ARUBA

CLIMATOLOGICAL SUMMARY 2015

PRECIPITATION

The total amount of rainfall recorded at Reina Beatrix International Airport for the year 2015 was **134.2** mm. This is **71.5 %** below normal (Figure 1).

During the first quarter of the year 2015 (January, February, March) a total of **43.8** mm of rainfall was recorded. This is **32.6%** of the total amount for 2015.

During the second quarter of the year 2015 (April, May, June) a total of **6.8** mm of rainfall was recorded. This is **5.1%** of the total amount for 2015.

During the third quarter of the year 2015 (July, August, September) a total of **36.2** mm of rainfall was recorded. This is **27.0%** of the total amount for 2015.

During the fourth quarter of the year 2015 (October, November, December) a total of **47.4** mm of rainfall was recorded. This is **35.3%** of the total amount for 2015.

The last quarter of the year 2015 which is part of the rainy season was the *wettest* quarter. But the total amount of rain for that quarter was still below normal values.

The *wettest* month for 2015 was July with a total of **33.8** mm which was just above normal values for that month. The *driest* month for 2015 was May with a total of **0.0** mm which is below normal for that month.

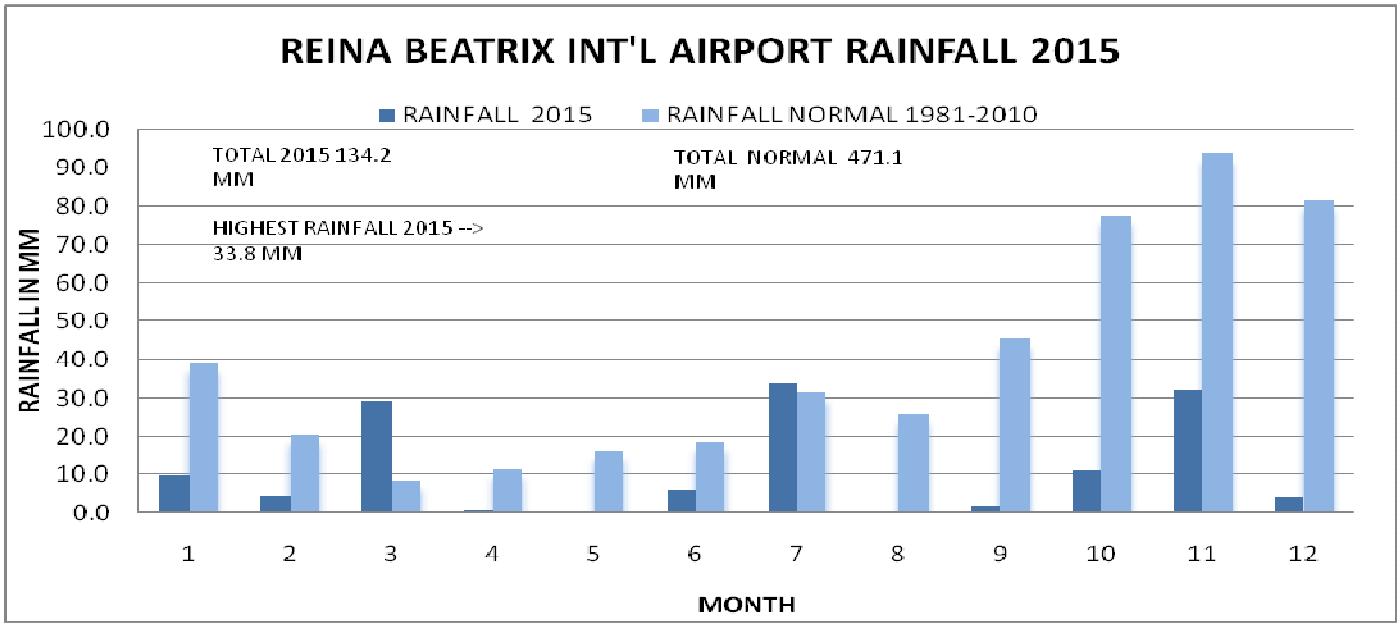


Figure 1. Rainfall 2015 versus 30 year normal (1981-2010) in mm.

TEMPERATURE

The year average air temperature recorded at the Reina Beatrix International Airport Aruba for 2015 was 28.6 ºC (normal value 28.1 ºC), which is a tab above normal. (Figure 2a).

September 2015 with an average of 30.2 ºC, October 2015 with an average of 29.8 ºC, August 2015 with an average of 29.4 ºC and November 2015 with an average of 28.9 ºC, appear to be the warmest months of the year 2015.

The *warmest* month of 2015 was September with an average of **30.2** ºC and the *coldest* month of 2015 was January with an average of **27.5** ºC.

