TROPICAL HURRICANES

Tropical hurricanes start as a low pressure wave in the region of the Cape Verde islands. Some lows pick up a circular motion and are almost immediately noted by NOAA satellite and given a name. They are then carefully tracked by noaa/hurricanes with the positions given every six hours.

Tropical depression , have winds to 34 kts/39mph/18mps and a bit more . They usually contain tons of rain but not much more than 40 kts of wind. These depressions sometime become Tropical storm 34 to 64 kts/39 to 74mph, 18 to 33mps. They in turn can become a hurricane, with sustained winds of 64 kts, 74 mph,33mps or a major hurricane with sustained winds of 94 kts, 111mph,50mps and up. Note NOAA speaks of sustained winds, but gust may and will be considerably higher than the sustained wind.

Occasionally a depression can become a tropical storm, then a hurricane64 kts and above, in a very short time. In 2014 Gonzales popped up as a tropical depression 150 miles east of Antigua. Then it was up graded by NOAA to a tropical storm. Preparations were made for a tropical storm but suddenly Gonzales developed into a major hurricane catching everyone in Antigua flat footed. It then curved north scoring direct hit on the St Martin, St Barts and Anguilla area causing much damage.

The reverse can happen, a hurricane can lose steam, and ease off to a tropical storm, or down to a tropical depression.

.Regarding the below, as mentioned in my experience with hurricanes, I have been studying the tracks of hurricanes since 1984, thirty four years. Thus the below should be regarded as fact, not guess work or speculation.

As long as the depression/tropical storm/hurricane stays below 19N its land fall in the Caribbean is quite easy to predict. They proceed westwards never changing direction more than 5 degreesin 24 hours. If they change directions, the change is almost always to the north. If it takes a zig to the south its south zig of 5 degrees only lasts for two days. Only once, since 1851 has the south zig lasted for more than two days. The south zig lasted for three days.

In the light of the above if a hurricane is aimed at your area, 48 hours before the hurricane is due to hit, head south. There are no hurricane holes in the eastern Caribbean. They are all too crowded. Every time a hurricane hits the islands of the eastern Caribbean, boats flee to the so called hurricane holes and anchor. Boats drag, foul other boat, dozens pile up on the beach or are sunk.. For more information on so called hurricane holes go to HURRICANE HOLES in this webb site.

Yachts from the states and Europe started arriving in the eastern Caribbean in the early 50’s as a trickle. The trickle became a stream in the 60s and early 70’s but since 75 the eastern Caribbean has experienced massive increases in the number of yachts arriving in the Eastern Caribbean year by year. Thus each time a hurricane hits the eastern Caribbean, the insurance companies are hit with larger and larger claims.

The area from St Barts westward to the east coast of Puerto Rico I refer to as Hurricane Alley. Since 1975 the area has been hit 9 times by hurricanes and many tropical storms, probably ten. Thus about every five years a hurricane will hit the area.

Antigua at 17 N, the next yachting center to the south has been hit 3 times by hurricane and 6 tropical storm since 1975, thus every five years a hurricane or tropical storm.

Martinique at 14 30 N has been very lucky as though it has been brushed by many hurricanes it has never taken a direct hit since 75. It has been hit by 7 tropical storms, thus one every six years.

Simarly St Lucia, 14 N since 75, has been brushed by a number of hurricanes but has not suffered a direct hit but has been hit by 7 tropical storms, again like Martinique one every 6 years.

Carriacou and the Grenadines, since 1975 has been hit by two hurricanes but also by 9 tropical storms. Thus a hurricane or strong blow every four years. The new Tyrell Bay Yacht yard, which claims it has room to store 200 boats during hurricane season, hopefully will do a really good job of chocking and tying down the boats they store.

Grenada at 12 N was thought to be south of the hurricane belt. It was hit in the last years of the 18th century by four tropical storms. As years went by everyone forgot about tropical storms and hurricanes. Then in 1955 the island was flattened by Janet. No insured yachts were in the area, and yachting infrastructure did not yet exist on the island so there were no marine insurance claims to the underwriters.

However, 49 years with no hurricanes convinced almost everyone that Grenada was south of hurricanes. Then Ivan hit in 2004 causing massive damage to the island and the yachting industry. The ariel shot of about 175 boats blown out of their chocks in Spice island boat yard was show on TV world wide. As a result many underwriters moved the southern limit of the so called Hurricane box to 12N just south of Grenada. As time went by, the yards in Grenada really put their mind to properly tying boats down in specially made cradles. They convinced some of the major yacht underwriters that boats were so well chocked and tied down that they were insurable. As a result, many underwriters have moved the southern limit of the hurricane box to 12 30 north. This is just far enough north to put Tyrell Bay Haul out south of the hurricane box.

Hopefully a cousin, son or uncle of Ivan does not visit Grenada. The insured value of the total number of yachts in Grenada, afloat and stored ashore is greater than any other yachting area in the eastern Caribbean.

Hurricanes when they hit the islands of the eastern Caribbean may be very intense, but are usually relatively small in diameter. This is illustrated by the fact that Dominica received direct hits and was stripped bare by the eye of hurricanes in 1979 and in 2017. In both cases the damage to the north end of Martinique, and the south end of Guadeloupe was relatively light.

Once a hurricane hits an island it can do very strange things. In 1886 a hurricane hit St Vincent, then turned north and followed the curve of the islands hitting every one until it hit Barbuda and departed off into the Atlantic.

In 1965 a tropical storm hit St Lucia then followed the island chain northwards hitting every island until it hit Anguilla and departed into the Atlantic and died.

