, and around 660 feet long.
- According to a BBC news report, the wave is thought to be the tallest and most intense wave ever measured. It would have dwarfed a 10-storey building and had the power to snap a ship in half - but never reached land.



4% of homes were destroyed and required complete reconstruction.

70%, or 9, 475, dwellings suffered severe damage

17% of the population or over 6,000 persons sought shelter after the event.



During the period September 9 to 30, it is estimated that some 10,470 persons left the island.

All persons experienced the loss of electricity, water and access to telecommunications for some period immediately following the disaster. Some residents waited over three months for power to be restored.



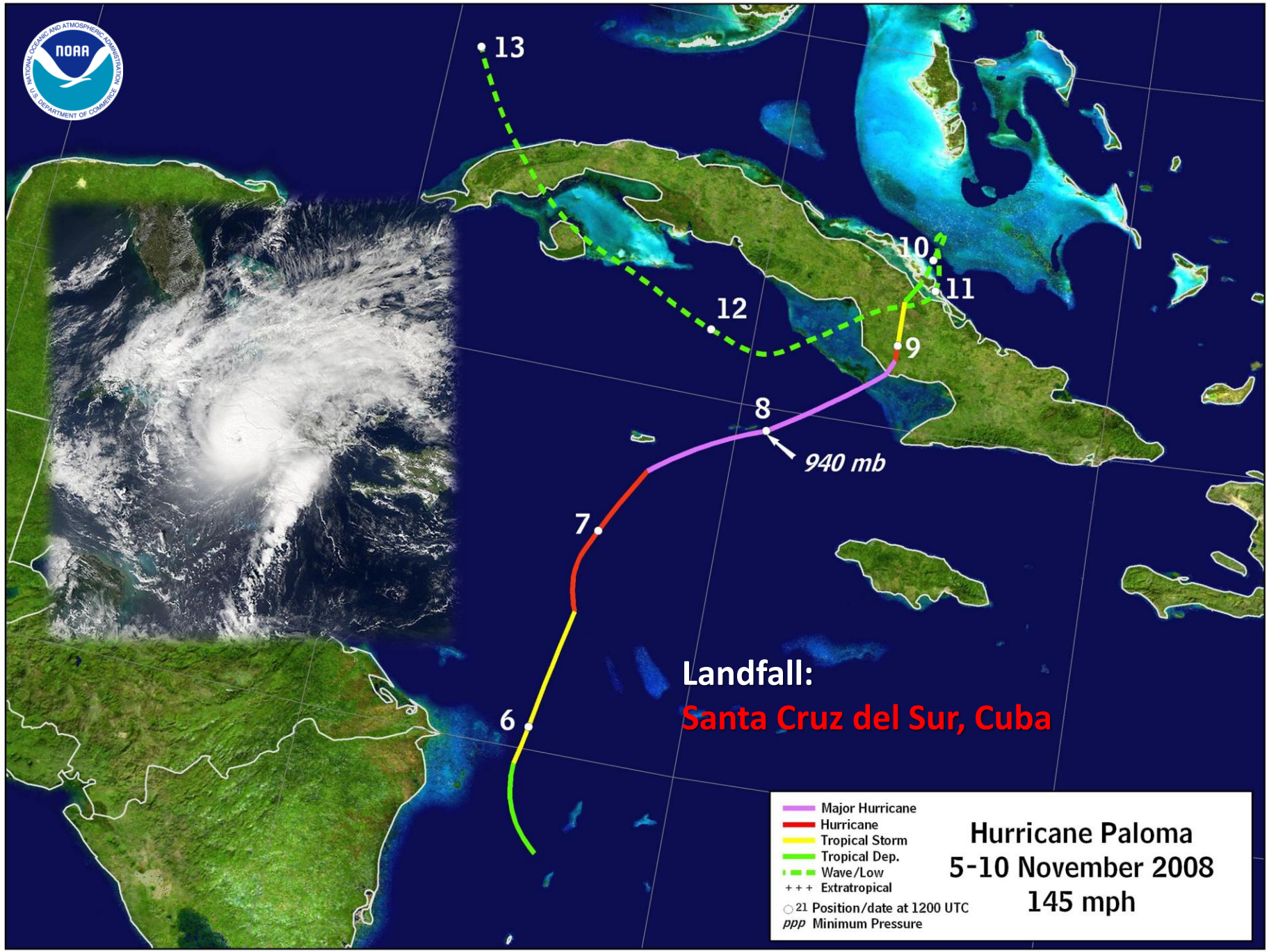
Many residents lost their vehicles in Hurricane Ivan, mostly because their car was not pre-positioned on higher ground.