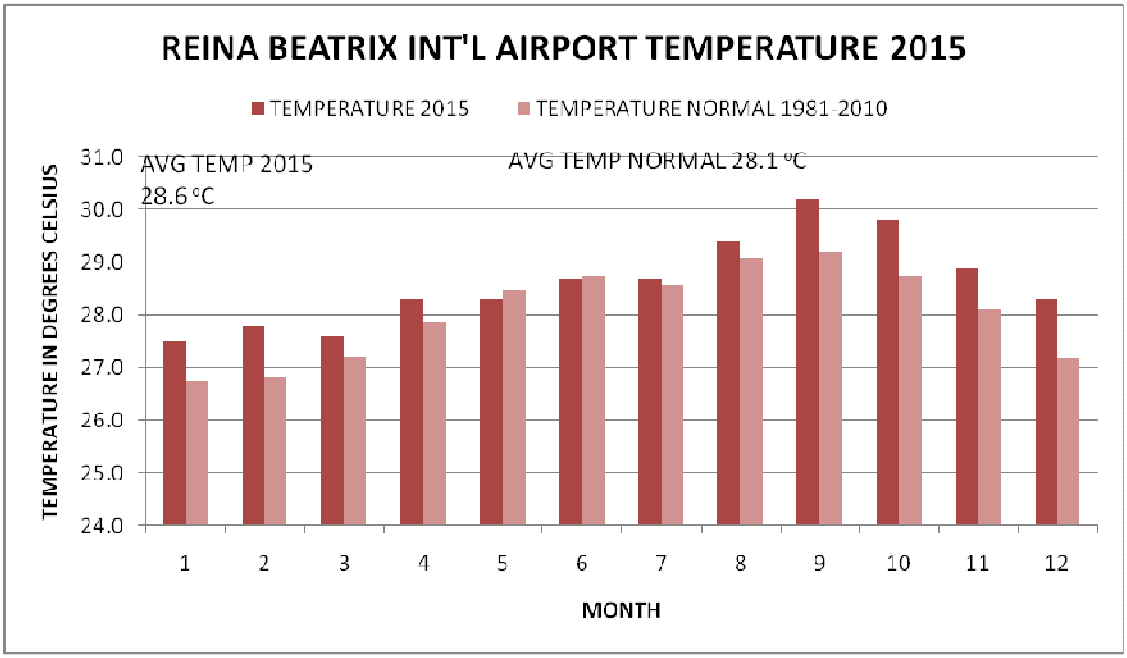


Figure 2a. Temperatures in degrees Celsius 2015

The average maximum temperature for the year 2015 was 32.2 ºC compared with the normal average maximum temperature 31.5 ºC which is just a tab above normal. (Figure 2b).

The *absolute* maximum temperature was in August and October 2015 with **35.3** ºC and the *absolute* minimum temperature recorded was **22.8** ºC in February 2015.

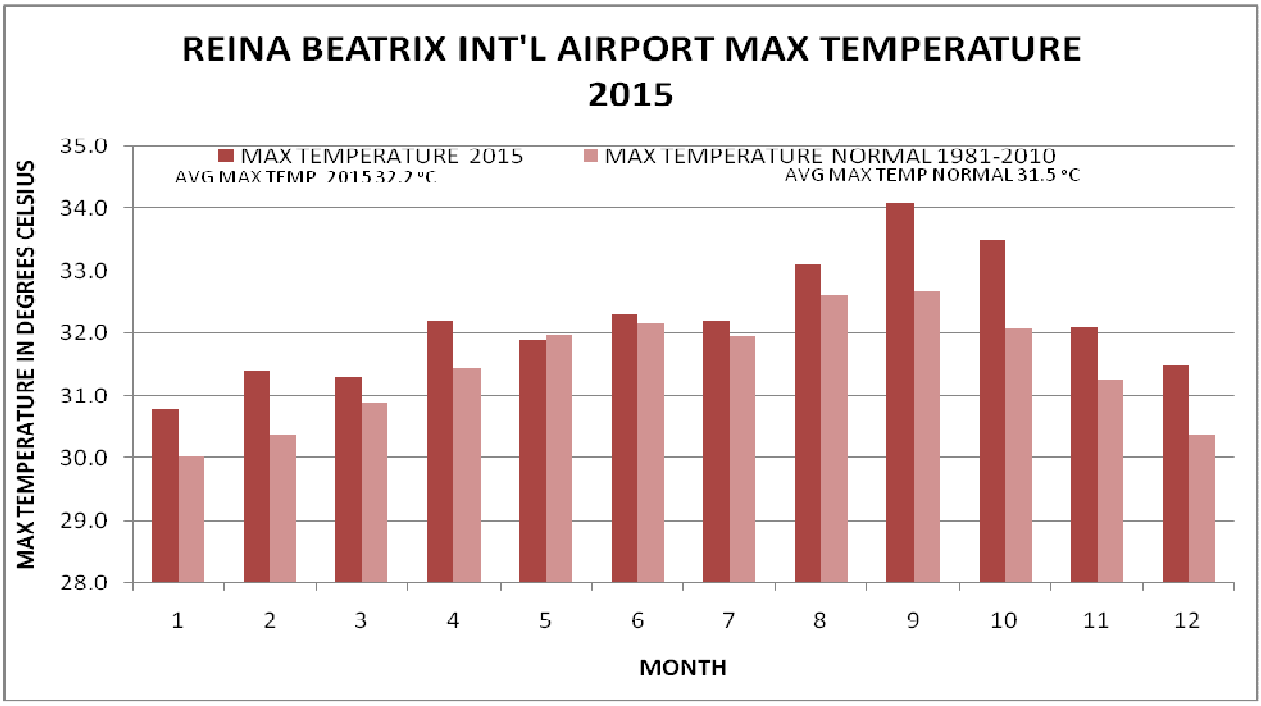


Figure 2b. Maximum temperatures in degrees Celsius 2015

WINDSPEED

The year average wind-speed at 10 meters height for the year 2015 at the Reina Beatrix International Airport was 8.6 m/sec (31.0 km/h) compared with the normal value of 7.3 m/sec (26.3 km/h) is a tab above normal. (Figure 3a).