Once a hurricane passes thru the chain of islands forming the eastern Caribbean, they can do all sorts of things. In 1963 hurricane Flora passed south of Grenada, went off into the Caribbean hit the eastern end of Cuba and did a 360 degree loop over the eastern end of Cuba. Castro claimed the US had seeded the hurricane to make it loop over Cuba. In general once the hurricanes enter the warmer waters of the Caribbean they build in size and intensity.

Once a hurricane passes north of 19 N its track is very hard to predict. In 2017 hurricane Jose, the NOAA computer model had it hitting the east coast of Florida, the European computer model had it hitting the west coast of Florida. The European model proved to be correct.

Hurricanes that are aimed at Hurricane Alley, St Barts to east coast of Puerto Rico, that pass north of Hurricane Alley pass over the warm shoal waters of the Bahamas and usually pick up a real head of steam. They continue on to Florida, or swing north up the coast of the states, sometimes making land falls with disastrous results, or at other times paralleling the coast, making the surfers very happy, before departing into the Atlantic. Boats in the Bahamas and the east coast of the states can not flee from an approaching hurricane. The tracks are too unpredictable, the hurricanes are too large covering a vast area.

All as one can do is ask local advise as to where to go to hide, and how to tie down.

In the eastern Caribbean the tidal surge is seldom more than 3’. Higher tidal surges may exist but in the 63 years I have been sailing in and dealing with the Eastern Caribbean, I have never heard of them.

However on the east coast of the states, hurricane tidal surge varies from about 5’ down south, higher up north. In the area east of New London, storm surges have occasionally reached 20’.

The hurricanes that turn north before they reach the Caribbean can go anywhere and do anything. A study of the hurricane tracks in the NOAA book Tropical Cyclones in the North Atlantic ocean 1851 to 2008 with loose pages to bring it thru 2018 reveals how erratic hurricanes can be once they are above 19N. They can suddenly turn south, can do a 360 degree loop, do absolutely anything.

Five hurricane have developed inside the eastern Caribbean and headed eastward. Alice, started dec 30 1954 and finished January 6 1955!, Klaus in 1984, Lenny in 1999, Odete in 2003, Omar in 2008 .The interesting thing is that since 1851 these are the only five hurricanes to form in the eastern Caribbean and head north east or east. All five in the last 65 years and four within the last 24 years.

Those that develop in the western Caribbean and the Gulf of Mexico can go anywhere. NOAA’s batting average on predicting the tracks of hurricanes in these areas has not been particularly good.

Regarding damage done by hurricanes, it must be remembered that wind pressure goes up with the square of the wind increase. Thus the wind pressure per sq ft at 40 kts is four times that at 20 kts. Some figures that are food for thought. Wind speed in mph/pressure per sq. ft, 50/8,100/28,150/58,180/82 Look at the pressure per sq ft 28 at 100 mph. Then look at the windage of the modern cruising catamaran and you will see why it is so hard to secure a catamaran either afloat of ashore , to survive a hurricane at 100mph, at 180 mph with wind loading of 82 lbs per sq ft with the windage of a catamaran it is impossible to keep it in place .

Wind loading on a 60’ mast, loading exerted 30’ off the deck, at 180mph is 5,280 lbs. If this load is exerted on the beam will the boat stay in the chocks or cradle?

This one is pretty interesting. The second column is the lateral force on a 60’ long piece of ¼” wire so side load created by that length and diameter. The third column is the interesting part. It is the load on the end of the wire so what a padeye on the deck would see or a person trying to hold on to it. What it suggests is that a 80mph on a 60’ long ¼” diameter wire halyard would lift a 200lb person off the deck with a little to spare. Having dragged a few halyards forward going upwind I don’t think this is far off!

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| Windspeed | Lateral Force on  a 60' Long 1/4" Wire | Load on the Ends of a 1/4" Wire |
| mph | lbs | lbs |
| 0 | 0 | 0 |
| 10 | 0.4 | 13 |
| 20 | 2 | 34 |
| 40 | 7 | 85 |
| 60 | 15 | 146 |
| 80 | 27 | 215 |
| 100 | 42 | 289 |
| 120 | 60 | 369 |
| 150 | 94 | 496 |
| 180 | 135 | 633 |

Remember, there is a big disclaimer that should go with all of this. It is highly dependent on the drag coefficient of each component and I have lumped a few shapes together and made some estimates to get in the ballpark. Also the “boat” dimensions are pretty generic. A boat like IOLAIRE will be a lot different than similar length IRC style boat.

When looking at damage after a hurricane, the damage is sometimes very puzzling. A very well built structure will be totally or almost totally destroyed while buildings near the destroyed structure that are not particularly well built are hardly damaged. Many of us have thought that within hurricanes there are mini tornadoes that of course will really tear things apart.

After Gonzales, I looked at the hillside on the northwest side of Falmouth harbour. You could see a path of destruction about 50 yards wide leading up the hill side parallel to the road, course NW the direction Gonzales was traveling. Everything in the path was very badly damaged, but either side of the damaged lane buildings were not badly damaged.

The tornado theory was proved to me in March 2018 when visiting my friends Charlie Haines and Doc Tattersal in Tortola. Charlie drove me to Cane Garden bay. We could clearly see a narrow path of destruction leading down the hill to the village of Cane Garden. Charlie said a very reliable friend saw the mini tornado come down the hill and pick up a car. The car was lifted in the air by the tornado, did a couple of loops in the tornado, fell out of the circular column and dropped back to earth. The lifting and the flying did not hurt the car but the sudden stop at the end of the drop pretty much demolished the car.

This explains how boats that are not well tied down have been lifted out of their cradles or jacks rather than just falling over.

For detailed information on various aspects of how to minimize damage done by hurricane, continue reading this webb site. Scroll down, pick the topics that are of importance to you, read and follow the advise.