

CLIMATOLOGICAL SUMMARY 2020

&

~ Hurricane Season Review ~

March 2020 Halo



Sept. 2020 Waterspout



June 2020 Saharan Dust



METEOROLOGICAL DEPARTMENT ST. MAARTEN

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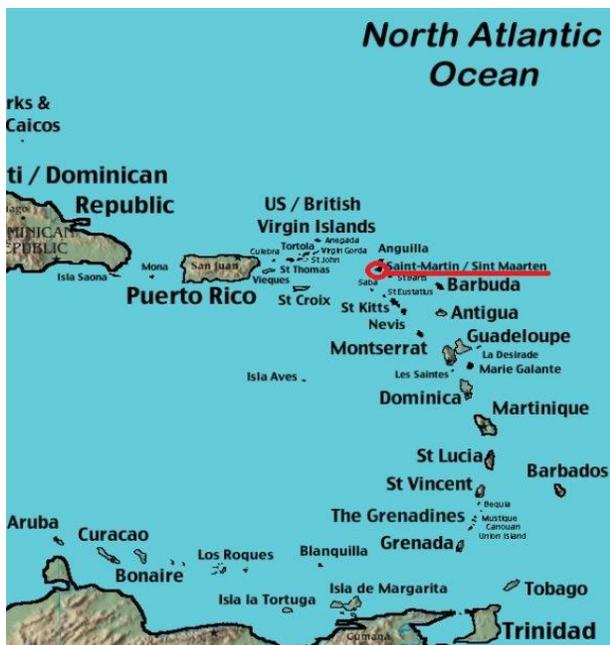
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Introduction

The country of Sint Maarten is located in the extreme northeast section of the Eastern Caribbean. It is part of an island which is approximately 37 square miles shared by two countries: French St. Martin to the north and Dutch Sint Maarten to the south, which occupies 16 square miles. The island is relatively flat but has a central range with various peaks. Pic Paradise on the French side is the highest point (1400ft) on the island while Sentry Hill is the highest point on the Dutch side (1100ft).



The Princess Juliana International Airport (PJIA) is located on the south western strip of Sint Maarten at latitude 18.02° north and longitude 63.06° west.

ISLAND CLIMATOLOGY

Based on records (1981-2010) at Princess Juliana International Airport (PJIA), the normal annual rainfall is approximately 1170mm or 46 inches. Like many other Caribbean islands, the driest months are from January to June while the wettest months are from July to November. December, May and June are considered transition-months since they can be either dry or wet.

The driest month on record is March while the wettest is November. On average, there are about 145 rain days a year with April having the least (8 days) and November the most (15 days). Rainfall during December to April is mainly as a result of old frontal boundaries or shear lines, dipping southwards from the northeast coast of the United States while the rainfall during May and June are often associated with upper-level trough interactions and from July onwards, rainfall is mostly from tropical cyclones.

The normal daily average temperature is 27 °C or 81 °F, the normal maximum and minimum temperatures are 32 °C and 23 °C respectively. August and September are the warmest months while February is the coolest.

On average St. Maarten receives approximately 250 hours of sunshine monthly with 8 to 10 hours daily. The months with the most sunshine hours are March and April and the least hours are recorded in November.



ABOUT US

The Meteorological Department of St. Maarten (MDS) — most commonly referred to as the Met. Office — is a scientific organization that operates 24 hours a day, all year round, monitoring and continuously keeping watch of the weather conditions across the island

OUR MISSION

Our aim is to “Protect life and property through the issuance of timely and appropriate weather products for the adjacent waters, air space and the general public and to provide meteorological, hydrological and seismological related services to specific sectors, in order to sustain social and economic developments.”

OUR VISION

The vision of the Meteorological Department of St. Maarten is to be a leading weather service provider collaborating with stakeholders to deliver services of high quality and accuracy



2020 Hurricane Season Summary

The 2020 Atlantic hurricane season officially ended on November 30. There were thirty (30) named storms, of which thirteen (13) became hurricanes including six (6) major hurricanes. This was the most storms ever recorded in a single season; 2020 exceeded the 28 storms formed in 2005 and produced the second highest number of hurricanes on record. The 2020 season started way before June 1st and broke many records.

The season produced nine named storms from May through July. Activity maximized further, quickly exhausting the 2020 Atlantic storms list by September 18. The Greek Alphabet had to be used for the rest of the season for the second time in history. The 2020 season was the fifth consecutive year with above-normal hurricane seasons.

This activity was attributed to the Atlantic Multi-Decadal Oscillation (AMO) – which began in 1995 that has favored more, stronger, and longer-lasting storms. Atmospheric and oceanic conditions linked to the AMO such as warm sea surface temperatures, weak vertical wind shear combined with La Nina, contributed in making this extremely active record-breaking season possible.

The 2020 Atlantic Hurricane season may have officially ended, however it is still possible for storms to form outside the season. Therefore, we must remain vigilant and prepared to take the necessary action when called upon. Monitor weather information from credible sources and remember it does not have to be a storm or hurricane; heavy rainfall events can also have significant impacts on our lives.

Cyclone Statistics for 2020 Season.

	NORMAL	NOAA'S PREDICTION	ACTUAL
NAMED STORMS	12	19-25	30
HURRICANES	6	7-11	13
MAJOR HURRICANES	3	3-6	6

Local Weather Effects

The 2020 Atlantic Hurricane season had no significant impact on the island. A tropical storm warning was issued for St. Maarten with the approach of Potential Tropical Cyclone #9 (PTC#9) on July 28. The system intensified to Tropical Storm Isaias on the 29th and a hurricane on the 30th. The tropical storm warning was discontinued on the 30th after the system passed approximately 160 miles southwest of St. Maarten. Rainfall recorded as a result of the passage of this system was 42.6mm/1.8 inches and the highest gust measured was 44kts/51mph.

On August 20th, a tropical storm watch was issued for Tropical Depression #13 and was later upgraded to a warning the following day as the depression had intensified to Tropical Storm Laura. Tropical storm Laura passed approximately 80 miles south-southwest of St. Maarten on the 21st. Rainfall recorded was 51mm/2 inches and the highest gust recorded was 33kts/38mph. The warning was then, discontinued on the 22.

Other notable weather impacts occurred in 2020:

Drought

From April temperatures became increasingly uncomfortable with very little rainfall. May was the driest May on record and was the warmest May in over 20 years. Severe bush fires occurred in late April posing a threat to homes, destroying over 177,000 square meters of vegetation and affecting several wildlife species according to the Nature Foundation.



In May, there was also a major fish die-off in the channel between the Great Salt Pond and Fresh Pond in Phillipsburg. The Nature Foundation cited that one of the possible causes was the dry weather and heat the island had been experiencing.



During the week of June 21, 2020 a thick plume of Saharan dust enveloped the Eastern Caribbean. St. Maarten experienced the worst of the effects on June 22nd with very low visibility and hazy skies. Visibility at the Princess Juliana International Airport was reduced to 4km on the 22. Persons with respiratory illnesses were advised to stay indoors.

