



# **GUIDE ON THE TROPICAL CYCLONE EARLY WARNING SYSTEM**

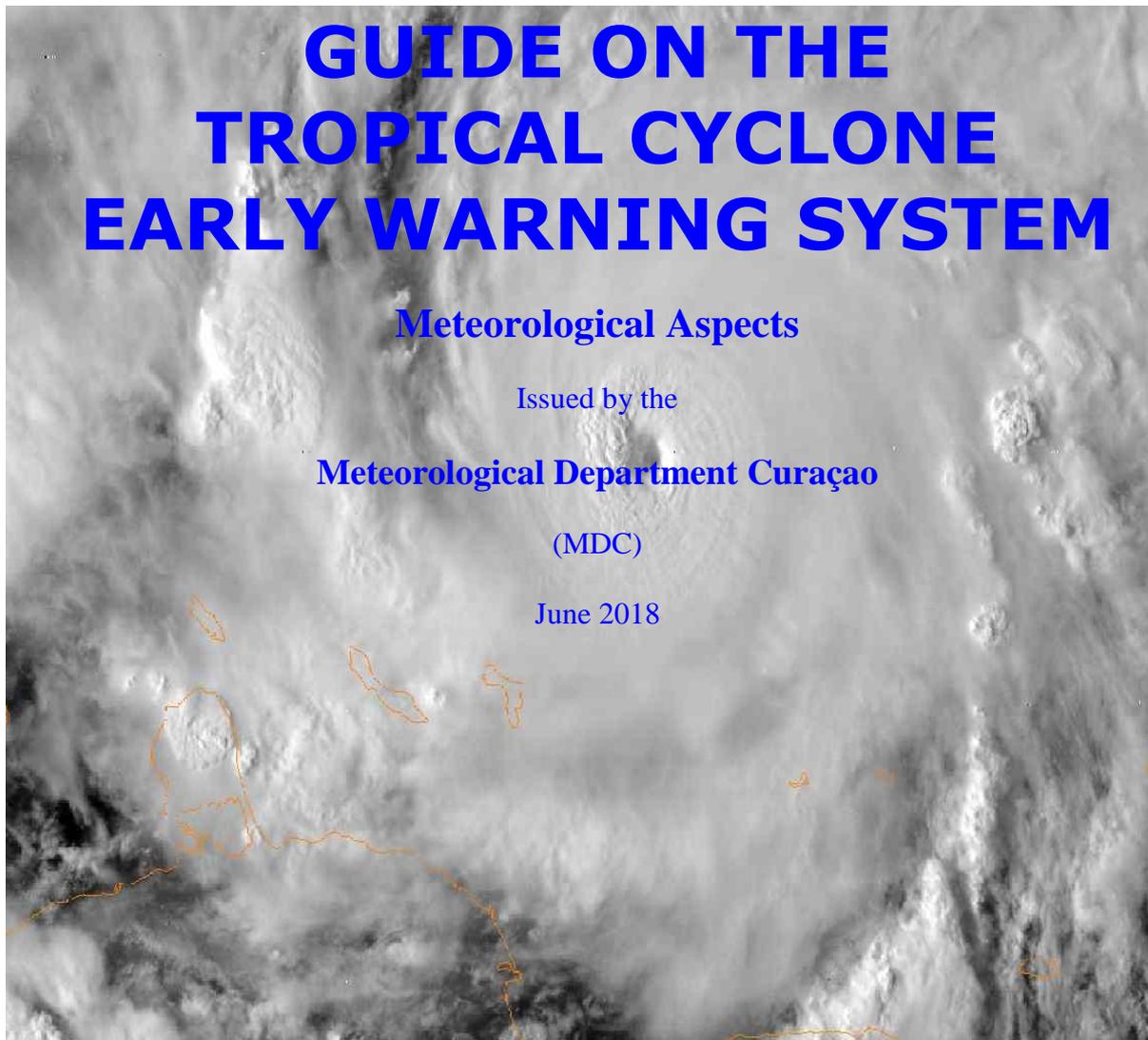
**Meteorological Aspects**

Issued by the

**Meteorological Department Curaçao**

(MDC)

June 2018



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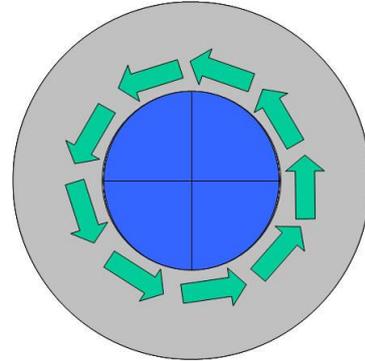
# I. Tropical Cyclones Basic Knowledge

## General

Tropical cyclones are low pressure areas with organized deep convection and a closed surface wind circulation around a well-defined center, which develop over warm tropical oceans. They appear over many parts of the tropical oceans, but the following information pertains specifically to tropical cyclones developing over the "Atlantic Basin", the area covering the North Atlantic Ocean, the Caribbean Sea and the Gulf of Mexico.

## Wind Circulation

In northern-hemispheric tropical cyclones the air rotates counter-clockwise around the center of the cyclone. The presence of such a circulation at sea level is a sure sign of the existence of a tropical cyclone.



## Tropical Cyclone Classification.

Based on the maximum sustained wind speed near the center, tropical cyclones are classified in three different types: tropical depressions, tropical storms and hurricanes.

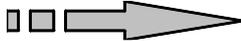


Class	Maximum Wind Speed		
	Knots	Km/hr	Miles/hr
<b>Tropical Depression</b>	33 or less	62 or less	38 or less
<b>Tropical Storm</b>	34 - 64	63 - 118	39 - 73
<b>Hurricane</b>	64 or higher	119 or higher	74 or higher

## The Saffir-Simpson Scale.

Furthermore, hurricanes are subdivided into five categories according to the Saffir-Simpson Scale.

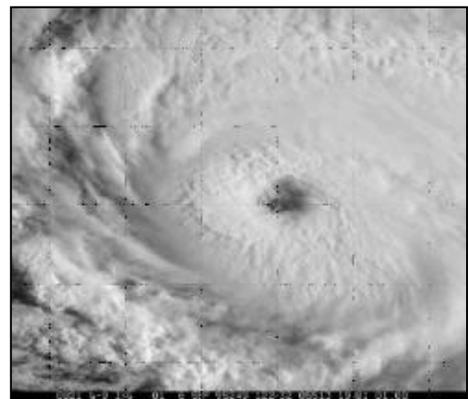
Category 1 and 2 are known as "minor hurricanes, category 3 and higher as "major hurricanes."



Saffir-Simpson Scale			
Category	Maximum Windspeed		
	Knots	Km/hr	Miles/hr
1	64-82	119-153	74-95
2	83-96	154-177	96-110
3	97-112	178-209	111-130
4	113-134	210-249	131-155
5	134+	250+	156+

## The Eye

The eye is the circular area of comparatively light winds that encompasses the center of a hurricane. The eye is either completely or partially surrounded by the eyewall cloud. The average diameter of the eye of an Atlantic hurricane is about 20 miles, but much smaller or larger diameters occur. The calm during the passage of the eye is only temporarily; when the eye has passed your location, winds will blow from the opposite direction and increase in intensity again.



Eye of Hurricane Luis, September 6, 1995.

## Naming

Since 1953, Atlantic tropical storms have been named from lists originated by the National Hurricane Center. They are now maintained and updated by the Regional Association IV Hurricane Committee of the World Meteorological Organization (WMO). The original name lists featured only women's names. In 1979, men's names were introduced and they alternate with the women's names. Six lists are used in rotation. Thus, the 2018 list will be used again in 2024. The letters Q, X, Y and Z are not used.