The month of December shows exceptionally strong wind compared to climate normal. This occurred due to a persistent tight pressure gradient between the area of high pressure on the Atlantic ocean and area of low pressure near Colombia.

The *highest* average wind-speed of **10.0** m/sec (36.0 km/h) was recorded during the month of May and June 2015. The *lowest* average wind-speed during the month of October 2015 with a **6.9** m/sec (24.8 km/h).

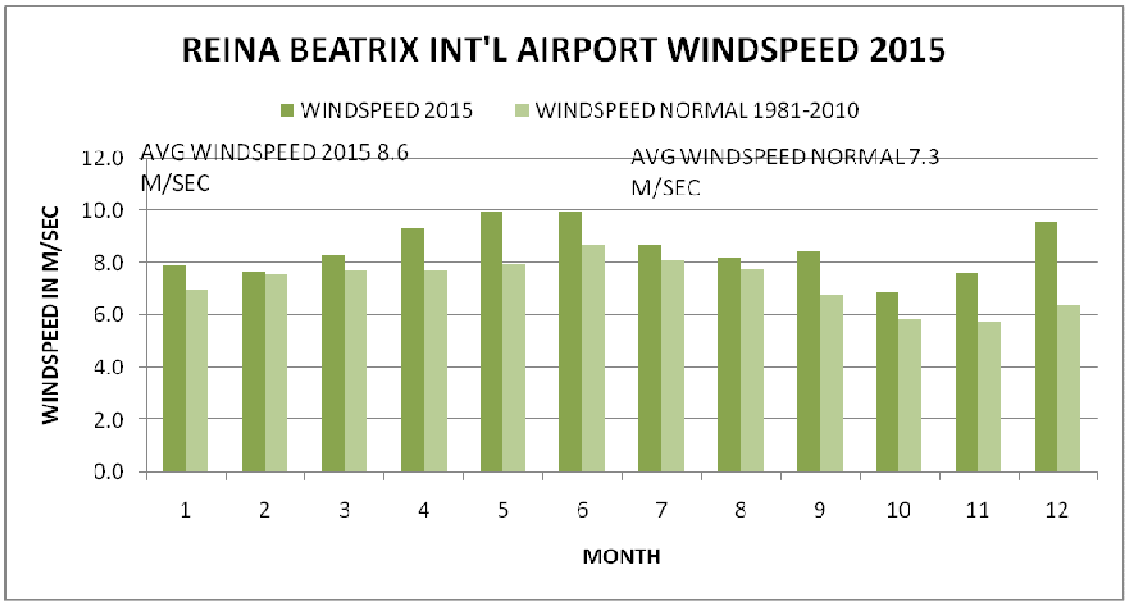


Figure 3a. Wind-speed 2015 in m/sec.

The average maximum wind-speed for the year 2015 was 16.6 m/sec (59.8 km/h) compared to the normal value of 14.5 m/sec (52.2 km/h) is a tab above normal. (Figure 3b). The month of December showed exceptionally high average maximum wind speed compared to climate normal.

The *absolute* maximum wind-speed of 23.1 m/sec (83.2 km/h) was recorded during the month of May 2015 .

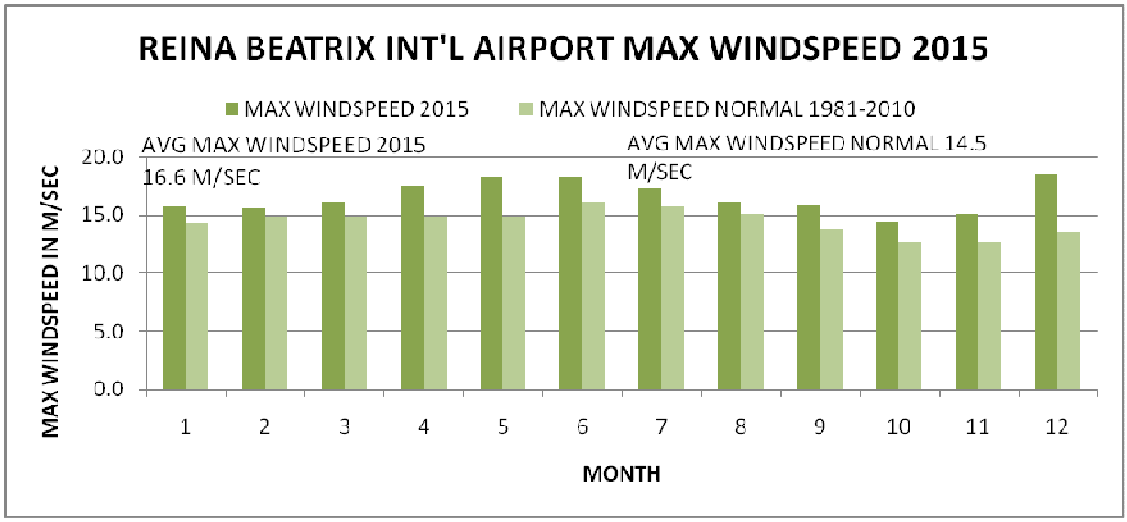


Figure 3b. Maximum wind-speed 2015 in m/sec.