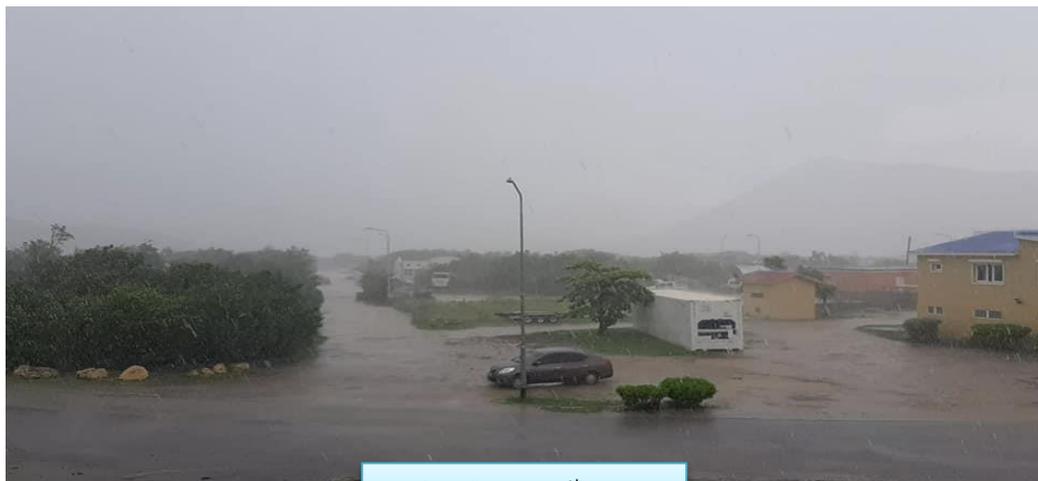


Heat waves

The Caribbean hot season is from June to October. Normally during this period St. Maarten experiences about 45 hot days (days with Max. temp. above 32.2°C/90°F). In 2020, there were 77 hot days during that period; this was more than 170% above-normal. There were 16 heat wave periods; a heat wave period is 2 or more consecutive days when the maximum temperature is above 32.2°C (90°F). The longest heat wave was ten (10) days from August 11 to 20. June 2020 was the warmest June in 25 years. There were 23 hot days in August the highest in any single month. September 2020 was the warmest September in 33 years and with a maximum temperature of 34.2°C (94°F) recorded on September 24th, this was the highest daytime high since 1991.

Flooding

Minor flooding was reported when the rains came during the latter part of the year. October was the wettest month of 2020 with 21 rainy days. The wettest day of the year was October 16th when 71.7mm/ 2.8 inches of rainfall was recorded.



Night of Oct. 16th 2020.



Summary Table

Below is a recap of the 2020 Atlantic Hurricane Season and associated effects on St. Maarten.

	Storm Name	Active Dates	Highest Category	Min. Pressure (mbar)	Max. Winds		Local Effects	Observed Rainfall (mm)	Observed Winds Gusts	
					Kt.	Mph			Kt.	Mph
1	Arthur	May 16-19	TS	990	50	58		-	-	-
2	Bertha	May 27-28	TS	1005	45	52		-	-	-
3	Cristobal	Jun. 2-9	TS	990	45	52		-	-	-
4	Dolly	Jun. 22-24	TS	1000	40	46		-	-	-
5	Edouard	Jul. 4-6	TS	*	39	45		-	-	-
6	Fay	Jul. 9-11	TS	*	52	60		-	-	-
7	Gonzalo	Jul. 21-25	TS	997	55	63		-	-	-
8	Hanna	Jul. 23-27	Cat. 1	973	80	92		-	-	-
9	Isaias	Jul. 31- Aug. 5	Cat. 1	*	74	85	Minor	46.2	44	51
	TD10	Jul. 31-Aug. 1	TD	1008	30	35				
10	Josephine	Aug. 11-16	TS	1004	40	46		-	-	-
11	Kyle	Aug. 14-16	TS	*	43	50		-	-	-
12	Laura	Aug. 20-28	Cat. 4	*	130	150	Minor	51.0	33	38
13	Marco	Aug. 20-25	Cat. 1	*	65	75				
14	Nana	Sept. 1-3	Cat. 1	994	65	75		-	-	-
15	Omar	Aug. 31-Sept.5	TS	1003	35	40		-	-	-
16	Paulette	Sept. 7-22	Cat. 2	*	91	105		-	-	-
17	Rene	Sept. 7-14	TS	1001	40	50		-	-	-
18	Sally	Sept. 11-17	Cat. 2	*	91	105		-	-	-
19	Teddy	Sept. 11-22	Cat. 4	*	121	140		-	-	-
20	Vicky	Sept. 14-17	TS	*	43	50		-	-	-
21	Wilfred	Sept. 17-21	TS	1006	35	40		-	-	-

* denotes NOAA analysis is incomplete'

Named Storms from Greek Alphabet

	Storm Name	Active Dates	Highest Category	Min. Pressure (mbar)	Max. Winds		Local Effects	Observed Rainfall (mm)	Observed Winds Gusts	
					Kt.	Mph			Kt.	Mph
22	Alpha	Sept. 17-19	STS	996	45	52		-	-	-
23	Beta	Sept. 18-22	TS	*	52	60		-	-	-
24	Gamma	Oct. 2-5	TS	*	61	70		-	-	-
25	Delta	Oct. 4-10	Cat. 4	*	126	145		-	-	-
26	Epsilon	Oct. 19-26	Cat. 3	*	100	115		-	-	-
27	Zeta	Oct. 24-29	Cat. 2	*	96	110		-	-	-
28	Eta	Oct. 31- Nov. 13	Cat. 4	*	130	150		-	-	-
29	Theta	Nov. 10-15	TS	*	61	70		-	-	-
30	Iota	Nov. 13-18	Cat. 5	*	139	160		-	-	-

* denotes NOAA analysis is incomplete'

Overview of the Storms formed in the 2020 Hurricane Season

May 2020

The month of May produced two (2) named storms well in advance of the June 1st official start of the season. Tropical Storm **Arthur** formed on May 16 east of Florida and Tropical Storm Bertha formed just off the southeast coast of the U.S on May 27. **Bertha** made landfall in South Carolina.

June 2020

Tropical Storm **Cristobal** formed on June 2nd in the Gulf of Mexico and Tropical Storm **Dolly** formed on June 23 in the north Atlantic and remained over water.

July 2020

July was a very busy month producing five (5) named storms two (2) of which became hurricanes. Tropical Storm **Edouard** formed on July 5th in the north Atlantic and remained over ocean. On July 9th, Tropical Storm **Fay** formed near the east coast of the U.S and made landfall in New Jersey. On July 21st, Tropical Storm **Gonzalo** formed over the central Atlantic and made landfall in Trinidad on July 25th. Tropical Storm **Hanna** formed on July 23rd in the Gulf of Mexico, became a hurricane on the 25th, and made landfall in Texas. Tropical Storm **Isaias** formed on the 29 in the Caribbean Seas and became a hurricane on July 30th in the western Atlantic. On the final day of July, Tropical Depression #10 formed but was a short-lived depression that stayed over the far eastern Atlantic Ocean.

August 2020

August 2020 produced four (4) named storms two became hurricanes. Tropical Storm **Josephine** formed on August 13 in the central Atlantic and Tropical Storm **Kyle** formed over the northwest Atlantic on 14 August. Tropical Storm **Laura** formed on August 21 east of the Leeward Islands and became a hurricane in the Gulf of Mexico on the 25th. Laura was the first major hurricane of the season. On August 21st, Tropical Storm **Marco** formed northwest of the Caribbean Sea and intensified to a hurricane in the Gulf of Mexico on the 25th.

September 2020

The month of September produced a record-breaking ten (10) named storms with four becoming hurricanes. Tropical Storm **Nana** formed on September 1st in the Caribbean Sea and became a hurricane the following day. Tropical Storm **Omar** formed in the northwest Atlantic on September 1st and remained over the Atlantic Ocean. On September 7th, two storms formed **Paulette** in the central Atlantic and **Rene** in the eastern Atlantic. Paulette became a hurricane on September 12th in the northwest Atlantic. Tropical Storm **Sally** formed on September 12th in the Gulf of Mexico and became a hurricane on September 14th. Tropical storms **Teddy** and **Vicky** formed on September 14th in the central and eastern Atlantic respectfully. Teddy became a hurricane on the 16th and later became a major hurricane. On September 18th, three (3) tropical storms formed exhausting the 2020 list of names, which lead to the use of the Greek alphabet for future names. Tropical Storm **Wilfred** and **Alpha** formed in the eastern Atlantic while tropical storm **Beta** formed in the Gulf of Mexico.