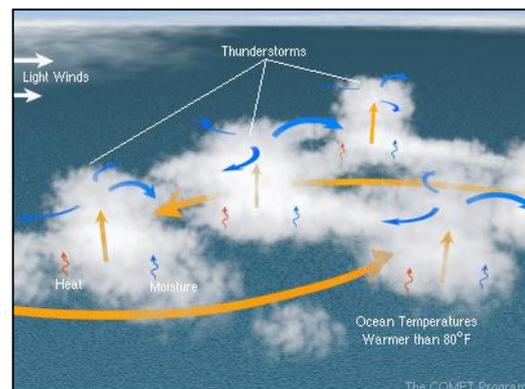
### Atlantic Basin Names

<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>
Alberto	Andrea	Arthur	Ana	Alex	Arlene
Beryl	Barry	Bertha	Bill	Bonnie	Bret
Chris	Chantal	Cristobal	Claudette	Colin	Cindy
Debby	Dorian	Dolly	Danny	Danielle	Don
Ernesto	Erin	Edouard	Elsa	Earl	Emily
Florence	Fernand	Fay	Fred	Fiona	Franklin
Gordon	Gabrielle	Gonzalo	Grace	Gaston	Gert
Helene	Humberto	Hanna	Henri	Hermine	Harold
Isaac	Imelda	Isaias	Ida	Ian	Idalia
Joyce	Jerry	Josephine	Julian	Julia	Jose
Kirk	Karen	Kyle	Kate	Karl	Katia
Leslie	Lorenzo	Laura	Larry	Lisa	Lee
Michael	Melissa	Marco	Mindy	Martin	Margot
Nadine	Nestor	Nana	Nicholas	Nicole	Nigel
Oscar	Olga	Omar	Odette	Owen	Ophelia
Patty	Pablo	Paulette	Peter	Paula	Philippe
Rafael	Rebekah	Rene	Rose	Richard	Rina
Sara	Sebastien	Sally	Sam	Shary	Sean
Tony	Tanya	Teddy	Teresa	Tobías	Tammy
Valerie	Van	Vicky	Victor	Virginie	Vince
William	Wendy	Wilfred	Wanda	Walter	Whitney

A change in the list occurs when a storm causes a great number of deaths and significant destruction and that the future use of its name on a different storm would be inappropriate for reasons of sensitivity. At the annual session of the Regional Association IV Hurricane Committee, the name is replaced.

Several names have been changed since the lists were created. For example, the name of the notorious Hurricane *Sandy* of 2012 in 2018 is substituted by *Sara* and the retired *Ingrid* of 2013 will be replaced in 2019 by *Imelda*. All 2014 names will return in 2020, but the disastrous *Erika* of 2015 will be replaced by *Elsa* and *Joaquin* by *Julian* in 2021. *Matthew* and *Otto* in 2016 will be substituted in 2022 by respectively *Martin* and *Owen*. The devastating hurricanes in 2017, *Harvey*, *Irma*, *Maria* and *Nate* in 2023 will be replaced respectively by *Harold*, *Idalia*, *Margot* and *Nigel*.

In the event that more than 21 named tropical cyclones occur in the Atlantic basin in a season, as happened in 2005, additional storms will take names from the Greek alphabet: *Alpha*, *Beta*, *Gamma*, *Delta* and so on. If a storm forms in the off-season, it will take the next name in the list based on the current calendar date. For example, if a tropical cyclone formed on December 28<sup>th</sup>, it would take the name from the previous season's list of names. If a storm formed in January, as occurred with *Alex* in 2016, it would be named from the subsequent season's list of names.



The early stages of a developing tropical cyclone

## Tropical Cyclone Genesis

In the Atlantic Basin most tropical cyclones, especially the major hurricanes, develop from **tropical waves**. A tropical wave is an area with cloudiness and showers that propagates from east to west. Annually, on average, an amount of 65 tropical waves moves through the Caribbean Area, mainly between May and November.

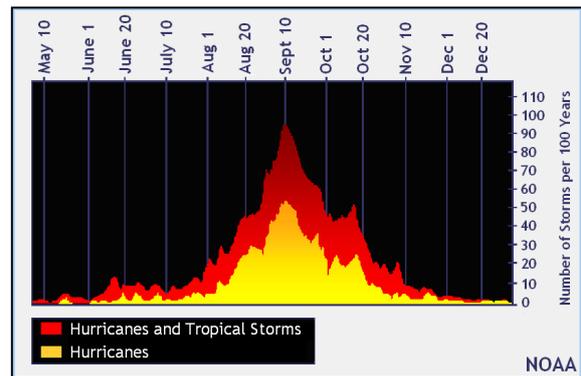
A tropical wave is not a tropical cyclone since a closed air circulation is not present near sea level. Near gale to gale force winds, which may be observed during the passage of a tropical wave, are caused by squalls in or near heavy showers rather than by an organized storm wind circulation.

## Cape Verde Cyclones

These are tropical cyclones which develop east of the Caribbean Area over the tropical Atlantic Ocean, mainly in the period between mid-August and mid-October. The Cape Verde cyclones almost always develop from tropical waves which emerge off Western Africa. These tropical cyclones in general pose the largest threat to the islands in the Caribbean. During their long trip over the warm waters of the Atlantic Ocean, they have the opportunity to grow to mature hurricanes.

## Hurricane Season and Frequency

The hurricane season in the Atlantic Basin officially starts on June 1 and ends on November 30; a great majority of tropical cyclones in this region develop during this period. Occasionally, a tropical cyclone will develop either before or after the season, as for instance happened with Hurricane *Alex* on January 14, 2016 and Tropical Storm *Arlene* on April 19, 2017. Other examples were the tropical storms *Odette* and *Peter* in December 2003, tropical storm *Zeta* in late December 2005, early January 2006 and tropical storm *Olga* in December 2007.



Yearly tropical cyclone activity from month to month with peak on September 10

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## II. The MDC Tropical Cyclone Early Warning System

### II.1 Standard Procedures

As the national meteorological authority the Meteorological Department Curaçao (MDC), on behalf of the Government of Curaçao, will issue watches or warnings, in case a (potential) tropical cyclone poses a threat to our country. The MDC will inform the U.S. National Hurricane Center (NHC) in Miami, Florida of this decision and the NHC will then include these watches or warnings in their advisory bulletins for a certain tropical cyclone. The NHC is the Regional Specialized Meteorological Center for the World Meteorological Organization and coordinates the tropical cyclone early warning system for the Caribbean Area, North and Central America. The NHC provides bulletins containing the latest location, forecast track and intensity of tropical cyclones. These bulletins provide mainly general information. The MDC will issue its own bulletins providing detailed information on the expected local effects of tropical cyclones on Curaçao.

To provide meteorological information on tropical cyclones the Meteorological Department Curaçao (MDC) issues the following information:

- ❑ In the **regular weather forecast bulletin**, when a tropical disturbance has a formation chance of 40% or more to become a tropical cyclone within the next five days over the Caribbean Area, this system will be mentioned in the “**Significant tropical weather systems**” section. Besides that, active (sub)tropical cyclones anywhere over the Atlantic Basin will also be mentioned in this section.
- ❑ Sometimes however a (non-threatening) tropical disturbance is mentioned on social media as a possible threat to us. The duty forecaster shall then discuss with the Director or Chief WWW whether or not to include the mention of that system in this section, to deny then to the public the existence of a possible threat.
- ❑ In case there is a (potential) threat to Curaçao, **Tropical Cyclone Bulletins** (containing watches, warnings and especially a forecast of the expected local conditions and their possible impact) will be issued. More details will be found in the following paragraphs.

The MDC will also issue two types of Track Charts: A **Basic Briefing Display Chart** and a **Wind Swath Chart**. These maps will be published on our web site and on our Facebook page when a (potential) tropical cyclone poses a threat to Curaçao or when such a system is located within 500 kilometers of our island.

The Basic Briefing Display Charts contain the following information:

1. Latest position of the system’s center;
2. Forecast track of the tropical cyclone;
3. Areas of Watches and Warnings.

The Wind Swath Charts contain:

1. Latest position of the system’s center;
2. Its forecast track;
3. Color coded areas with wind speeds in excess of respectively 34, 50 and 64 knots.

- The MDC will brief the Ministers of General Affairs and Traffic, Transport and Urban Planning and also the Operational Leader by phone, before the issuance of the *first* Cyclone Message.
- The meteorological information as presented in the Tropical Cyclone Bulletins (TCBs) and Track Charts is based on the latest storm data and forecasts models, as made available by the NHC every 6 hours at specific times: 0900 UTC, 1500 UTC, 2100 UTC and 0300 UTC, if necessary supplemented by intermediate updates. UTC stands for Universal Time Coordinated and is equal to Greenwich Mean Time (GMT), which is local time + four (4) hours in the eastern Caribbean.

## II.2 Outline of the Tropical Cyclone Early Warning System

A four-phase Tropical Cyclone Warning System is used by the MDC and each phase is represented by a specific color. These will be respectively yellow, orange, red and violet. The color green will represent normal (safe) weather conditions.

The MDC has the responsibility of initiating this early warning system by the issuing of Information, Watch or Warning Messages to the emergency and disaster management authorities and organizations and also the general public on Curaçao. See the table below with the phase definitions.