The wind-rose figure indicates that for 66.6 % of the time the wind was between 11-17 knots. The wind was for roughly 33.4 % of the time between 17-21 knots (Figure 3c).

The wind was 91.5 % of the time from the East and 8.5 % of the time from the East-Northeast.

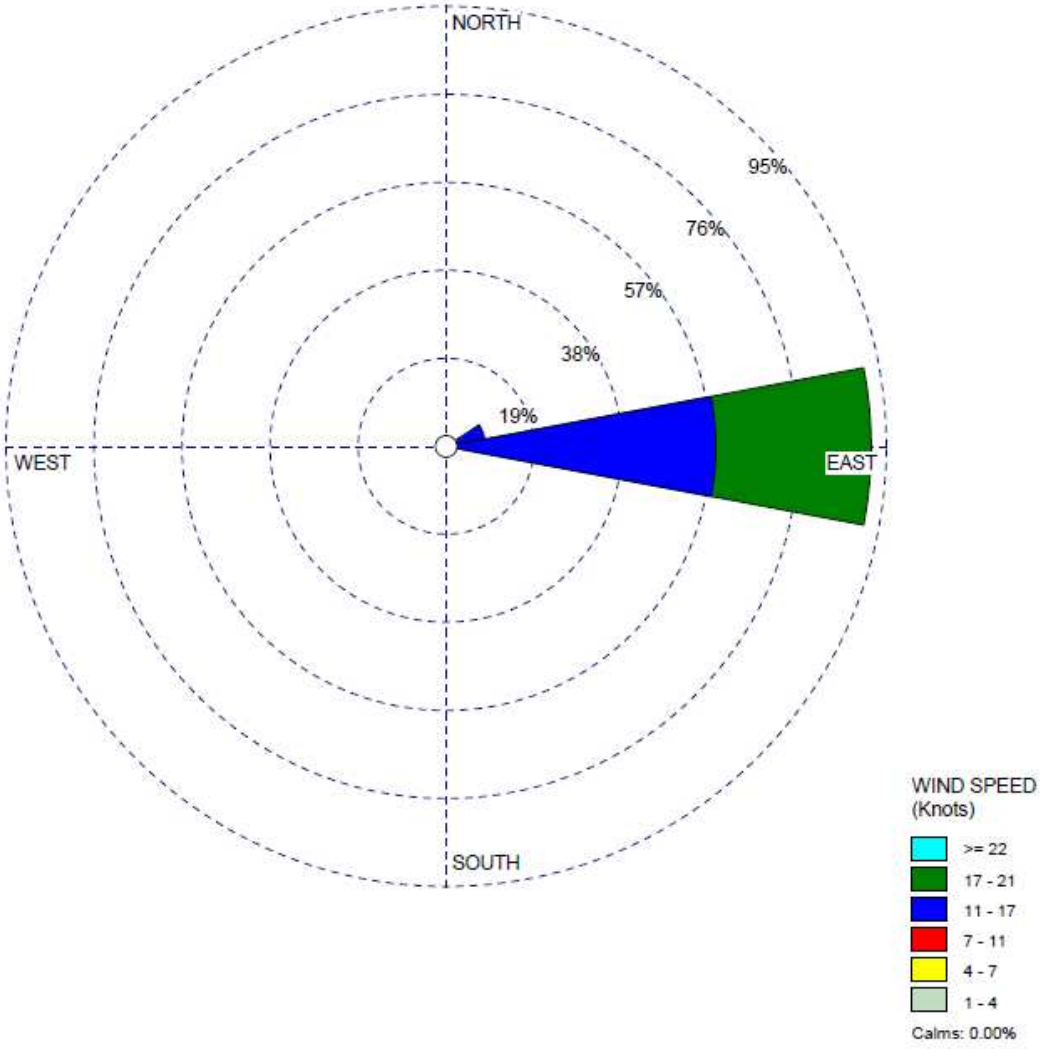


Figure 3c. Wind-rose data 2015 in knots.

ATMOSPHERIC PRESSURE

The average atmospheric pressure for 2015 recorded at the Reina Beatrix International Airport was 1012.1 hPa compared with normal value of 1011.8 hPa which is around normal (Figure 4).

The *highest* monthly average atmospheric pressure of **1013.4** hPa was recorded during March 2015 with the *lowest* during November 2015 of **1010.1** hPa.