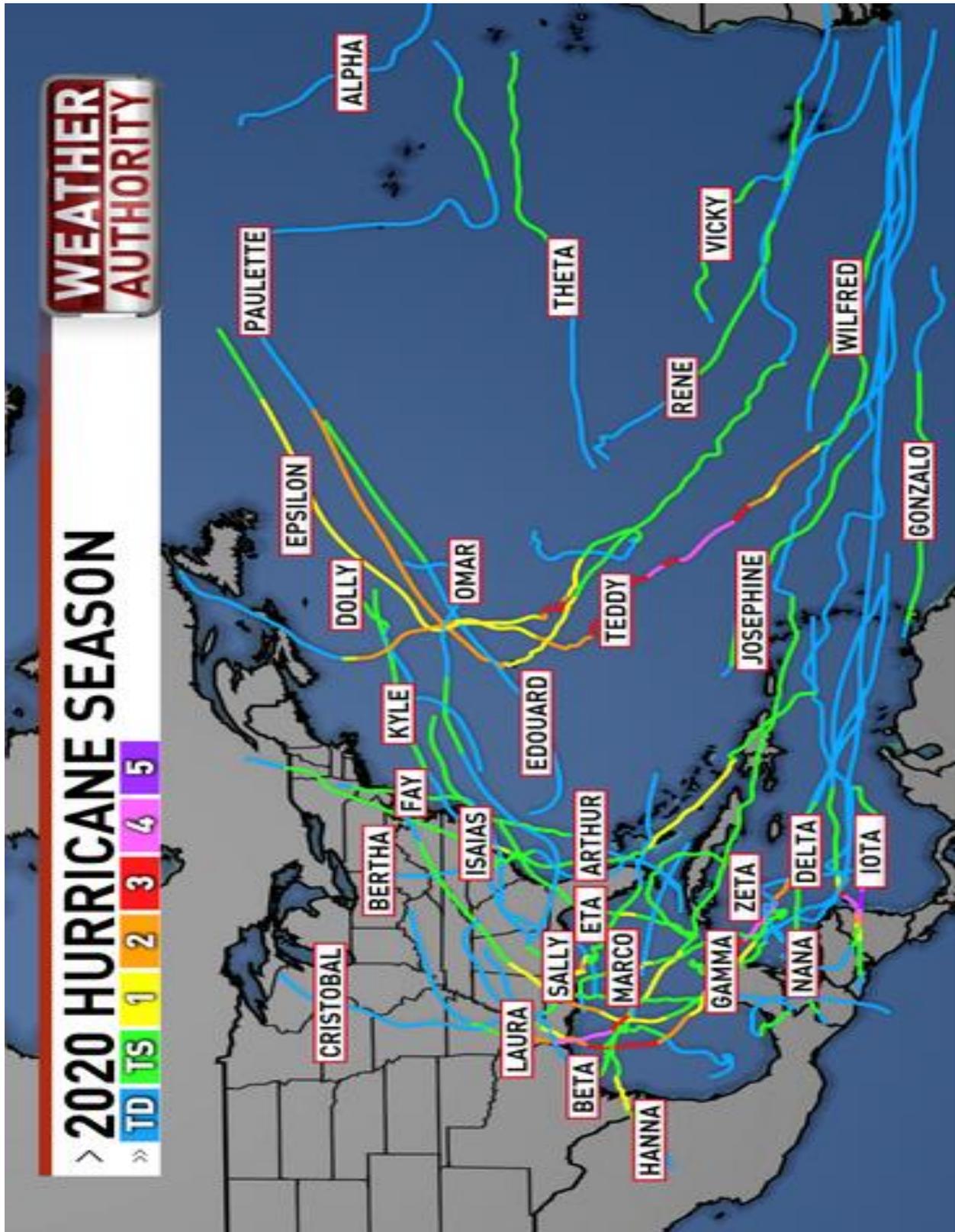
October 2020

Tropical Storm **Gamma** formed on October 2nd in the western Caribbean Sea. Tropical Storm **Delta** also formed in the western Caribbean on October 5th and became a hurricane on the same day. Delta intensified to a major hurricane thereafter. Tropical Storm **Epsilon** formed on October 19th in the north Atlantic and became a hurricane the following day. **Zeta** formed on October 25th and became a hurricane the following day in the western Caribbean Sea. On October 31st, tropical storm **Eta** formed in the western Caribbean Sea, became a hurricane on November 2nd and then intensified to a major hurricane.

November 2020

The month of November produced two (2) named storms. Tropical storm **Theta** formed on November 10th in the northeast Atlantic and Tropical Storm **Iota** formed on November 13th in the Caribbean Sea, became a hurricane on the 15th and went on to become a major hurricane.

2020 Atlantic Hurricane Season Storm Track

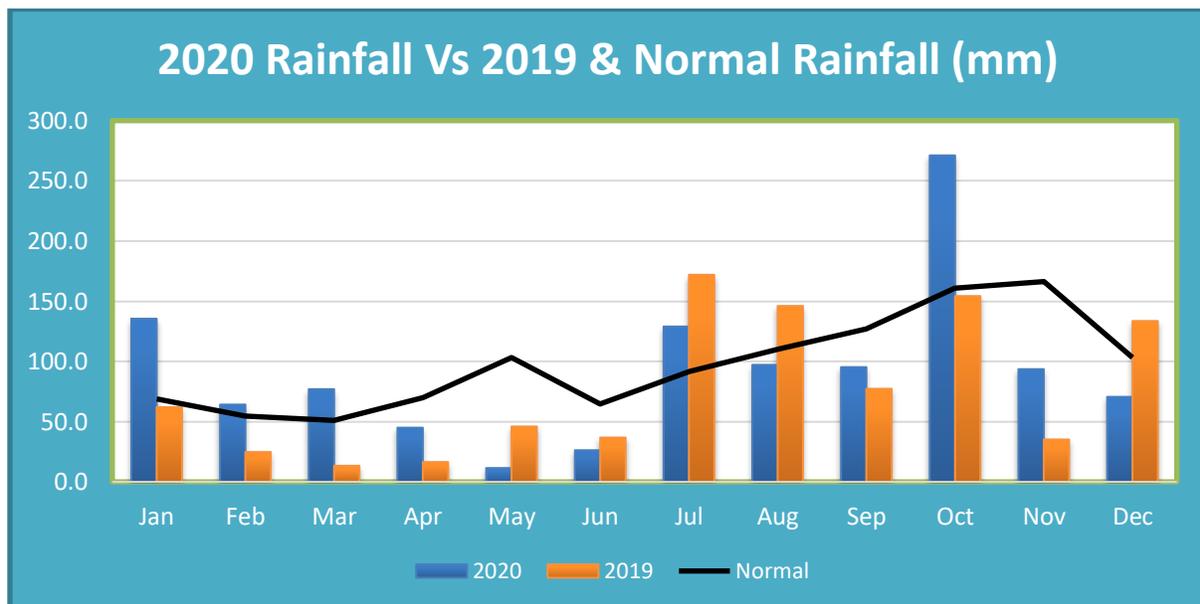


2020 Climate Data

Rainfall

The total rainfall recorded at the Princess Juliana International Airport, for the year 2020 was **1116.3 mm or 43.9 inches**. The normal annual rainfall ranges from about 1026–1274 mm/40 – 50 inches (1981–2010). This year's total rainfall was below the normal range by approximately 5%. The year 2020 was slightly wetter than 2019.