Hurricane Paloma



- Impacted the Sister Islands of Cayman Brac and Little Cayman on the 8th November 2008
- It was a late season storm that originated off the Miskito Cays, Nicaragua and travelled up from the south. Max winds Cayman Brac were 138 mph gusting to 172 mph (official National Weather Service) Max winds in Little Cayman 132 mph gusting to 165 mph (official National Weather Service)
- Rainfall total in Cayman Brac was 17.77 inches. There was extensive damage (in the Brac) to most wooden structures and numerous roof failures. Total impact US\$ 154.4 million (ECLAC)



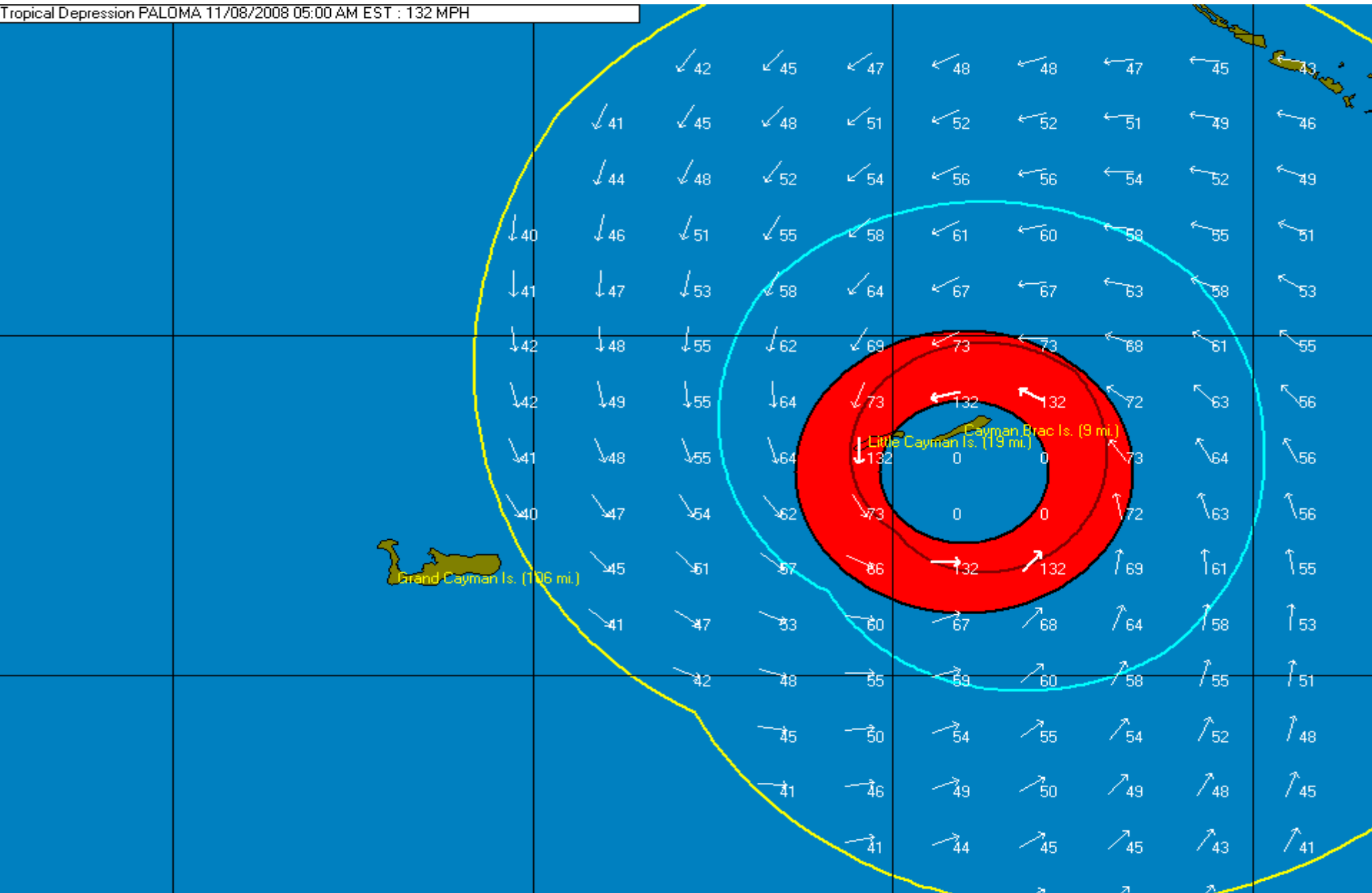
Landfall:
Santa Cruz del Sur, Cuba

	Major Hurricane
	Hurricane
	Tropical Storm
	Tropical Dep.
	Wave/Low
	Extratropical
	21 Position/date at 1200 UTC
	Minimum Pressure

Hurricane Paloma
5-10 November 2008
145 mph

Hurricane Paloma– 5 a.m. Saturday November 8, 2008

Tropical Depression PALOMA 11/08/2008 05:00 AM EST : 132 MPH



**Mixture of heavy rains and
storm surge flood portion of
runway**





Flooding in Hurricane Paloma –
Cayman Brac

Lessons Learned - Enhancing the preparedness and response mechanism

- The retrofitting and strengthening of shelters, and upgrading their level of self-sufficiency (so each shelter can operate in isolation for extended periods of time)
- Erection of directional signs for the shelters
- District fuel Tanks
- The development of a storm surge atlas to assist in the identification of flood prone areas the retrofitting of the hospital to reduce the impact of flooding on the hospital grounds



Lessons Learned - Enhancing the preparedness and response mechanism

- The protection of road infrastructure through the construction of sea walls and increased elevation of new roads
- The development of a hazard focused, informational website Caymanprepared.ky and associated social media websites to increase the public outreach capacity and awareness
- The development (and regular revision) of a national hurricane plan