## II.3 Description of Phases

Tropical Cyclone Bulletin (TCB) Types 

PHASE	DEFINITIONS:
	No hazard
Information --- Be alert! ---	Tropical cyclone poses possible threat within next 120 hours
Watch ---Prepare yourself! ---	Tropical cyclone conditions are possible within next 48 hours
Warning --- Protect yourself! ---	Tropical cyclone conditions are expected within next 36 hours
Strike --- Seek shelter! ---	Tropical cyclone conditions are imminent within next 6 hours

### II.3.1 The Information Phase

This phase will be initiated when there is still too much uncertainty whether or not an existing or developing tropical cyclone will affect Curaçao with tropical storm or hurricane winds within the next 120 hours (five days). During the Information Phase, TCBs will be issued once or twice a day.

There are several scenarios in which the Information Phase can be initiated:

- ❖ A tropical cyclone is still quite some distance away, but because of its forecast track and intensity it *may* become a threat to Curaçao within 120 hours (five days).
- ❖ When a tropical disturbance is expected to become a threat to Curaçao within 120 hours and shows a strong potential to develop into a tropical cyclone. The Information Phase is therefore a means of increasing awareness of the authorities and to advise them to await future bulletins, without the general public having to take preventive measures as yet, unless the local authorities advise otherwise.

MDC initiates the Information phase by issuing Tropical Cyclone Bulletin No.1

**Example of header:**

TROPICAL CYCLONE BULLETIN No. 1.



METEOROLOGICAL DEPARTMENT CURAÇAO

MONDAY, JUNE 25, 2018, 17:00 L.T.

**II.3.2 The Watch Phase**

In coordination with the National Hurricane Center (NHC) in Miami the Watch Phase is initiated when the forecast track and intensity of a tropical cyclone are such, that the possibility exists for either tropical storm force or hurricane force winds to affect Curaçao within 48 hours. The Watch Phase is initiated locally when the MDC issues a Tropical Cyclone Bulletin that contains the orange tropical storm or hurricane watch pictogram in the upper-left corner. During the Watch phase Tropical Cyclone Bulletins will be issued 3-4 times a day.

**Example of header:**

TROPICAL CYCLONE BULLETIN No 4.



METEOROLOGICAL DEPARTMENT CURAÇAO

SUNDAY, AUGUST 26, 2018, 12:00 L.T.

\*\*\*HURRICANE WATCH IN EFFECT FOR CURAÇAO\*\*\*.

**Definitions:**

***Tropical Storm Watch:*** An announcement for a specific area that a tropical storm or incipient tropical storm conditions poses a possible threat within 48 hours.

***Hurricane Watch:*** An announcement for a specific area that a hurricane or incipient hurricane conditions pose a possible threat within 48 hours.

**II.3.3 The Warning Phase**

In coordination with the NHC in Miami the warning phase is initiated when the forecast track and intensity of a tropical cyclone are such, that the either tropical storm force or hurricane force winds are expected to affect the islands within the next 36 hours.

The warning phase is initiated locally when the MDC issues a Tropical Cyclone Bulletin that contains the red tropical storm or hurricane warning pictogram in the upper-left corner. During the warning phase, Tropical Cyclone Bulletins will be issued at least 4 times a day.

**Example of header:**

TROPICAL CYCLONE BULLETIN No. 6.



METEOROLOGICAL DEPARTMENT CURAÇAO

MONDAY, AUGUST 27, 2018, 12:00 L.T.

\*\*\*HURRICANE WATCH IN EFFECT FOR CURAÇAO\*\*\*.

**Definitions**

**Tropical Storm Warning:** A warning for tropical storm conditions, including possible sustained winds within the range 63-117 km/h (39-73 mph) (34-63 knots) are expected in specified areas in 36 hours or less.

**Hurricane Warning:** A warning that one or both of the following dangerous effects of a hurricane are expected in a specific area in 36 hours or less: (a) average winds 118 km/h (74 mph) (64 knots) or higher; (b) dangerously high water or a combination of dangerously high water and exceptionally high waves.

### II.3.4 The Strike Warning Phase

A Strike Warning is issued by the MDC when the island is expected to experience tropical storm force or hurricane force winds within the next six hours. All relevant preparatory measures should be completed rapidly.

**Definitions**

**Strike Warning:** Tropical storm or hurricane conditions are expected within the next six to nine hours. The Strike Warning will be issued as part of the Warning Message.

**Example of header:**

TROPICAL CYCLONE BULLETIN No. 11.



METEOROLOGICAL DEPARTMENT CURAÇAO

MONDAY, AUGUST 27, 2018, 12:00 L.T.

\*\*\*STRIKE WARNING FOR CURAÇAO\*\*\*

### II.4 Special Cyclone Update

In case a sudden development takes place between the issuance of two bulletins, a Special Cyclone Update shall be issued. It will contain information about

- the center's location;
- the observed maximum sustained winds;
- the observed significant rainfall amounts;
- wave height information.

Data received through our weather radar will be used to obtain information about the location, wind speeds and rainfall. Information from our automatic weather stations will also be used. Buoy data will be used for wave height information.

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## III. Distribution of Tropical Cyclone Information to Users

### III.1 Standard Procedures

- Before the first information Tropical Cyclone Bulletin (TCB) is issued, the Ministers of General Affairs and Traffic, Transport and Urban Planning and also the Operational Leader shall be briefed to inform these authorities about a potential threat by a tropical cyclone.
- The following products will thereafter be issued by the MDC:
  - Tropical Cyclone Bulletins (TCBs)
  - Track Charts containing the current and forecast positions of the threatening tropical cyclone, as received from the National Hurricane Center;
  - Radar images;
  - Satellite images;
- These products will be made available to authorities and the general public through the following means:
  - The web site of the MDC (<http://www.meteo.cw>);
  - By e-mail;
  - Through our Facebook page at:  
<http://www.facebook.com/meteorological.department.curacao/>
  - The MDC Curaçao Weather app;
  - In WhatsApp messages to authorities, members of the media and private agencies or persons. The WhatsApp number of the MDC is +599-9-560-1089.
  - On our YouTube channel (Meteo Curacao).

All authorities and other interests should send us updates of their e-mail addresses and cell phone numbers, as used by the MDC, before the official start of the hurricane season (1 June).

### III.2 Using the Meteorological Information

For the meteorological information to be useful and effective, it is of the utmost importance that:

- ❖ The messages are received by the proper authority within the shortest time possible.
- ❖ The user is able to interpret the messages correctly and then determine a meaningful scenario for his or her specific use, taking into account the known limitations of tropical cyclone forecasting.

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## **IV. Tropical Cyclones in Curaçao**

### **Frequency Curaçao**

Based on the statistical analysis of historical data by the National Hurricane Center in Miami, return periods have been calculated for Curaçao:

1. Passage of a severe tropical storm within 75 nautical miles (138 kilometers): once in 25 years;
2. Passage of a category one hurricane within 75 nautical miles: once in 46 years;
3. Passage of a category two hurricane within 75 nautical miles: once in 100 years;
4. Passage of a category three hurricane within 75 nautical miles: once in 170 years;

See graph in [Attachment 4](#).

### **Speed of Development of Emergency Situations**

Hurricanes and strong tropical storms reaching the eastern Caribbean Area are in general of the "Cape Verde" type. The location where these systems develop and their forward speed often are such that it will take several days before the islands are affected. Geostationary weather satellites continuously observe the area which allows the meteorologists to monitor tropical cyclone development on a 24-hour a day basis.

Sometimes however, a tropical storm may develop very close to our island. Storm conditions will then develop rather suddenly which results in a warning period of only a few hours (Cesar in July 1996). Although the associated storm effects in such cases will be limited, action may have to be taken rapidly, in particular for certain vulnerable areas and sectors.

### **Effects on communities**

The effects that a tropical storm or hurricane has on our community depends on the intensity, track and forward speed of the system. The hazards associated with the passage of tropical cyclones are caused by three phenomena: sea conditions (high waves and storm surge), wind and rainfall.

### **Duration and Intensity of Tropical Storm or Hurricane Conditions**

The duration and intensity of storm/hurricane conditions depend on:

- The forward speed of the tropical storm/hurricane; the slower the movement, the longer conditions will persist;
- The diameter of the area with storm/hurricane winds;
- The size of the rainfall region;
- The distance at which the center of the storm/hurricane passes the island, the closer the center to the island, the more intense the effects of the tropical storm or hurricane will be. In general, with westward moving hurricanes, the most intense effects are felt when the eye passes just south of the island.