Fig. 1

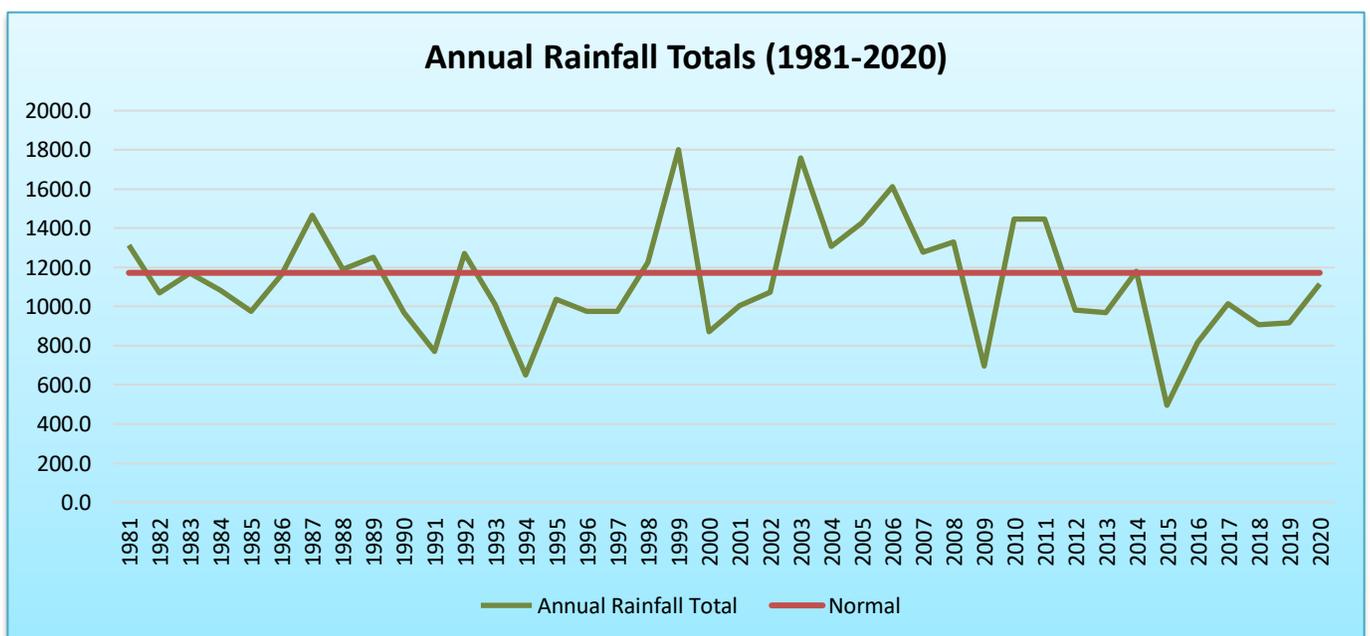
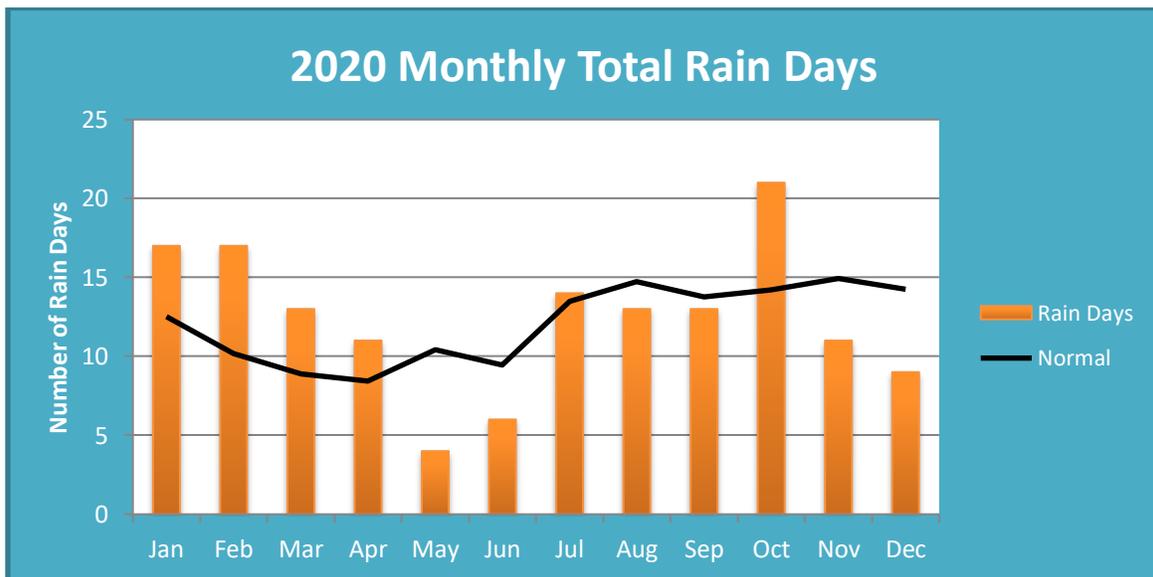


October was the *wettest month* of the year, with a total of 271.1 mm or 10.7 inches. The *driest month* was **May** with 11.5 mm or 0.5 inches. The *wettest day* of the year was **October 16th**, when 71.7 mm or 2.8 inches was recorded as a result of the passage of a tropical wave across the region.

A rain day is considered as any day, which records 1.0 mm or more of rainfall. Normally there are approximately 145 rain days in a year on St. Maarten. For 2020, 149 rain days were recorded with the month of October having the most (21 days), the highest for any October on record.

May 2020 was the driest May since 1974 and also had the lowest number of rain days (4 days) for that month since 1999. January 2020 was the wettest January since 2006 while October 2020 was the wettest October since 2010.

