

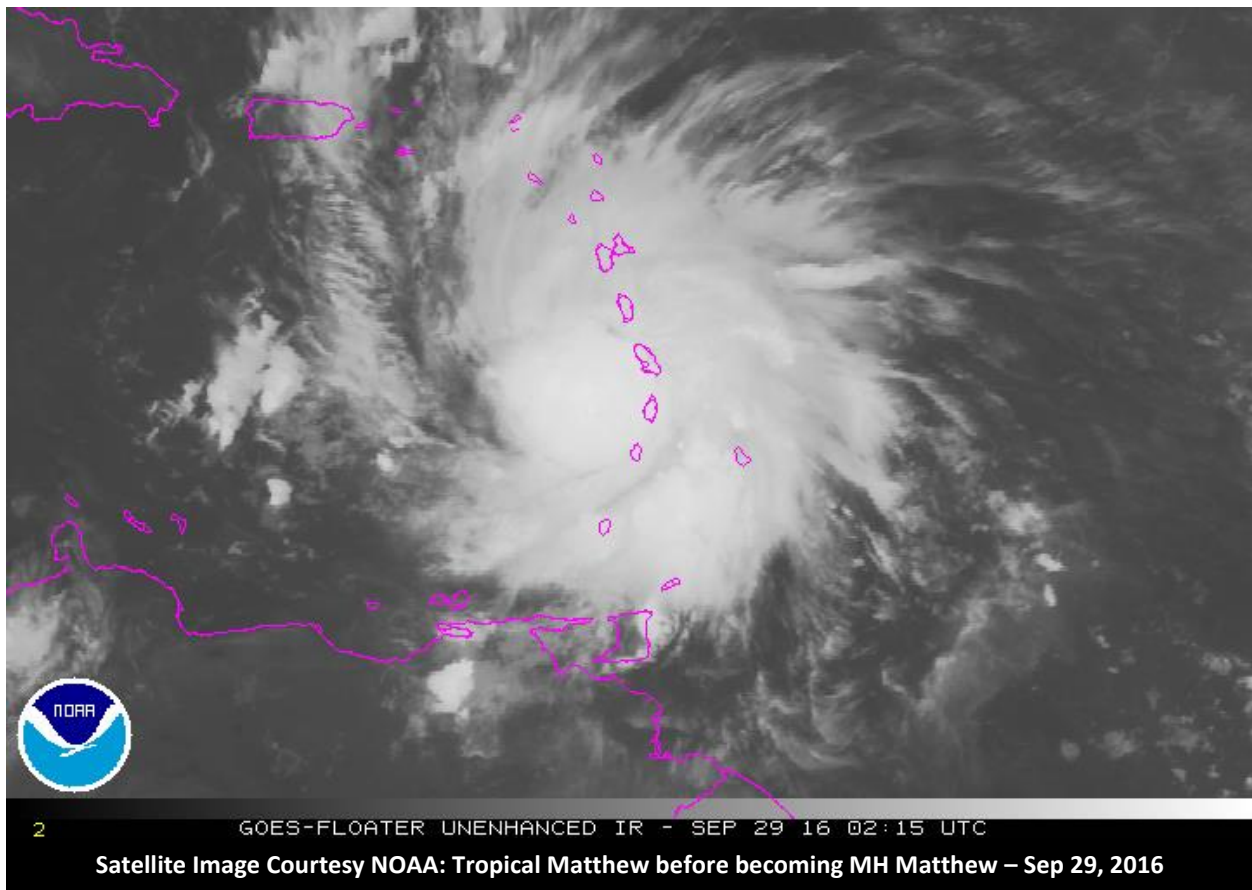
# THE ATLANTIC HURRICANE SEASON SUMMARY - 2016