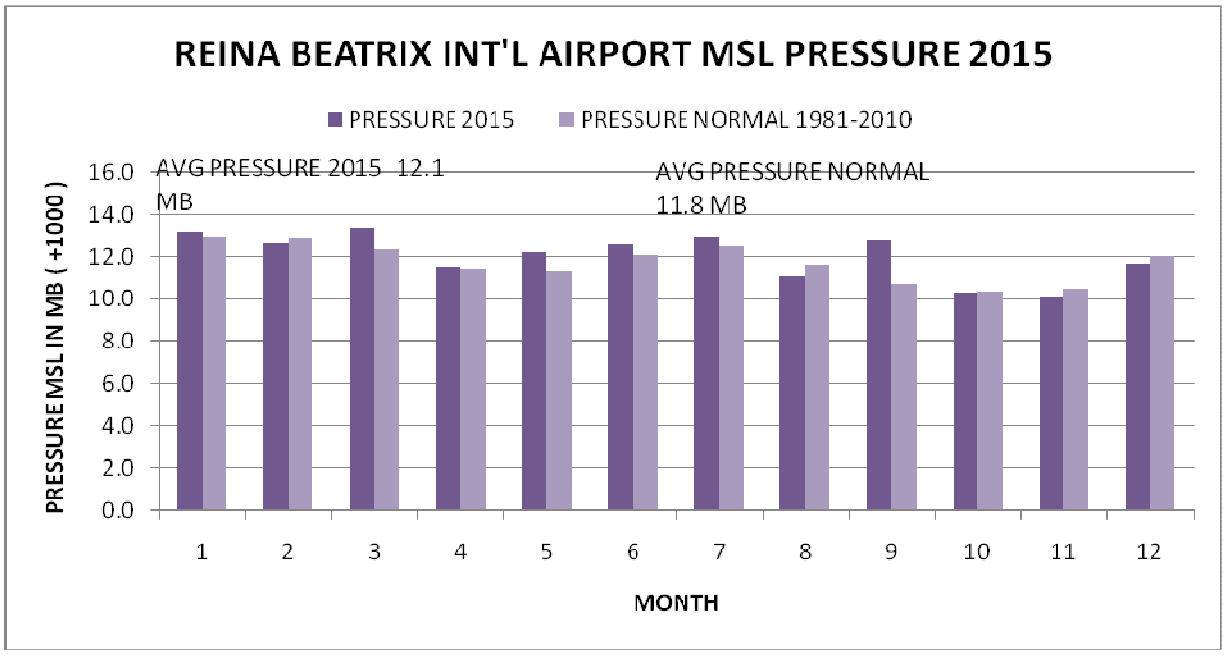


Figure 4. Atmospheric Pressure at MSL, (Mean Sea Level) in hPa (+1000).

CLOUD COVERAGE DURING 2015

The average cloud coverage in 2015 was 58.3 % compared with normal value of 47.3% which is a tab above normal. (Figure 5).

Highest average cloud coverage in 2015 was observed during May (**70.2** %) with the *lowest* during the month of January (**45.4**%).

Even though the cloud amount was higher than, normal, most clouds were upper-level clouds that do not induce rain.

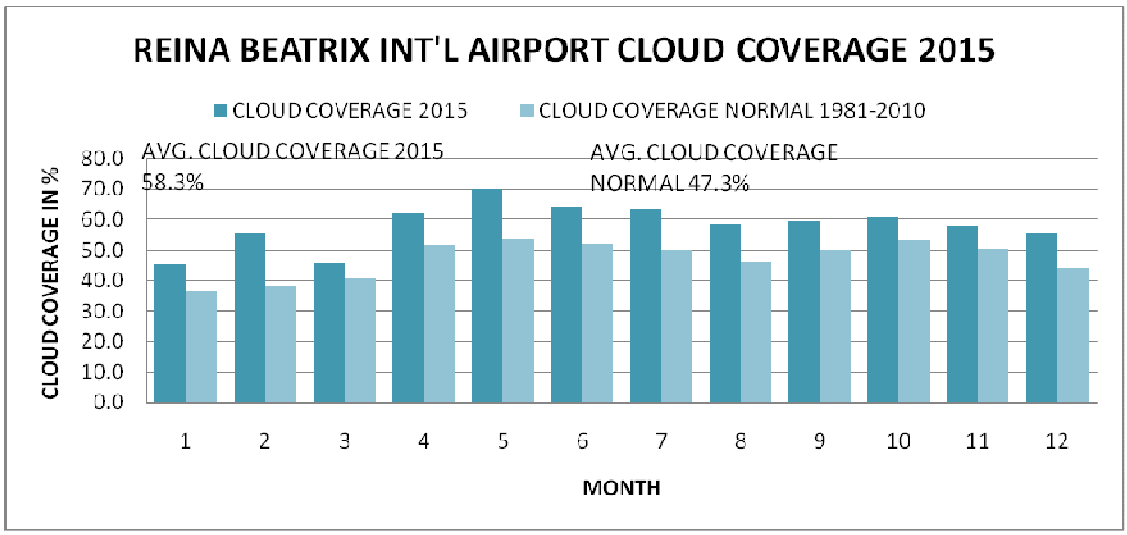


Figure 5. Total cloud cover in percentage.

RELATIVE HUMIDITY 2015

The average relative humidity of 2015 was 75.4% compared to the normal value of 77.4%, which is a tab below normal. (Figure 6). The months September, October, November and December were exceptionally dry compared to the climate normal.

Highest monthly average relative humidity of **80.0**% was recorded during the July 2015 with a *lowest* monthly average of **73.2%** during the month of March 2015.