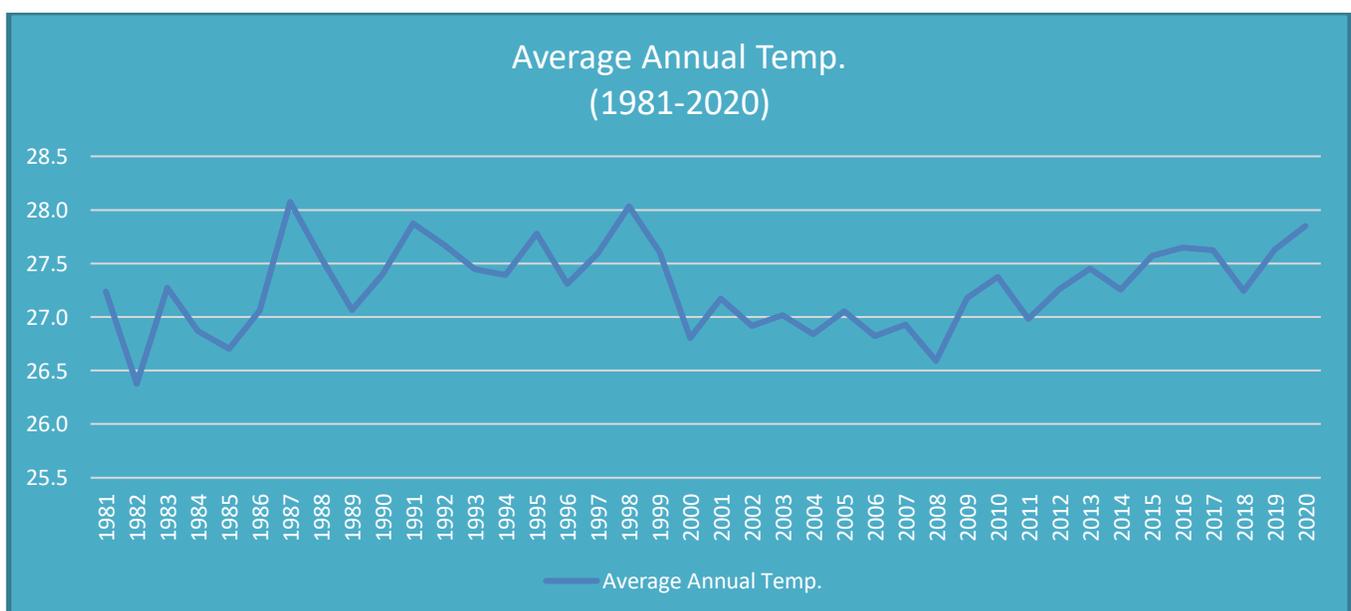
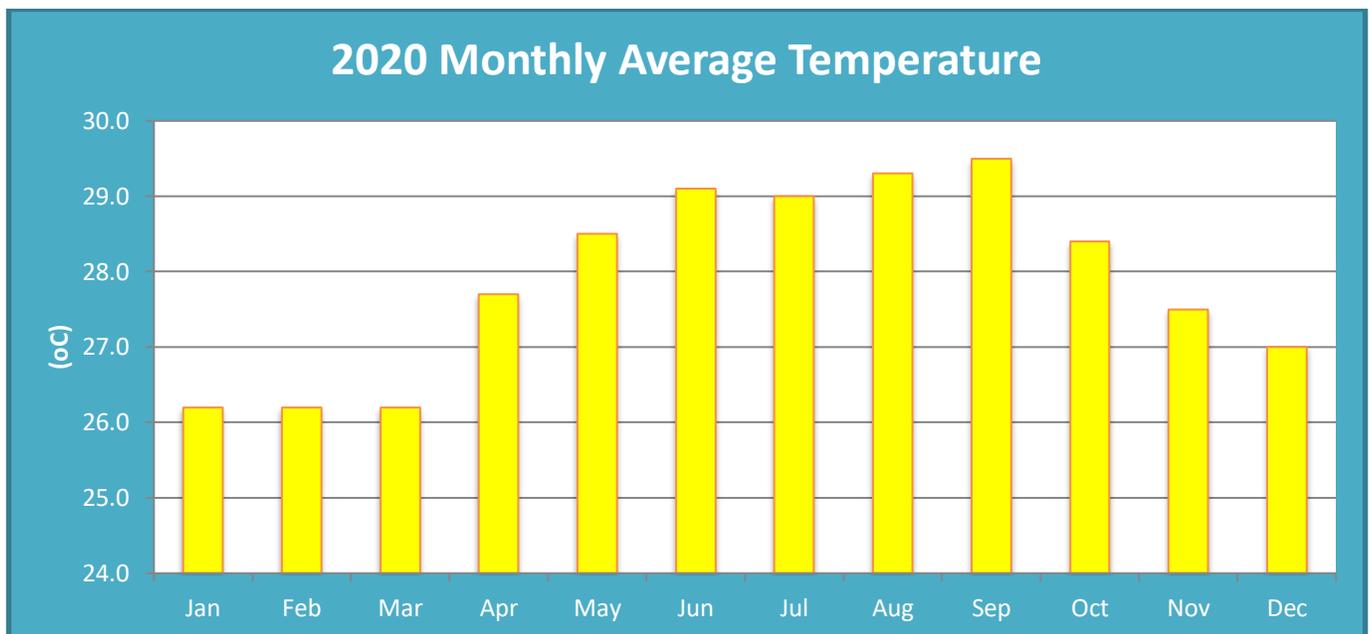
Fig. 2



Temperature

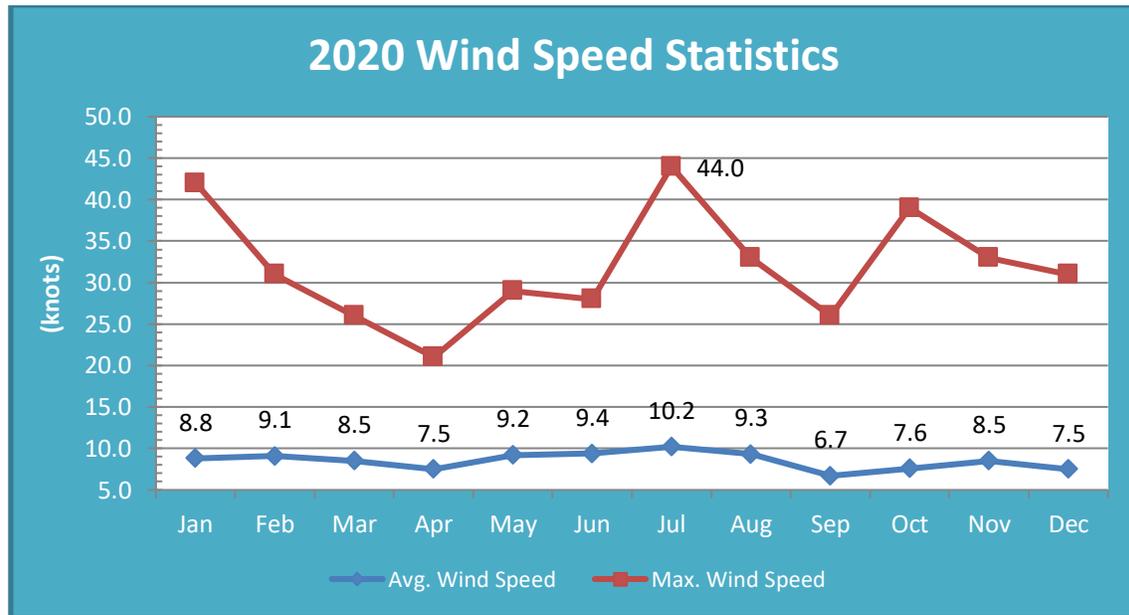
The average temperature recorded in 2020 was **27.9° C (82° F)** which was slightly above-normal. The 30-year normal (1981–2010) is 27.2° C. **September** was the warmest month with an average temperature of 29.5° C (85° F) while **January, February and March** tied for the coolest month with an average temperature of 26.2° C (79° F). 2020 was warmer than 2019 on average and the warmest in the past 22 years.

The highest daytime *temperature* recorded in 2020 was **34.2° C (94° F)** which was recorded on September 24th while the lowest night-time *temperature* was recorded on January 14th as **21.2° C (70° F)**.



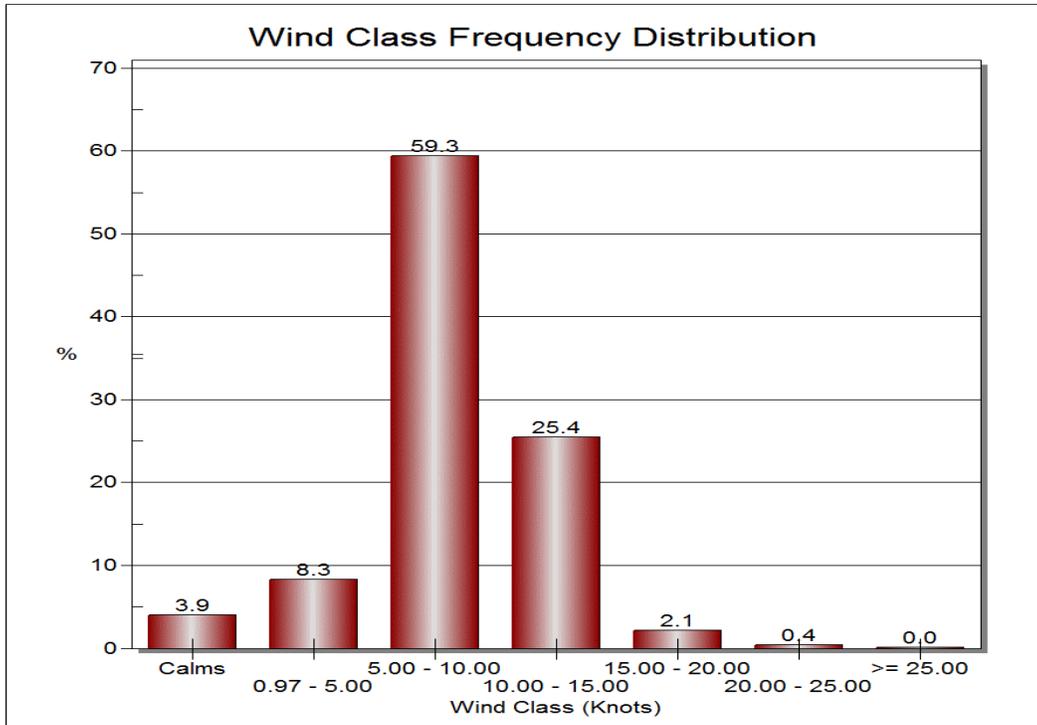
Wind

Surface winds at the Princess Juliana International Airport for 2020 were generally from the east at an average speed of **8.5 knots** (10 mph) which was slightly below average compared to the 30-year average (1981–2010). The *highest monthly average wind speeds were recorded in July* as 10 knots (13 mph); while **September** had the *lowest monthly average wind speeds* at 7 knots (8 mph). The highest wind gust was recorded on July 29th as **44 knots** (51 mph)