### **Uncertainties**

The large amount of information which nowadays is at the disposition of meteorologists and disaster managers has to be evaluated and used carefully. The inaccuracy of the forecasts for longer periods (>36 hours) is considerable and they should be used carefully.

### **Center Position**

The accuracy, with which the position of the cyclone center in each case can be determined, is one of the most important factors influencing the reliability of the forecasts.

There are three methods to fix the position the center of storms and hurricanes:

1. satellite imagery;
2. hurricane reconnaissance aircraft;
3. weather radar.

The fixing of center positions is carried out by hurricane specialists at the National Hurricane Center (NHC) in Miami. The accuracy of the center's location depends on the method used and how well the center is organized. As the center or eye becomes better defined, it becomes easier to make a more accurate fix of the center's position.

Center positions' fixes based on satellite imagery during daytime (*visible* images) have an accuracy of 6 to 30 miles, depending on the organization of the system.

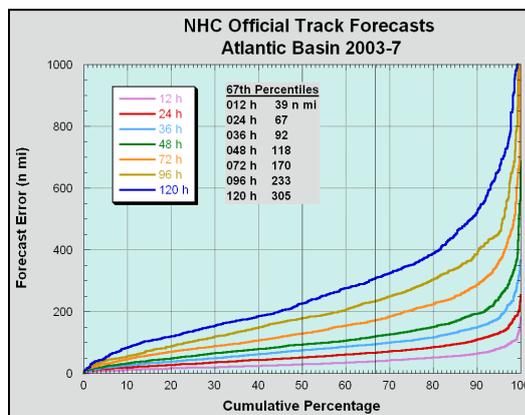
At night, forecasters have to rely on *Infrared* satellite imagery when the system is located too far away from a weather radar. The Infrared satellite analysis gives the least accurate position fix; the error in fixing the position of a poorly organized system's center can be more than 30 miles.

When reconnaissance aircraft (hurricane hunters) penetrate the storm during daytime, they can make very accurate position fixes of the center of tropical storms and hurricanes.

### Forecast Position/Track

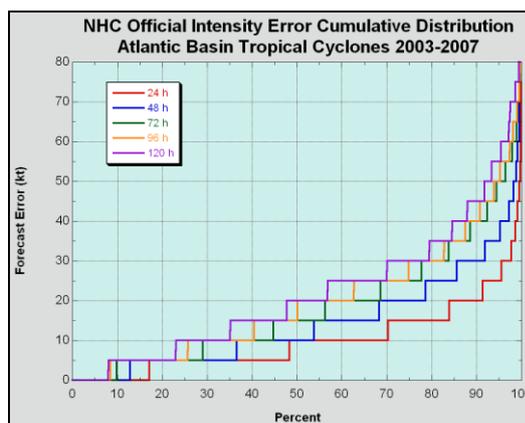
The accuracy of the cyclone track forecasts decreases as the moment of the forecast lies further in the future. The average error in track forecasts of the NHC over the period 2003-2007 can be seen in the graph to the right.

These numbers again show that with forecast periods greater than 36 hours, the accuracy of the forecast track becomes so poor that these forecasts have to be handled very carefully.



### Intensity

The intensity of storms and hurricanes is based on the speed of the maximum sustained winds (1-minute averages) around the center and the air pressure in the center. The wind speed measured or estimated from hurricane reconnaissance flights is very accurate while wind speed measurement using satellite imagery is much less accurate. The accuracy of intensity forecasts decreases rapidly as the forecast period becomes longer.



## V. Glossary of Terms

### **Message:**

Official information issued by the Meteorological Department Curaçao (MDC) 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. There are three types of bulletins:

- Information Bulletins
- Watch Bulletins
- Warning Bulletins

### **Cyclone Center:**

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

### **Tropical Cyclone Bulletin:**

A message issued by the Meteorological Department Curaçao (MDC), containing the latest information on a tropical cyclone (depression, tropical storm or hurricane) or a potential tropical cyclone (strong tropical wave).

A Tropical Cyclone Bulletin contains one of the following specific types of information:

- Information Message**
- Watch Message
- Warning/Strike Message
- Special Cyclone Update

### **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 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.

### **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 surrounds 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 hPa/hr for at least 12 hours or 5 hPa/hr for at least six hours.

### **Gale Warning:**

A warning of 1-minute sustained surface winds in the range 34 knots (63 km/hr) to 47 knots (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 knots (64 km/hr) or greater lasting for 1 hour or longer, or winds gusting to 50 knots (93 km/hour) or greater regardless of duration that are either expected or observed over land.

**Hurricane:**

A tropical cyclone, in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 64 knots (119 km/hour) or more.

**Hurricane Season:**

The portion of the year that has a relatively high incidence of hurricanes. The hurricane season in the Atlantic, Caribbean, and Gulf of Mexico runs from June 1 to November 30.

**Hurricane Watch:**

Hurricane conditions are possible within the next 48 hours, possibly causing sustained winds greater than 64 knots/119 km per hour.

**Hurricane Warning:**

Hurricane conditions are expected within the next 36 hours, causing sustained winds greater than 64 knots/119 km per hour and/or dangerously high water and exceptionally high waves.

**Information Bulletin:**

A message issued by the MDC prior to possible issuance of watches or warnings initiating the first stage of the local disaster prevention preparedness (Information phase).

**Initial Position:**

The observed position of the center of the cyclone on a certain date and time. It is the starting point of a forecast track.

**Leading Edge Band:**

The first band with thunderstorms at the front edge of the tropical cyclone weather area.

**Maximum Sustained Winds:**

The maximum wind speeds measured as a one-minute average. Maximum sustained winds are indicative for the classification of the tropical cyclone.

**Named Storms:**

A collective name for tropical storms and hurricanes. Tropical Depressions don't resort under this term since these get no name but a number.

**Potential Tropical Cyclone:**

A term used in advisory products to describe a disturbance that is not yet a tropical cyclone, but which poses the threat of bringing tropical storm or hurricane conditions to land areas within 48 hours.

**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.

**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 (or Rapid Intensification):**

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

**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 Tide:**

The actual sea water level resulting from the astronomic tide combined with the storm surge.

**Strike Warning:**

A Strike Warning will be issued when the effects of Tropical Storm or Hurricane force winds are imminent, generally within 6-9 hours. It is part of the Warning Phase.

**Small Craft Warning:**

This warning is issued when conditions over open waters and/or coastal waters are expected to deteriorate in such a manner, that it is advisable for small vessels not to leave port, to moor these vessels securely and, where possible, to pull them on shore.

**Storm Track:**

The track followed by the cyclone; on a chart it is the line connecting the observed center positions. Because this is often a very irregular curve, an average (smoothed) track is used for operational purposes.

**Tropical Depression:**

A tropical cyclone, in which the maximum sustained surface wind speed (1-minute average) is 33 knots (62 km/hour) or less.

**Tropical Disturbance:**

A discrete tropical weather system of apparently organized convection (generally 100 to 300 nautical miles in diameter) originating in the tropics or subtropics, having a non-frontal 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.

**Track Map or Track Chart:**

A map that displays the initial position, forecast track and the potential track area of the cyclone. Areas where *watches* or *warnings* are in effect are indicated on this map.

**Tropical Storm:**

A tropical cyclone, in which the maximum sustained surface wind speed (1-minute average) ranges from 34 knots (63 km/hr) to 63 knots (118 km/hr).

**Tropical Storm, Minor:**

A tropical storm with maximum sustained winds of 34 to 40 knots, wind force 8; wave height over the open waters is 2 meters.

**Tropical Storm, Moderate:**

Tropical storm with maximum sustained winds of 41 to 47 knots, wind force 9; wave height over the open waters of about 9 feet (3 meters).

**Tropical Storm, Severe:**

Tropical storm with maximum sustained winds of 48 to 63 knots; wind force 10 to 11; wave height over the open waters of 12-15 feet (4 to 5 meters).

**Tropical Storm Watch:** Tropical Storm conditions are possible within the next 48 hours, possibly causing sustained winds between 34 to 63 knots (63 to 118 km/hour).

**Tropical Storm Warning:** Tropical Storm conditions are expected within the next 36 hours, causing sustained winds between 34 knots/63 km per hour to 63 knots/118 km per hour.

**Watch Bulletin:**

A message that is issued by the MDC when a Tropical Storm Watch or Hurricane Watch is in effect.

**Warning Bulletin:**

A message that is issued by the MDC when a Tropical Storm Warning or Hurricane Warning is in effect.