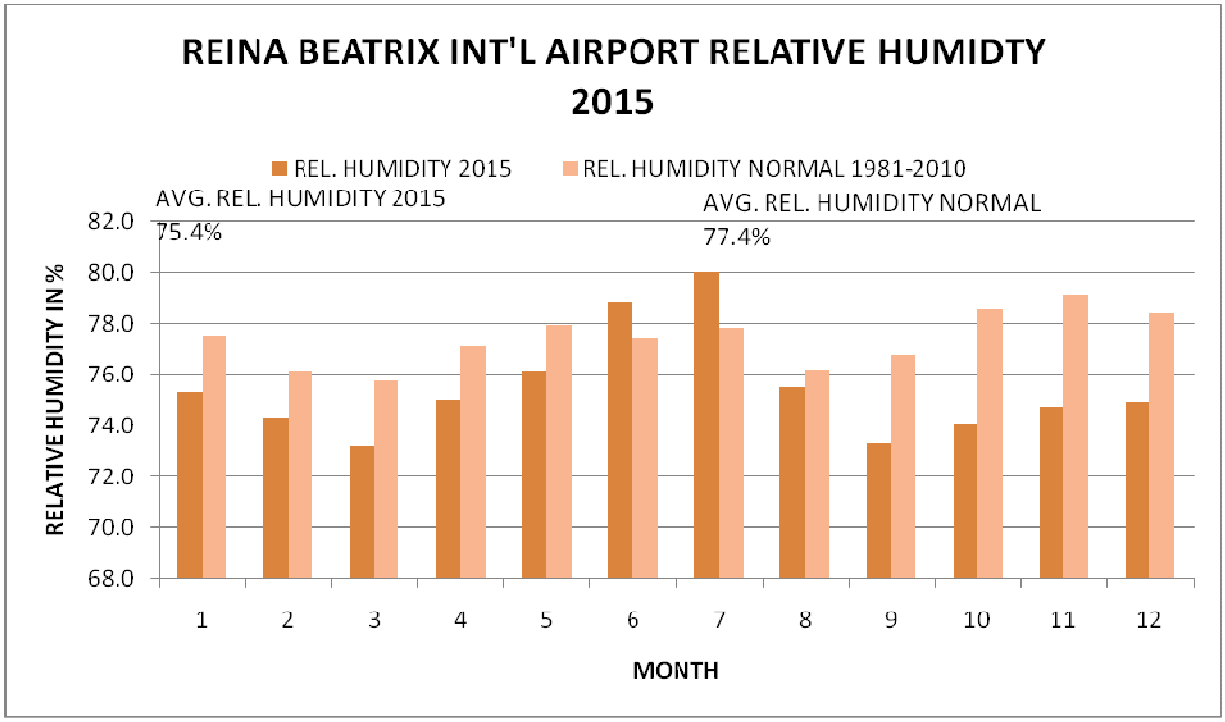


Figure 6. Relative humidity in percentage.

SPECIAL OCCURRENCE (EVENTS) DURING THE YEAR 2015

SEISMIC ACTIVITIES:

There were about 23 earthquake events near Aruba recorded and felt by humans in the year 2015 of which the strongest earthquake was on April 8 2015 at 2:03 AM local time and had a magnitude of 3.7 with epicenter at latitude 12.15 degrees north and longitude 69.95 degrees west, which is about 39 kilometers south of Aruba and a depth of 24.0 kilometers.

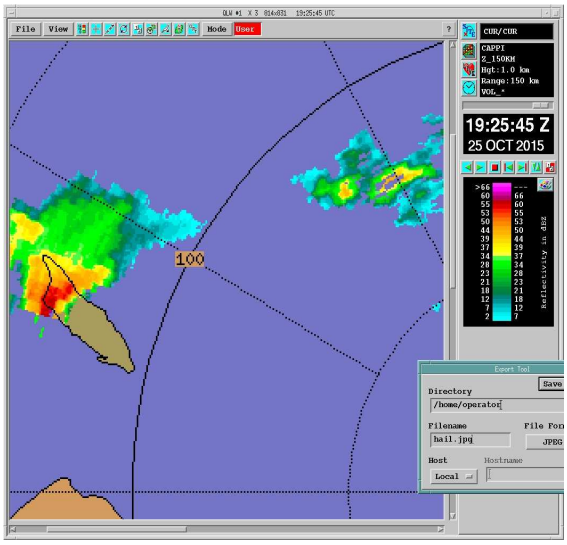
EARTHQUAKES NEAR ARUBA YEAR 2015

Date	Local Time (AM/PM)	Latitude North (degrees)	Longitude West (degrees)	Magnitude	Depth (km)
Dec 04 2015	5:31 PM	12.14	69.85	2.6	22.1
Nov 19 2015	7:36 PM	11.61	69.13	2.9	16.1
Nov 10 2015	5:39 PM	11.83	69.32	2.7	13.3
Nov 09 2015	9:58 AM	12.27	70.12	2.9	22.8
Nov 08 2015	5:20 PM	12.25	70.01	3.5	26.3
Sep 11 2015	9:43 PM	11.43	69.47	3.4	20.4
Jul 01 2015	9:08 AM	12.05	69.88	2.5	7.2
Jul 01 2015	8:56 AM	12.06	69.89	3.3	8.6
Jun 06 2015	1:08 AM	12.28	70.24	2.5	3.9
Jun 02 2015	12:21 PM	11.64	70.47	2.7	13.5
May 10 2015	2:17 PM	12.6	70.47	2.5	9.5
May 01 2015	4:49 AM	12.21	69.9	3.3	19.4
Apr 22 2015	8:16 AM	12.32	68.09	2.7	10.9
Apr 18 2015	7:03 PM	11.88	70.16	3.4	16.2
Apr 11 2015	7:48 AM	12.33	70.11	3.1	24.9
Apr 08 2015	2:03 AM	12.15	69.95	3.7	24.0
Apr 08 2015	12:14 AM	12.14	69.99	2.8	26.0
Mar 23 2015	9:32 PM	11.59	70.93	2.8	22.6
Mar 21 2015	3:25 AM	11.85	71.32	2.5	19.2
Feb 21 2015	5:43 PM	11.84	71.11	2.8	21.0
Feb 18 2015	2:03 PM	12.21	70.22	2.5	10.4
Feb 10 2015	10:59 AM	12.18	70.01	2.6	5.0
Jan 28 2015	5:13 PM	12.6	70.52	2.9	5.0