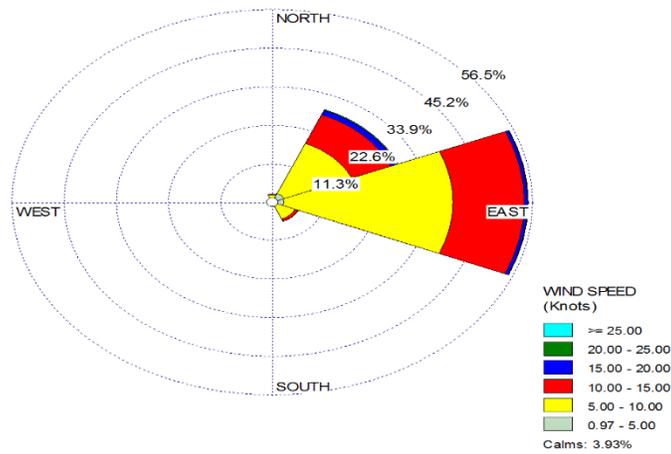


This following wind analysis was obtained, by using the average hourly wind speeds and direction from 1st January to 31st December 2020.

- Approximately 59% of the time, wind speeds at Juliana were between 5 and 10 knots.
- Approximately 25% of the time, wind speeds were between 10 and 15 knots.
- Approximately 8% of the time, wind speeds were between 1 and 5 knots.
- Approximately 4% of the time, winds speeds were calm.
- Approximately 2% of the time, winds speeds were between 20 and 25 knots.
- Approximately 1% of the time, winds speeds were greater than 20 knots.



2020 Wind Rose



55% of the time winds came from the **East**.

30% of the time winds came from the **Northeast**.

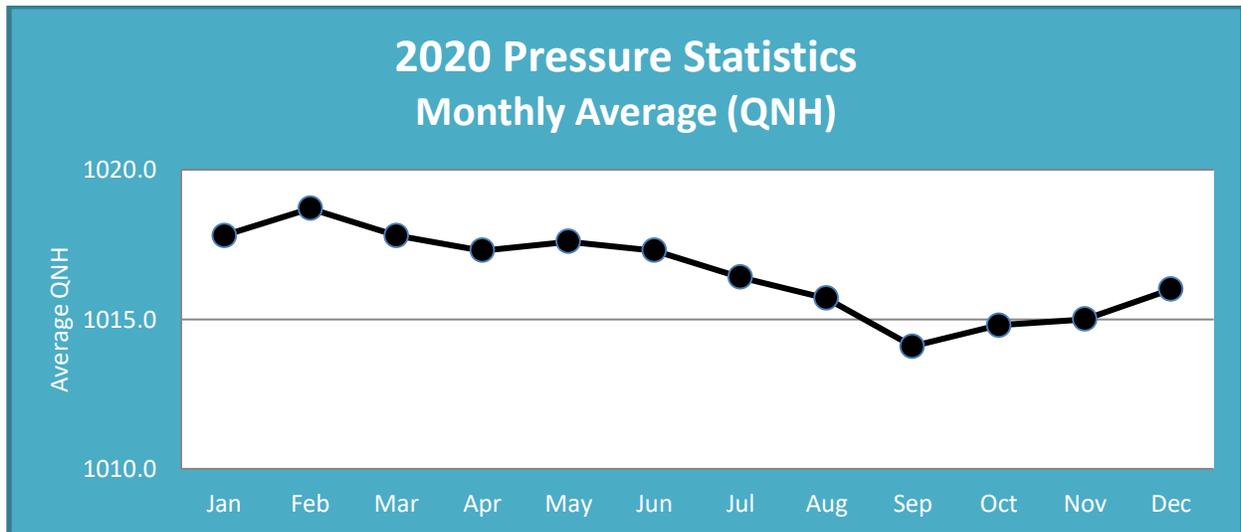
6% of the time winds came from **Southeast**.

4% of the time winds were calm.

Winds came from other directions **5%** of the time or less.

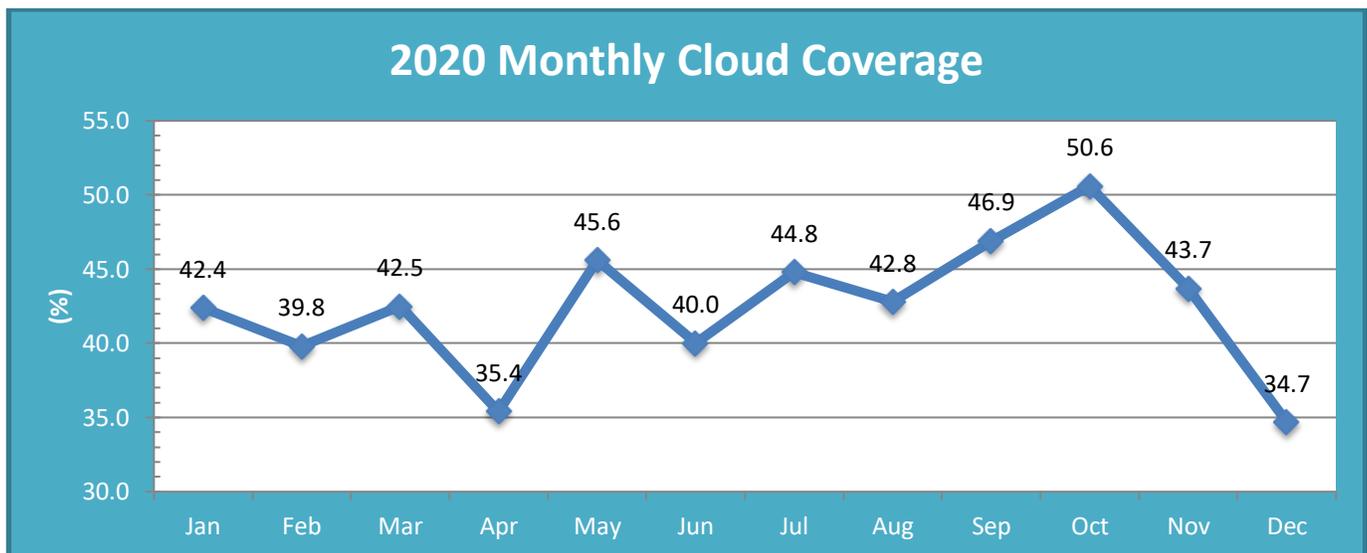
Air Pressure

At the Princess Juliana International Airport, on average the mean sea-level Pressure for 2020 was **1016.5 millibars**. The highest daily average was recorded on January 12th as **1021.7 mb** while the lowest daily average of 1010.4 mb occurred on October 19th.



Cloud Cover

The average cloud cover for St. Maarten over the past year as recorded at the Princess Juliana International Airport was about 42.4%. The *highest monthly average cloud cover* was 50.6% during the month of October while December had the *lowest value* of 34.7%; this was the lowest for the month of December since 1997.