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## Attachment 1.....Beaufort Scale of Wind

Beaufort Scale. Velocity equivalent at 10 meters over an open flat surface; wave heights over the open sea, figures in brackets indicate probable maximum wave height.

No.	Knots	Mph	Description	Effects at Sea	Effects on Land	Wave Height (m)	Wave Height (ft)
0	0	0	Calm	Sea like a mirror	Smoke rises vertically	---	---
1	1 - 3	1 - 3	Light Air	Ripples, but no foam crests	Smoke drifts in the wind	0.1 (0.1)	¼
2	4 - 6	4 - 7	Light Breeze	Small wavelets	Leaves rustle. Wind felt on face	0.2 (0.3)	½ (1)
3	7 - 10	8 - 12	Gentle Breeze	Large wavelets, crests not breaking	Small twigs in constant motion. Light flags extended	0.6 (1)	2 (3)
4	11 - 16	13-18	Moderate Wind	Numerous white caps	Dust, leaves and loose paper raised. Small branches move.	1 (1.5)	2 (3)
5	17-21	19-24	Fresh Wind	Many whitecaps, some spray	Small trees sway	2 (2.5)	3.5 (5)
6	22-27	25-31	Strong Wind	Larger waves form. Whitecaps everywhere. More spray	Large branches move. Whistling in phone wires. Difficult to use umbrellas	3 (4)	9.5 (13)
7	28-33	32-38	Very Strong Wind	White foam from breaking waves begins to be blown in streaks	Whole trees in motion	4 (5.5)	13.5 (19)
8	34-40	39-46	Gale	Edges of wave crests begin to break into spindrift	Twigs break off trees. Difficult to walk	5.5 (7.5)	18 (25)
9	41-47	47-54	Severe Gale	High waves. Sea begins to roll. Spray may reduce visibility.	Chimney pots and slates removed.	7 (10)	23 (32)
10	48-55	55-63	Storm	Very high waves with overhanging crests. Blowing foam gives sea a white appearance.	Trees uprooted. Structural damage.	9 (12.5)	29 (41)
11	56-63	64-72	Severe Storm	Exceptionally high waves	Widespread damage	11.5 (16)	37 (52)
12	> 63	> 73	Hurricane force	Air filled with foam. Sea completely white. Visibility greatly reduced	Widespread damage. Very rarely experienced on land	14 (-)	45

**Attachment 2A...Wind conversion table for Knots**

KTS	mph	kph	m/s												
0	0	0	0	48	55	89	25	96	110	178	49	144	166	267	74
1	1	2	1	49	56	91	25	97	112	180	50	145	167	269	75
2	2	4	1	50	58	93	26	98	113	181	50	146	168	270	75
3	3	6	2	51	59	94	26	99	114	183	51	147	169	272	76
4	5	7	2	52	60	96	27	100	115	185	51	148	170	274	76
5	6	9	3	53	61	98	27	101	116	187	52	149	171	276	77
6	7	11	3	54	62	100	28	102	117	189	52	150	173	278	77
7	8	13	4	55	63	102	28	103	119	191	53	151	174	280	78
8	9	15	4	56	64	104	29	104	120	193	54	152	175	282	78
9	10	17	5	57	66	106	29	105	121	194	54	153	176	283	79
10	12	19	5	58	67	107	30	106	122	196	55	154	177	285	79
11	13	20	6	59	68	109	30	107	123	198	55	155	178	287	80
12	14	22	6	60	69	111	31	108	124	200	56	156	180	289	80
13	15	24	7	61	70	113	31	109	125	202	56	157	181	291	81
14	16	26	7	62	71	115	32	110	127	204	57	158	182	293	81
15	17	28	8	63	72	117	32	111	128	206	57	159	183	294	82
16	18	30	8	64	74	119	33	112	129	207	58	160	184	296	82
17	20	31	9	65	75	120	33	113	130	209	58	161	185	298	83
18	21	33	9	66	76	122	34	114	131	211	59	162	186	300	83
19	22	35	10	67	77	124	34	115	132	213	59	163	188	302	84
20	23	37	10	68	78	126	35	116	133	215	60	164	189	304	84
21	24	39	11	69	79	128	35	117	135	217	60	165	190	306	85
22	25	41	11	70	81	130	36	118	136	219	61	166	191	307	85
23	26	43	12	71	82	131	37	119	137	220	61	167	192	309	86
24	28	44	12	72	83	133	37	120	138	222	62	168	193	311	86
25	29	46	13	73	84	135	38	121	139	224	62	169	194	313	87
26	30	48	13	74	85	137	38	122	140	226	63	170	196	315	87
27	31	50	14	75	86	139	39	123	142	228	63	171	197	317	88
28	32	52	14	76	87	141	39	124	143	230	64	172	198	319	88
29	33	54	15	77	89	143	40	125	144	231	64	173	199	320	89
30	35	56	15	78	90	144	40	126	145	233	65	174	200	322	90
31	36	57	16	79	91	146	41	127	146	235	65	175	201	324	90
32	37	59	16	80	92	148	41	128	147	237	66	176	203	326	91
33	38	61	17	81	93	150	42	129	148	239	66	177	204	328	91
34	39	63	17	82	94	152	42	130	150	241	67	178	205	330	92
35	40	65	18	83	96	154	43	131	151	243	67	179	206	332	92
36	41	67	19	84	97	156	43	132	152	244	68	180	207	333	93
37	43	69	19	85	98	157	44	133	153	246	68	181	208	335	93
38	44	70	20	86	99	159	44	134	154	248	69	182	209	337	94
39	45	72	20	87	100	161	45	135	155	250	69	183	211	339	94
40	46	74	21	88	101	163	45	136	157	252	70	184	212	341	95
41	47	76	21	89	102	165	46	137	158	254	70	185	213	343	95
42	48	78	22	90	104	167	46	138	159	256	71	186	214	344	96
43	49	80	22	91	105	169	47	139	160	257	72	187	215	346	96
44	51	81	23	92	106	170	47	140	161	259	72	188	216	348	97
45	52	83	23	93	107	172	48	141	162	261	73	189	217	350	97
46	53	85	24	94	108	174	48	142	163	263	73	190	219	352	98
47	54	87	24	95	109	176	49	143	165	265	74	191	220	354	98

**Attachment 2B...Wind conversion table for Miles per Hour**

MPH	knots	kph	m/s												
0	0	0	0	48	42	77	21	96	83	154	43	144	125	232	64
1	1	2	0	49	43	79	22	97	84	156	43	145	126	233	65
2	2	3	1	50	43	80	22	98	85	158	44	146	127	235	65
3	3	5	1	51	44	82	23	99	86	159	44	147	128	237	66
4	3	6	2	52	45	84	23	100	87	161	45	148	129	238	66
5	4	8	2	53	46	85	24	101	88	163	45	149	129	240	67
6	5	10	3	54	47	87	24	102	89	164	46	150	130	241	67
7	6	11	3	55	48	89	25	103	90	166	46	151	131	243	68
8	7	13	4	56	49	90	25	104	90	167	46	152	132	245	68
9	8	14	4	57	50	92	25	105	91	169	47	153	133	246	68
10	9	16	4	58	50	93	26	106	92	171	47	154	134	248	69
11	10	18	5	59	51	95	26	107	93	172	48	155	135	249	69
12	10	19	5	60	52	97	27	108	94	174	48	156	136	251	70
13	11	21	6	61	53	98	27	109	95	175	49	157	136	253	70
14	12	23	6	62	54	100	28	110	96	177	49	158	137	254	71
15	13	24	7	63	55	101	28	111	96	179	50	159	138	256	71
16	14	26	7	64	56	103	29	112	97	180	50	160	139	257	72
17	15	27	8	65	56	105	29	113	98	182	51	161	140	259	72
18	16	29	8	66	57	106	30	114	99	183	51	162	141	261	72
19	17	31	8	67	58	108	30	115	100	185	51	163	142	262	73
20	17	32	9	68	59	109	30	116	101	187	52	164	143	264	73
21	18	34	9	69	60	111	31	117	102	188	52	165	143	266	74
22	19	35	10	70	61	113	31	118	103	190	53	166	144	267	74
23	20	37	10	71	62	114	32	119	103	192	53	167	145	269	75
24	21	39	11	72	63	116	32	120	104	193	54	168	146	270	75
25	22	40	11	73	63	117	33	121	105	195	54	169	147	272	76
26	23	42	12	74	64	119	33	122	106	196	55	170	148	274	76
27	23	43	12	75	65	121	34	123	107	198	55	171	149	275	76
28	24	45	13	76	66	122	34	124	108	200	55	172	149	277	77
29	25	47	13	77	67	124	34	125	109	201	56	173	150	278	77
30	26	48	13	78	68	126	35	126	109	203	56	174	151	280	78
31	27	50	14	79	69	127	35	127	110	204	57	175	152	282	78
32	28	51	14	80	70	129	36	128	111	206	57	176	153	283	79
33	29	53	15	81	70	130	36	129	112	208	58	177	154	285	79
34	30	55	15	82	71	132	37	130	113	209	58	178	155	286	80
35	30	56	16	83	72	134	37	131	114	211	59	179	156	288	80
36	31	58	16	84	73	135	38	132	115	212	59	180	156	290	80
37	32	60	17	85	74	137	38	133	116	214	59	181	157	291	81
38	33	61	17	86	75	138	38	134	116	216	60	182	158	293	81
39	34	63	17	87	76	140	39	135	117	217	60	183	159	295	82
40	35	64	18	88	76	142	39	136	118	219	61	184	160	296	82
41	36	66	18	89	77	143	40	137	119	220	61	185	161	298	83
42	36	68	19	90	78	145	40	138	120	222	62	186	162	299	83
43	37	69	19	91	79	146	41	139	121	224	62	187	162	301	84
44	38	71	20	92	80	148	41	140	122	225	63	188	163	303	84
45	39	72	20	93	81	150	42	141	123	227	63	189	164	304	84
46	40	74	21	94	82	151	42	142	123	229	63	190	165	306	85
47	41	76	21	95	83	153	42	143	124	230	64	191	166	307	85