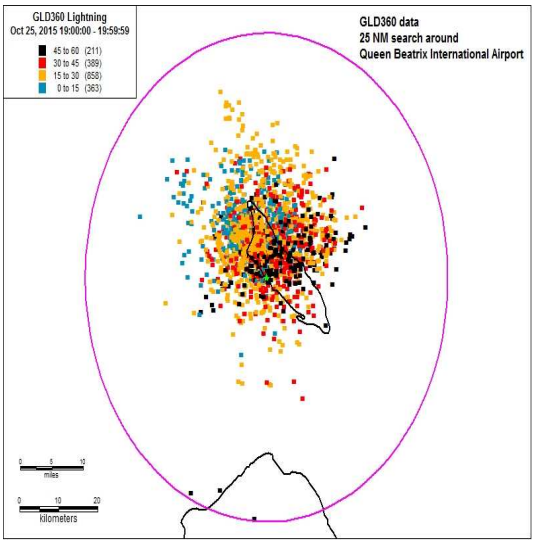
Table 1. Earthquakes near Aruba year 2015.

SEVERE BAD WEATHER:

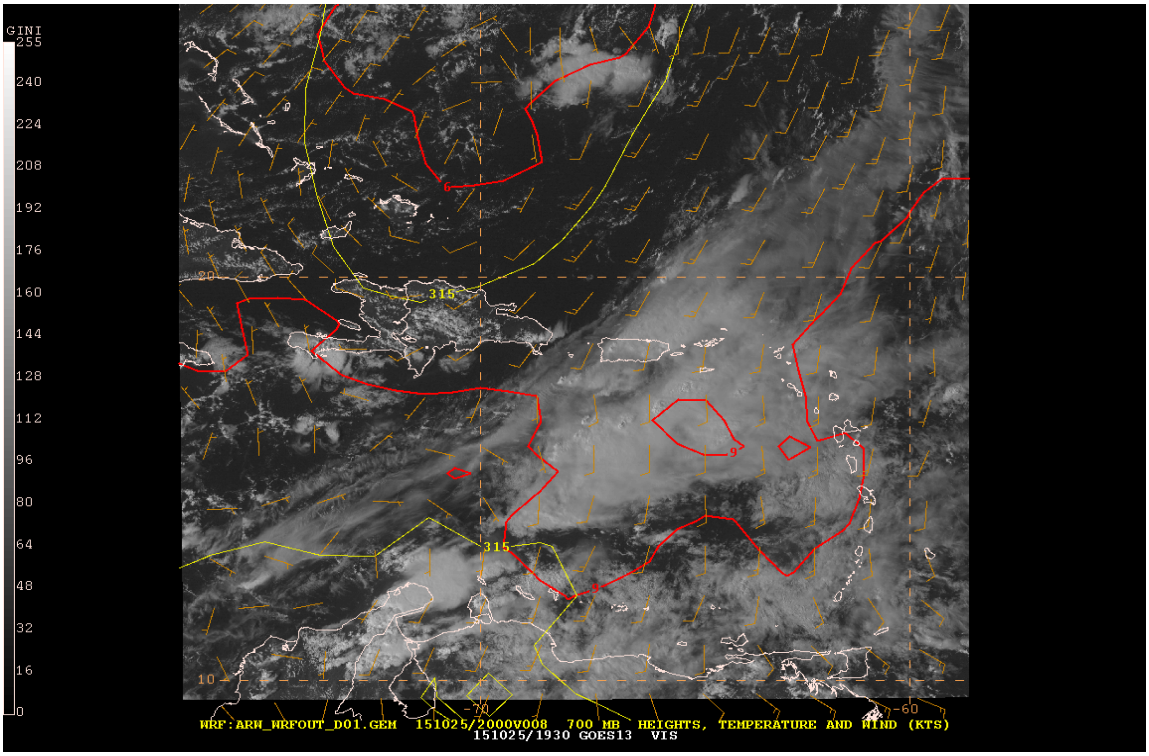
On October 25 2015 around 3:37 PM local time small hail was possibly observed at area around Superfood (Hotel Area). On the weather radar a reflectivity greater than 50 dBZ was observed. The lightning detector indicated a peak and afterwards a drop in activity just near the hail occurrence. The instability in the atmosphere that induced this isolated severe thunderstorm was due to a mid-level disturbance.



Radar image



Lightning Image



Mid-level disturbance

CLIMATE ANOMALY:

El Niño developed from weak to a very strong El Niño in 2015. The El Niño-Southern Oscillation (ENSO) phenomenon is the result of the interaction between the ocean and atmosphere in the east-central Equatorial Pacific. It has an irregular recurrence period of between two and seven years. Typically, El Niño peaks late in the calendar year, hence its name (Spanish for Christ Child). It causes droughts and excess rainfall in different parts of the world.