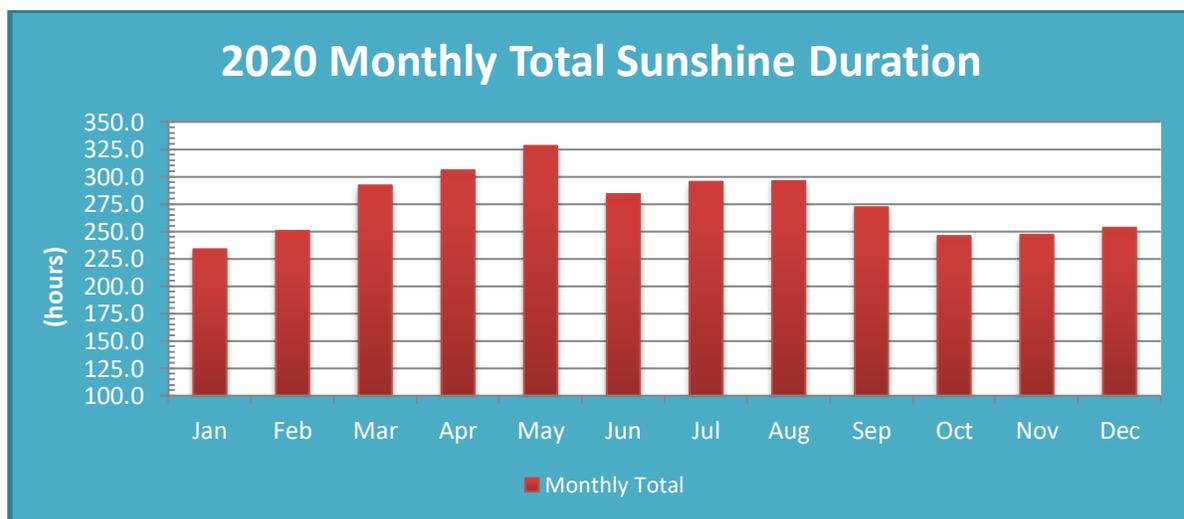
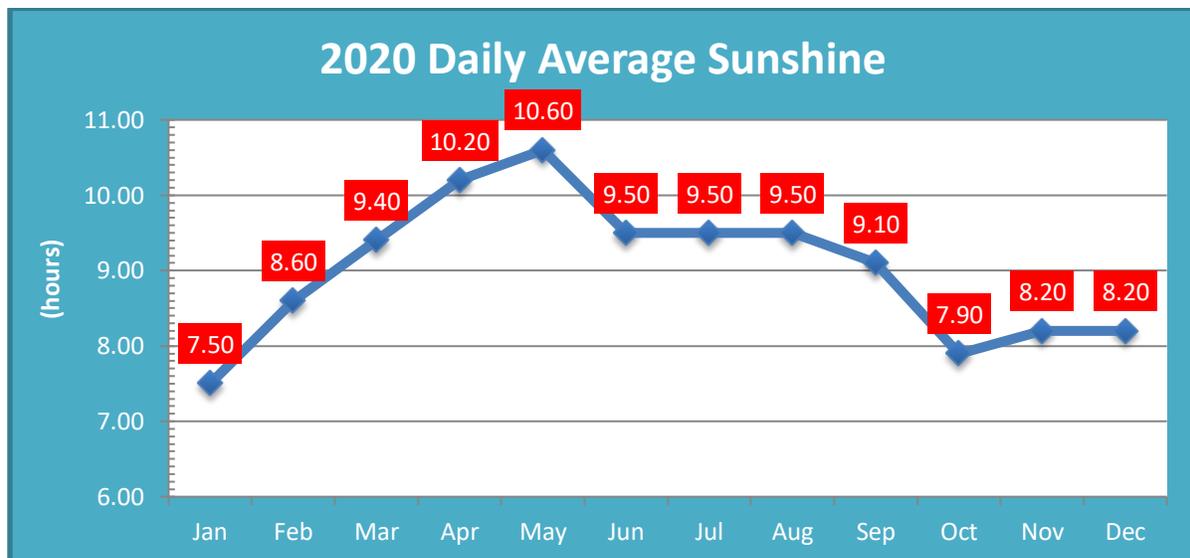


Sunshine Duration

Approximately 74% of possible sunshine was recorded at the surface at the Princess Juliana International Airport, that is, 3303.7 hours out of a possible 4443.1 hours. The *average daily sunshine duration* was **9 hours 12 minutes**.

May received the most hours of sunshine in 2020 and was the month with the highest daily average sunshine: 10 hours and 36 minutes. **January** received the least sunshine and was the month with the lowest daily average: 7 hours 30 minutes.

Maximum daily sunshine hours were recorded on **June 13th** as 12 hours 06 mins. There was only one (1) day in 2020 when no sunshine was recorded due to overcast conditions: **November 10th**.



Statistical Summary

Below is a recap of the 2020 climate data, in terms of averages, extremes, and totals:

Rainfall		
Total Rainfall for the year	1116.3 mm	43.9 inches
Wettest Month	271.1 mm/10.7 in	October
Driest Month	11.5 mm/0.5 in	May
24-hr Maximum Rainfall	71.7 mm/2.8 in	October 16 th
Number of Rain Days (with 1.0+ mm)	149 days	
Number of Heavy Rain Days (with 10.0+mm)	35 days	
Temperature		
Average Air Temperature	27.9° C	82° F
Absolute Maximum Temperature	34.2° C/ 94° F	September 24 th
Absolute Minimum Temperature	21.2° C/ 70° F	January 14 th
Warmest Month	29.5° C/85° F	September
Coollest Months	26.2° C/79° F	Jan/Feb/ Mar.
Average Relative Humidity	73%	
Wind & Pressure		
Average Wind Speed	9.0 knots	10 mph
Average wind Direction	90 degrees	East
Maximum Wind Gust	July 26 th	44 kts /51 mph
Most frequent category speed	5-10 knots	56%
Average Air Pressure	1016.5 mb.	
Clouds & Sunshine		
Average Cloud Coverage	42.4%	
Average Daily Sunshine Duration	9 hours : 00 minutes	
Month: Maximum Sunshine	May	
Month: Minimum Sunshine	January	
Daily Maximum Sunshine	12 hrs. 06 min.	Jun. 13 th
Daily Minimum Sunshine	0 hrs. 00 min.	Nov. 10 th