Lessons Learned - Enhancing the preparedness and response mechanism

- The establishment of a community level training program (CERT) to increase disaster preparedness, resilience and response capacity in the districts
- The mandatory requirement of all government agencies to develop Continuity of Operations plans to ensure continued service delivery and a rapid response in the aftermath of a disaster
- New technology and equipment for the national response teams to monitor and coordinate the response to any event (especially the Crisis Management software WebEOC)



Lessons Learned - Enhancing the preparedness and response mechanism

- Installation of additional weather station data recording devices and the ongoing work to bring the (2013) dopplar radar coverage on line
- Revision of Planning Regulations to ensure that critical buildings are built to withstand category 5 hurricanes
- Review of the levels of vulnerability for the existing stock of critical buildings (in order to identify strategies) for increasing resilience
- The construction of disaster resistant schools and the Government Administration Building



Lessons Learned - Enhancing the preparedness and response mechanism

- Training for Government staff and volunteers in a variety of areas and disciplines, including post-earthquake / post hurricane damage assessment, mass casualty and emergency response, incident command systems and urban search and rescue.
- A vibrant public education program that includes outreach into the schools and business community, public service announcements, appearances at public events, press releases to the media etc.
- Regular disaster drills and exercises to improve inter agency coordination and response capability.



Lessons Learned - Enhancing the preparedness and response mechanism

- The development of the national recovery plan, evacuation plan and other relevant plans to support an efficient response



Source: David **Wolfe** Photography