**Attachment 3.....List of tropical cyclones (until December 31, 2017) passing within 100 nautical (or 115 statute) miles or 185 kilometers of 12.5N 69.0W**

Year	date	hour (AST)	minimum distance (nautical miles)	storm intensity (km/hr)	name	remarks
1605	----	----	-	ts	----	1)
1784	----	----	lt 25 S	hu	----	2)
1807	Oct. 17	night	lt 25	ts	----	3)
1831	June 24	09:00	35 N	hu	----	4)
1876	Sep. 25	----	-	ts	----	5)
1877	Sep. 23	11:30	lt 25 S	hu	----	6)
1886	Aug. 17	18:00	lt 25 NNE	160	----	7)
1887	July 21	19:00	72 NE	160	----	
1887	Dec. 9	12:00	lt 25 NNW	95	----	
1892	Oct. 7	23:00	35 SSW	160	----	8)
1895	Oct.17	01:00	81 N	190	----	
1897	Oct. 11	04:00	72 N	80	----	
1901	July 3	20:00	50 N	80	----	
1909	July 14	19:00	91 NNE	65	----	
1918	Aug. 2	15:00	76 NNE	80	----	
1918	Aug. 23	17:00	67 NNE	130	----	
1931	Sep. 7	----	99 NNE	ts	----	
1932	Nov. 2	08:00	48 N	160	----	
1933	June 29	06:00	lt 25 NE	160	----	
1933	Aug. 18	16:00	92 NNE	65	----	
1941	Sep. 25	03:00	90 N	120	----	
1954	Oct. 7	13:00	50 N	190	Hazel	9)
1955	Sep. 24	14:00	81 NNW	130	Janet	10)
1961	July 21	01:00	38 NNW	110	Anna	
1963	Oct. 1	00:00	99 NNE	175	Flora	
1969	Aug. 29	19:00	36 N	50	Francelia	
1971	Sep. 7	08:00	lt 25 NNW	110	Edith	
1971	Sep.16	02:00	lt 25 S	55	Irene	
1978	Aug.11	20:00	40 N	55	Cora	
1978	Sep. 14	14:00	lt 25 N	70	Greta	
1988	Oct. 16	13:00	lt 25 S	80	Joan	
1993	Aug. 8	07:00	60 S	70	Bret	
1996	Jul. 25	17:00	lt 30 SW	70	Cesar	
2004	Sep. 8	23:00	65 N	230	Ivan	
2005	Jul. 15	03:00	100 NE	210	Emily	
2007	Sep. 2	07:00	30 N	170	Felix	
2008	Oct. 14	14:00	77 N	80	Omar	
2010	Nov. 1	13:00	56 N	70	Tomás	
2016	Sep 30	00:00	97 N	130	Matthew	

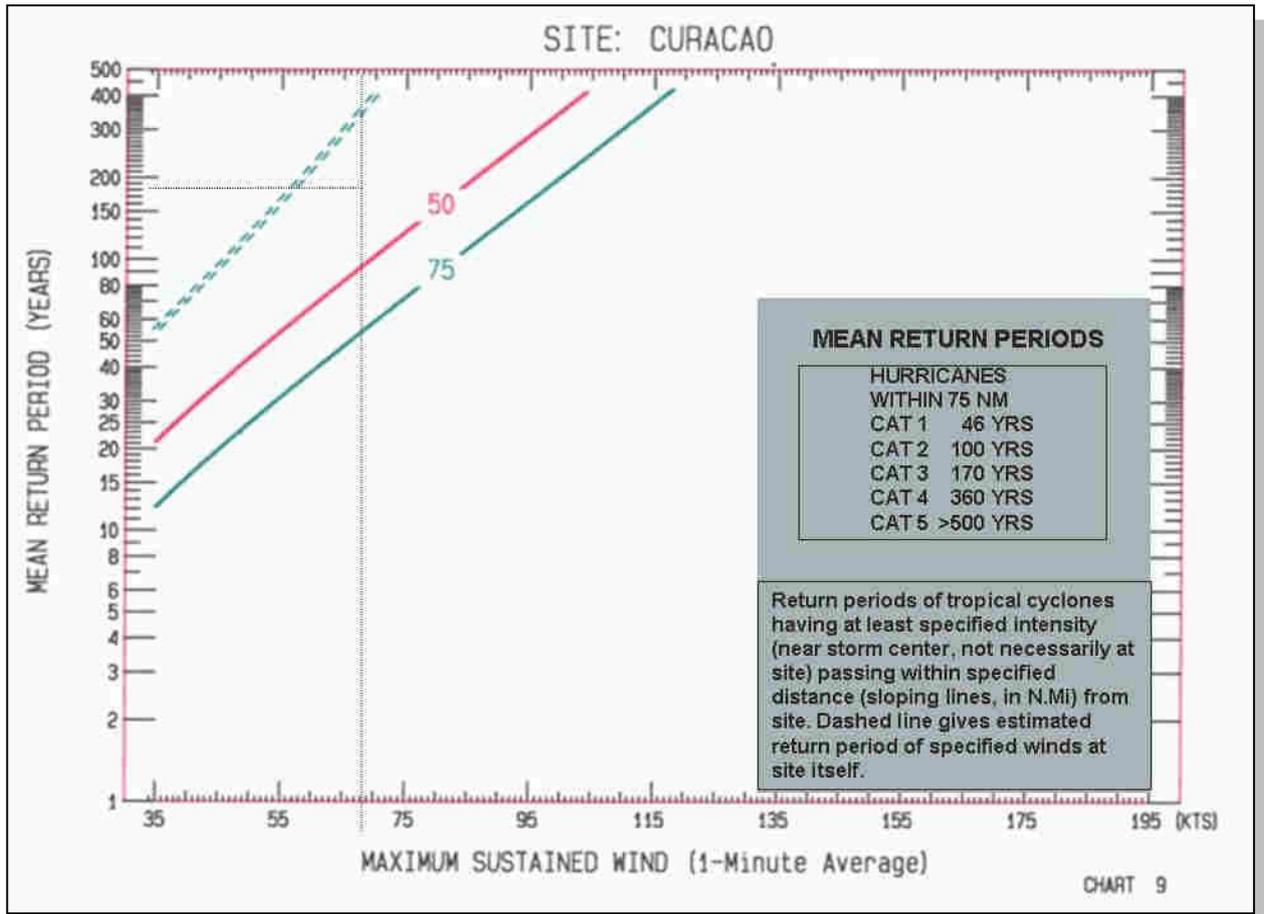
## REMARKS:

- 1 Based on the description of a disaster with a Spanish fleet near Cumaná, Venezuela. Ref. "Armada Española desde la unión de los reinos de Castilla y de Aragón", by Cesáres Fernandez Duro, Madrid, 1895, Vol.III, p. 487.
- 2 In the harbor of Willemstad, Curaçao, several full laden ships were swept ashore, others driven out to sea and lost. Other damages have been sustained to an immense value. A long range of warehouses was blown down and the goods buried under the ruins. Ref. "The Gentleman's Magazine", 1785, Vol. 57, p. 154.
- 3 In connection with the storm of June 24, 1831, reference is made to "the fatal night of October 17, 1807, when a hurricane past". No reports on damage available. Ref. "Curaçaosche Courant", June 1831.
- 4 Heavy storm and torrential rain with frequent thunder. Around 09:00 local time, the wind backed from NW to SW. No structural damage at Curaçao. HM brig "Sirene" lost at Kralendijk, Bonaire. Ref. "Curaçaosche Courant", June 1831. Known as the "Barbados-Yucatán hurricane".
- 5 Many houses of poor people were ruined, losses of live-stock in Aruba and Bonaire. Government buildings more or less damaged. Ref. "Colonial Report", 1877.
- 6 See text under "Hurricane climatology of the Netherlands Antilles - The Leeward islands". Ref. "Colonial Report", 1878.
- 7 Quays along harbor entrance heavily damaged, western part of Curaçao flooded, heavy trees were uprooted, stocks of salt were melted. In Bonaire, the Government pier was washed away and many ships lost, considerable damage to buildings and roads. At the north coast of Aruba, the German brig "Nero" was lost. Ref. "Colonial Report", 1887, "Curaçaosche Courant", August 20 and 27, 1886.
- 8 No damage reported in Curaçao, ship "Anita" lost near Bonaire. Strongest winds between 23:00 and 02:00 local time, lowest barometer reading 1013 mb (?). Ref. "Curaçaosche Courant", October 14, 1892.
- 9 Government pier in Bonaire damaged, flash floods in Curaçao and Aruba. In Aruba a bridge and several water dams destroyed. Wind speed about 30 knots with gusts to 50 knots. Ref. "Beurs- en Nieuwsberichten", October 7-14, 1954.
- 10 Some damage to quays along harbor entrance. Considerable damage to beach facilities at Piscadera Bay and Vaersen Bay. In Aruba, gusts to 50 mph, heavy trees uprooted but no significant damage. In Bonaire, piers and coastal boulevard damaged. Ref. "Beurs- en Nieuwsberichten" and "Amigoe di Curaçao" September 25, 1955.

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## Attachment 4.....Return Periods Curaçao



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## Attachment 5.....Meteorological Reports

### Tropical Cyclone Bulletins

Bulletins are issued for the benefit of authorities, disaster management organizations and the general public, according to a four phase tropical cyclone warning system.

PHASE	NAME Bulletin	FREQUENCY of Issuance
1. Information Phase	Information Message	Once to twice a day
2. Watch Phase	Watch Message	Every six hours
3. Warning phase	Warning Message	Every six hours, if necessary, every three hours
4. Strike Phase	Warning Message	Every three hours

### Special Cyclone Update

The purpose of this short message is to report information regarding significant developments, for example in case of a sudden increase or decrease in storm strength, change in track, rapid deterioration of inclement weather, etc.

### Structure of the Bulletins

#### Contents of Bulletins:

A Message consists of the following sections:

- \* Heading;
- \* Lead Statement (Title);
- \* Watches/warnings in effect;
- \* Synopsis;
- \* Effect on Local Conditions (Wind, Seas and Rain);
- \* Brief Advice to Local Authorities and General Public;
- \* Latest and Forecast Positions;
- \* Definitions;
- \* Time of issuance of Next Message
  - *All times in the Message are local times.*

#### Explanation and Remarks to the Sections of a Message

##### 1. HEADING.

- TROPICAL CYCLONE BULLETIN NO....  
Here the reader is able to check whether all messages have been received; it is a sequential numbering, starting with number 1 for the first Tropical Cyclone Bulletin.  
The code colored tropical cyclone symbol will illustrate the alert phase below this sentence.
- Line 2: METEOROLOGICAL DEPARTMENT CURAÇAO
- Line 3: Date and Time.
- Line 4 of the Heading is the LEAD STATEMENT. This is a statement that characterizes the latest developments and/or tendency and may consist of two lines.

## 2. CURRENT STORM DATA.

After the heading and lead sentence a synopsis about the latest developments of the corresponding disturbance will be given and it is based on official information from the NHC in Miami.

### Explanation of terminology

#### \* WARNINGS:

This is an enumeration of all special warnings, if any, that are in effect on the island. For example, a so called Rough Seas Warning.

When there are watches and/or warnings in effect, definitions of these will be given above the Forecast Center Positions section.

#### \* EFFECT ON LOCAL CONDITIONS

In this section, the (expected) influence of the cyclone on local conditions is given in brief. The expected **Winds**, **Seas** and **Rainfall** will be discussed in separate paragraphs, including the impact of these parameters.

\* **LATEST AND FORECAST CENTER POSITIONS:** In this section, the latest and at least one forecast position is given with indication of respectively date/local time, position, intensity and distance in respect to a certain island or city. The current and forecast intensity will be given according to the information displayed below for the intensity category.

- potential tropical cyclone (a strong tropical disturbance that still lacks a closed wind circulation but is a threat to land within 48 hours);
  - tropical depression (wind speed below 34 knots; < 39 mph; < 8 Bft.);
  - weak tropical storm (34-40 knots; 39-46 mph; 8 Bft./Gale);
  - moderate tropical storm (41-47 knots; 47-54 mph; 9 Bft./strong Gale);
  - severe tropical storm (48-63 knots; 55-73 mph; 10-11 Bft./Storm);
  - hurricane category 1 (64-83 knots; 74-95 mph; 12 Bft.);
  - hurricane category 2 (84-96 knots; 96-110 mph; 12 Bft.);
  - hurricane category 3 (97-112 knots; 111-130 mph; 12 Bft.);
  - hurricane category 4 (113-134 knots; 131-155 mph; 12 Bft.);
  - hurricane category 5 (>134 knots; >156 mph; 12 Bft.);
- (mph = miles per hour; Bft. = wind force according to Beaufort Scale).

A description of the Beaufort scale is found in [Attachment 1](#).

#### \* NEXT BULLETIN:

Day of the week, date and time of issuance of the next message.

#### \* DISCONTINUATION OF PHASES:

Discontinuation of the phases happens most of the time by means of the final TCB.

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## Examples of Bulletins

### Example of *first* INFORMATION Message:

#### TROPICAL CYCLONE BULLETIN NO 1



METEOROLOGICAL DEPARTMENT CURAÇAO  
MONDAY, JUNE 26, 2018, 17:00 L.T.

#### HURRICANE DUMMY POSES POSSIBLE THREAT TO CURAÇAO

**WATCHES/WARNINGS IN EFFECT:** None at this time (Code Yellow).

A Tropical Storm or Hurricane Watch may go into effect on Wednesday.

**SYNOPSIS:** Tropical Storm became a hurricane earlier today and was located this afternoon well east of Trinidad. With the expected track it is forecast to pass at a distance of less than 100 kilometers north of Curaçao on Friday morning.

#### EFFECT ON LOCAL CONDITIONS:

**Winds:** Tropical storm force winds are possible starting in the evening of Thursday and these may last through the afternoon of Friday.

- Loose outside objects may be turned into dangerous projectiles;
- Strong winds can create unsafe traveling conditions as it affects the ability to steer a car.

**Seas:** Possibly becoming rough during the afternoon of Wednesday and lasting through the morning of Saturday.

- Breakers are likely to damage small craft, if left onshore close to the water line;
- Coastal flooding is expected to cause damage to beach facilities.

**Rainfall:** Periods with occasionally heavy rain and/or thundershowers could start during the afternoon of Thursday and may last through the evening of Friday.

- Heavy rainfall will lead to local flooding and/or landslides over sections of the island;
- Frequent cloud to ground lightning can cause damage to electronic equipment and other items.

Authorities and residents are advised to continue monitoring the further progress of this weather system through our bulletins and to take all necessary measures to safeguard life and property.

#### CENTER'S LATEST AND FORECAST POSITIONS:

DATE/TIME	POSITION	INTENSITY	DISTANCE
20/11:00 L.T.	10.3N 52.2W	Category One Hurricane	1835 km east of Curaçao
22/20:00 L.T.	13.5N 68.5W	Category Four Hurricane	160 km north of Curaçao

**This bulletin is to increase the awareness of the authorities and the general public and to await future bulletins.**

#### NEXT MESSAGE:

Tuesday, June 27, 2018, 11:00 l.t., or sooner if conditions warrant.