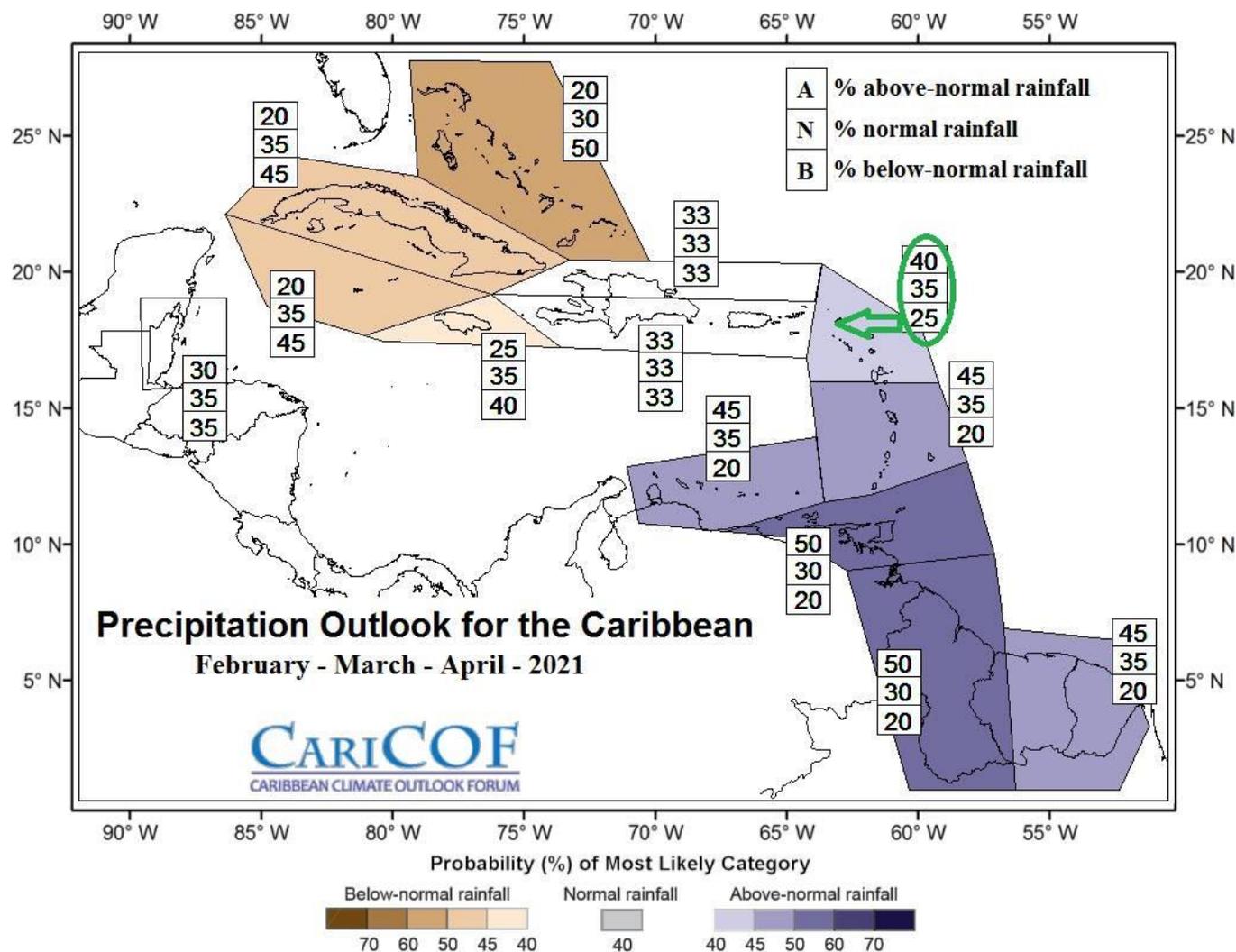
Conclusion

This report provides a summary of all the meteorological data recorded at the Princess Juliana International Airport during the year 2020. The data was collected from various meteorological parameters under regulations stipulated by the World Meteorological Organization (WMO). These elements include rainfall, relative humidity, atmospheric pressure, wind speed and direction, cloud cover and sunshine duration among others.

The Meteorological Department St. Maarten (MDS) records and compiles climatological data for use in research in a number of fields and institutions. Records go as far back as the 1950's in certain parameters. Requests for data must be put in writing through the Department Head.

Outlook for 2021

Rainfall Outlook for Feb-Mar-Apr. 2021



Map compliments: CARICOF: [Caribbean Institute for Meteorology & Hydrology](#)

Rainfall for the next three (3) months Feb-Mar-Apr 2021 is expected to be the usual or wetter for St. Maarten and most of the east Caribbean but drier than usual in the western Caribbean.

Normal rainfall for this season ranges between 148–179 mm or 6-7 inches. Based on historical data, the current state of the weather and some subjective input, the rainfall forecast for the next three (3) months in St. Maarten is as follows: a **25%** chance of being **below Normal** (less than 148 mm); a **35%** chance of being **Near Normal** (between 148 mm and 179 mm); and a **40%** chance of being **Above Normal** (more than 179 mm).

Note that the green arrow points to St. Maarten and the forecast probabilities are circled in green on the map above.

List of Tropical Cyclone for the 2021 Atlantic Hurricane Season

ANA	HENRI	ODETTE
BILL	IDA	PETER
CLAUDETTE	JULIAN	ROSE
DANNY	KATE	SAM
ELSA	LARRY	TERESA
FRED	MINDY	VICTOR
GRACE	NICHOLAS	WANDA

BE PREPARED!!!

BE ALERT!!!

BE READY!!!

Be reminded that it only takes one storm to impact our island to make it an active season for us. Therefore, everyone should prepare for every season, regardless of how much activity is predicted.

Appendix

Stages of Tropical Cyclone Development

Below are the decisive factors (criteria) for the various development stages for tropical cyclones:

Stage	Criteria
<i>Tropical disturbance</i>	A discrete system of clouds, showers, and thunderstorms that originates in the tropics and maintains its identity for 24 hours or more.
<i>Tropical wave</i>	A type of trough of low pressure or tropical disturbance that moves generally from east to west, typically embedded in the tropical easterlies. They are also sometimes called easterly waves.
<i>Tropical Depression</i>	A tropical disturbance that has developed a closed circulation (counterclockwise winds blowing around a center of low pressure in the Northern Hemisphere). Tropical depressions contain maximum sustained (1-minute) winds of 38 mph (62 km/h or 33 knots) or less.
<i>Tropical Storm</i>	A well-organized warm-core tropical cyclone that has maximum sustained (1-minute) winds of 39-73 mph (63-118 km/h or 34-63 knots). Once a system reaches tropical storm status, it is given a name by the National Hurricane Center (located in Miami, Florida).
<i>Hurricane</i>	A warm-core tropical cyclone that has maximum sustained (1-minute) winds of at least 74 mph (119 km/h or 64 knots). Hurricanes are categorized by the Saffir-Simpson Scale. (<i>see next page</i>)
<i>Extra-tropical Cyclone</i>	A cyclone that is no longer tropical in origin, which usually means the system moves away from the tropics and moves toward the poles. An extra-tropical cyclone has no wind speed criteria and may exceed hurricane force.
<i>Subtropical Cyclone</i>	A closed circulation, low-pressure system that has characteristics of both tropical and extra-tropical cyclones. Subtropical cyclones typically have a radius of maximum winds occurring relatively far from the center (usually more than 60 nautical miles), and generally have a less symmetric wind field and distribution of convection (clouds and thunderstorms).
<i>Post-tropical Cyclone</i>	A former tropical cyclone that no longer possesses sufficient tropical characteristics to be considered a tropical cyclone. Post-tropical cyclones can, however, continue carrying heavy rains and high winds.

Saffir-Simpson Hurricane Scale

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage.

	Category	Max. Sustained Winds			Effects
		mph	km/h	knots	
	1	74 - 95	119 - 153	64 - 82	Minimal Damage
	2	96 - 110	154 - 177	83 - 95	Moderate Damage
Major	3	111 - 129	178 - 208	96 - 112	Extensive Damage
	4	130 - 156	209 - 251	113 - 136	Extreme Damage
	5	157+	252+	137+	Catastrophic Damage

Watches & Warnings

Tropical Storm Watch

Issued when tropical storm conditions (sustained winds of 39-73mph, 63-118 km/h, or 34-63 knots) are possible within the specified area within the next 48 hours (2 days).

Tropical Storm Warning

Issued when tropical storm conditions (sustained winds of 39-73mph, 63-118 km/h, or 34-63 knots) are expected somewhere within the specified area within the next 36 hours (1.5 days).

Hurricane Watch

Issued when hurricane conditions (sustained winds of 74+ mph, 119+ km/h, or 64+ knots) are possible within the specified area within the next 48 hours (2 days).

Hurricane Warning

Issued when hurricane conditions (sustained winds of 74+ mph, 119+ km/h, or 64+ knots) are expected within the specified area within the next 36 hours (1.5 days).

Note: Hurricane preparedness activities become difficult once winds reach tropical storm force, therefore, hurricane watches & warnings are issued well in advance of the anticipated onset of tropical-storm-force winds.

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