The global average surface temperature in 2015 broke all previous records by a strikingly wide margin, at 0.76±0.1° Celsius above the 1961-1990 average. For the first time on record, temperatures in 2015 were about 1°C above the pre-industrial era, according to a consolidated analysis from the World Meteorological Organization (WMO). An exceptionally strong El Niño and global warming caused by greenhouse gases joined forces with dramatic effect on the climate system in 2015

It is important to note that El Niño and La Niña are not the only factors that drive global climate patterns. For example, the state of the Indian Ocean (the Indian Ocean Dipole), or the Tropical Atlantic Sea Surface Temperature, are also capable of affecting the climate in the adjacent land areas. Northern hemisphere winter conditions are influenced by the so-called Arctic and North Atlantic Oscillations

TROPICAL CYCLONE ACTIVITIES:

One tropical cyclone, Hurricane Kate, formed in the Atlantic bas induring November. Based on a 30-year (1981-2010) climatology, a named storm forms in the Atlantic basin in November in about 7 out of 10 years, with a hurricane forming once every other year.

For the 2015 season, 11 named storms formed in the Atlantic basin. Four of the storms became hurricanes, and 2 reached major hurricane status. There was also one unnamed tropical depression. While the number of named storms, hurricanes, and major hurricanes was only a little below the long-term average activity levels of 12, 6, and 3, respectively, many of the named storms were relatively weak and short-lived. As a result, in terms of Accumulated Cyclone Energy (ACE), which measures the combined strength and duration of tropical storms and hurricanes, activity in the Atlantic basin for the season was only about 63 percent of the 1981-2010 median. This makes 2015 a below-average season in terms of ACE.

SUMMARY TABLE 2015

NAME	DATES	MAX WIND (KTS)
TS ANA	7-10 MAY	50
TS BILL	15-17 JUN	50
TS CLAUDETTE	13-14 JUL	45
MH DANNY	18-24 AUG	100
TS ERIKA	24-29 AUG	45
H FRED	30 AUG-5 SEP	75
TS GRACE	5-7 SEP	45
TS HENRI	10-11 SEP	35
TS IDA	19-24 SEP	45
MH JOAQUIN	29 SEP-8 OCT	135
H KATE	9-12 NOV	65

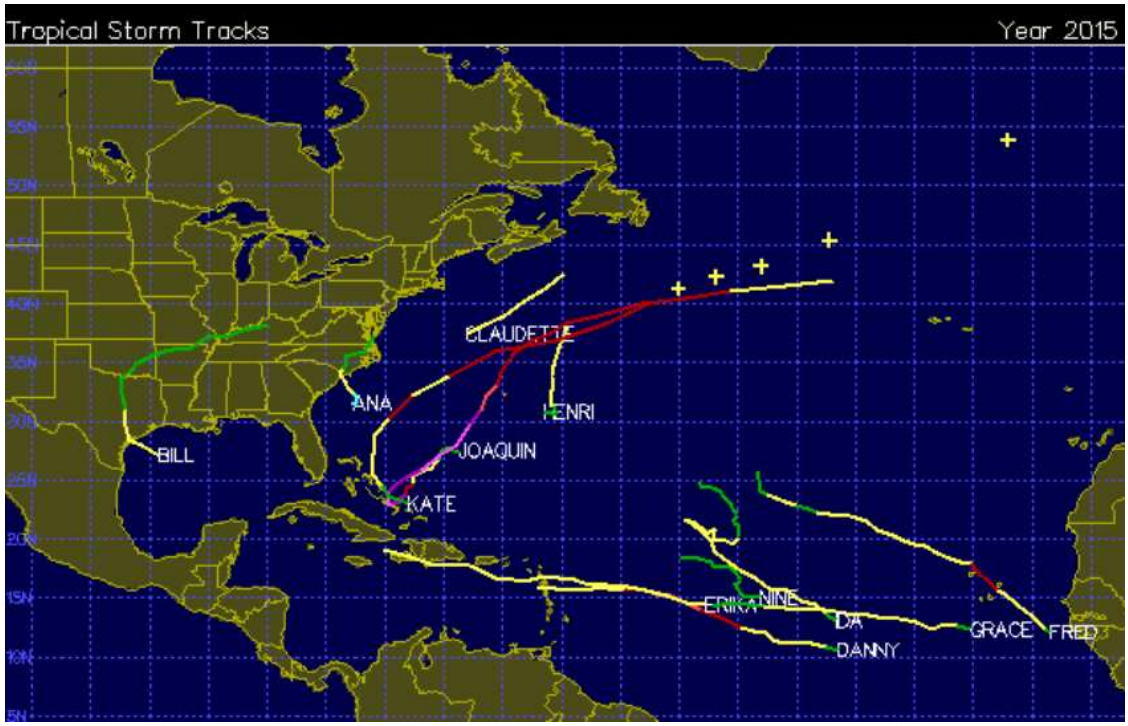


Figure 7. Storm tracks Atlantic Basin 2015.

In figure 7 we can see the storm tracks. Major-hurricane Danny and tropical storm Erika were the closest to Aruba but were no major threat.

For the year 2016 again a below-average hurricane is forecasted. This according to experts mainly due to unfavorable trade winds in the Caribbean Sea and tropical North Atlantic region.
Keep in mind that these are extreme long-term forecasts therefore changes can occur.

Prepared by
ir. Lothar Irausquin.
Researcher
Departamento Meteorologico Aruba

Supervised by :
Marck Oduber MSc.
Director
Departamento Meteorologico Aruba