END

## Example of Warning Bulletin

### TROPICAL CYCLONE BULLETIN NO 6



**METEOROLOGICAL DEPARTMENT CURAÇAO**  
**WEDNESDAY, JUNE 28, 2018, 11:30 L.T.**

### **HURRICANE DUMMY POSES SERIOUS THREAT THE CURAÇAO**

**WARNINGS:** A Hurricane Warning and a Small Craft Warning (Code Red) are in effect until further notice.

**SYNOPSIS:** Hurricane Dummy is moving toward the west and its center is forecast to pass just north of Curaçao later on Thursday.

#### **EFFECT ON LOCAL CONDITIONS:**

**Winds:** Hurricane force winds are expected starting in the evening of Thursday and these will last through the morning of Friday.

- Loose outside objects may be turned into dangerous projectiles;
- Strong winds can create unsafe traveling conditions as it affects the ability to steer a car;

**Seas:** Becoming very rough during afternoon of Thursday and lasting through the afternoon of Friday.

- Breakers are likely to damage small craft, if left onshore, close to the water line;
- Coastal flooding is expected to cause damage to beach facilities.

**Rainfall:** Periods with occasionally heavy rain and/or thundershowers will start during the afternoon of Thursday and will last through the morning of Saturday.

- Heavy rainfall will lead to local flooding and/or landslides over sections of the island;
- Frequent cloud to ground lightning can cause damage to electronic equipment and other items.

Authorities and residents are urged to complete all necessary measures to safeguard life and property and to continue monitoring the further progress of this weather system through our bulletins.

#### **Definitions:**

**HURRICANE WARNING:** A warning that one or both of the following dangerous effects of a hurricane are expected in a specific area in 36 hours or less: (a) average winds 118 km/h (64 knots) or higher; (b) dangerously high water or a combination of dangerously high water and exceptionally high waves.

A **Small Craft Warning** announces that the sea will get very rough, mainly because of tropical storm or hurricane conditions.

#### **CENTER'S LATEST AND FORECAST POSITIONS:**

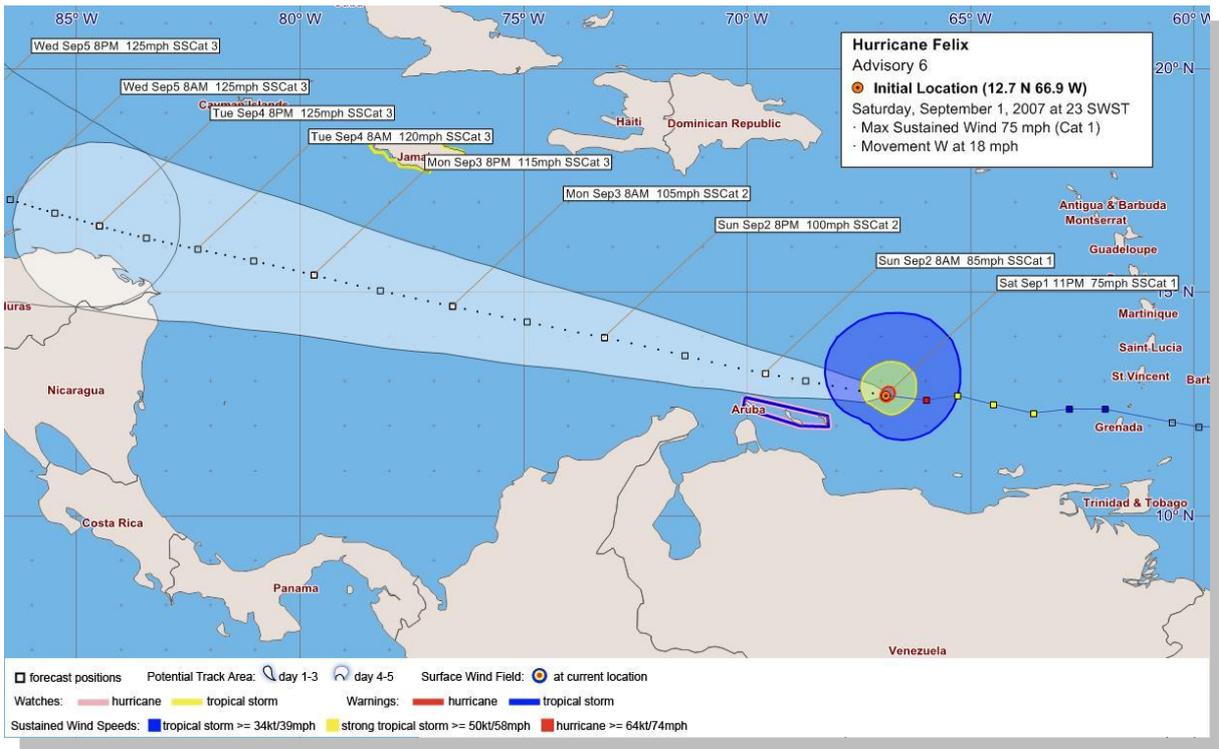
DATE/TIME	POSITION	INTENSITY	DISTANCE
28/11:00 L.T.	12.3N 62.2W	Category Two Hurricane	800 km east of Curaçao
29/14:00 L.T.	12.6N 69.3W	Category Three Hurricane	70 km northwest of Curaçao

**NEXT MESSAGE:** Wednesday, June 28, 15:00 l.t.. or sooner if conditions warrant.

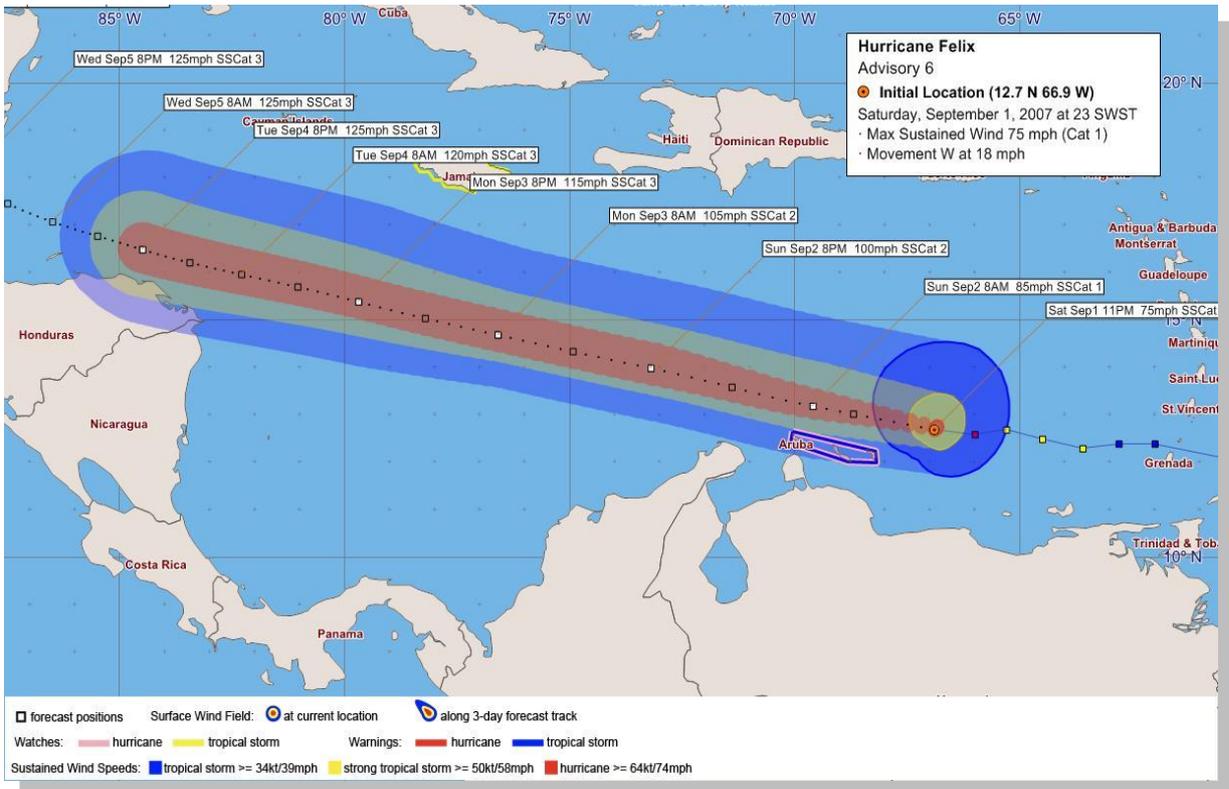
**END**

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# Examples of Track Maps



*Basic Information Map*



*Wind Swath Map*

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