## SPECIAL FOCUS ON ANTIGUA AND BARBUDA

### PRELIMINARY



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December 1, 2016



# The Atlantic Hurricane Season Summary - 2016

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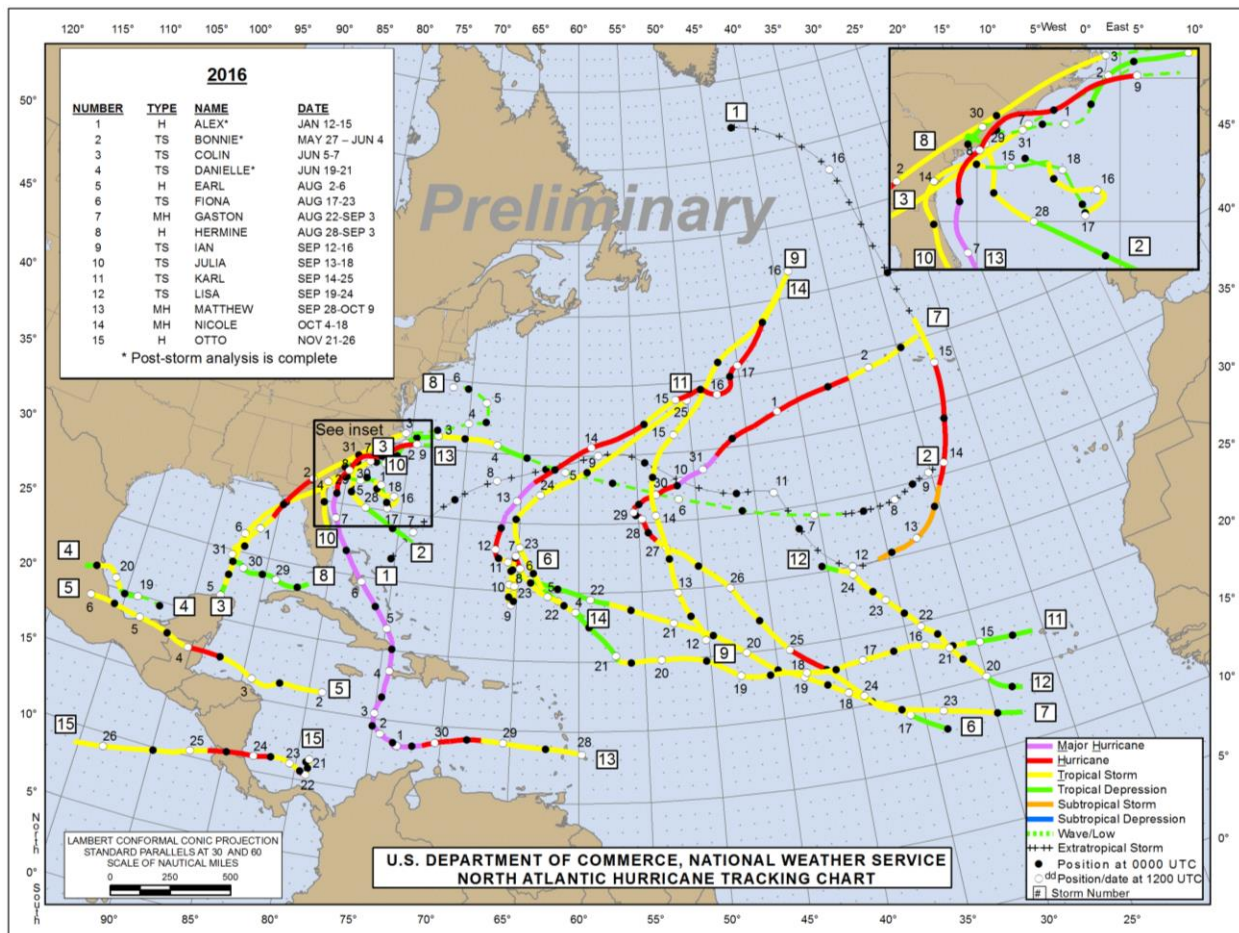
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### The Season in Brief

The 2016 Atlantic hurricane season was the first active (above normal) season since 2012 and the most active since 2010, based on the Accumulated Cyclone Energy (ACE) index. It produced 15 named storms. Of the 15, 7 became hurricanes and 3 reached major hurricane status – at least Category 3 on the Saffir-Simpson Hurricane Wind Scale. The strongest tropical cyclone for the season was Major Hurricane (MH) Matthew with peak winds of 160 mph and minimum pressure of 934 millibars (see map 1 for a summary).



Map 1: Tropical cyclone tracks for the 2016 hurricane season (Courtesy NHC).

## Relative to Antigua and Barbuda

This is the first year [since 2008](#) not tropical cyclone (tropical depression, tropical storm, hurricane) passed within 121 miles of Antigua. For Antigua and Barbuda, the rest of the northeast Caribbean (Leeward Islands and the British Virgin Islands), Matthew was the only tropical cyclone which enter (or formed) in our defined monitored-area (10N 40W – 10N 55W – 15N 70W – 20N 70W – 20N 55W – 15N 40W – 10N 40W). The centre of Matthew passed over 205 miles south of Antigua and even further away from Barbuda. The system caused some periods of heavy showers and storm force gusts across Antigua and Barbuda. On average, Antigua is affected ([directly hit, hit or brushed](#)) by a named storm every other year, a hurricane every 3 years and a major hurricane every 7-8 years ([click here for the full stats for Antigua and Barbuda](#)).

## Detail and Perspective

In terms of number, the season had above the normal of 12 named storms, near the normal of 6 hurricanes and the normal of 3 major hurricanes. It was the highest number of named storms since 2012.

Further, the season was above normal with respect to the ACE index, which was 134. The ACE index, measures the collective strength and duration of named storms and hurricanes. The index was 145% of the median and 127% of average (1981 – 2010). This is the most [ACE since 2010](#). Compared to last year, 2016 had four more storms, three more hurricanes, one more hurricane and almost twice as much ACE. Matthew alone accounted for near 40% of the ACE with 48.5 – [the 12<sup>th</sup> most](#) on record for any Atlantic tropical cyclone.

Overall, tropical cyclone activity caused over US\$11 billion dollars in damage and 1765 deaths. For Antigua and Barbuda, the damage was very minimal and there was no loss of life. Further, the residents of these islands would have had one of the least stressful hurricane season since 2008 – nearly a decade.

The above normal hurricane season was due primarily to reduced vertical wind shear, slight warmer than usual tropical Atlantic sea surface temperature and cool-neutral El Nino Southern Oscillation. It is quite possible that the season would have been more active if not for drier than normal mid-levels conditions prevailing for the hurricane season.

Our [ensemble forecast for the season](#) was quite good in terms of the numbers of storms. It called for 15 named storms, 7 hurricanes and 3 major hurricanes. However, it did not do to well with the ACE; the forecast ACE was 102, 32 below the actual value. An average season has 12 named storms and six (6) hurricanes, including three (3) major hurricanes and an average ACE of 105.6 based on the climate period 1981 to 2010.

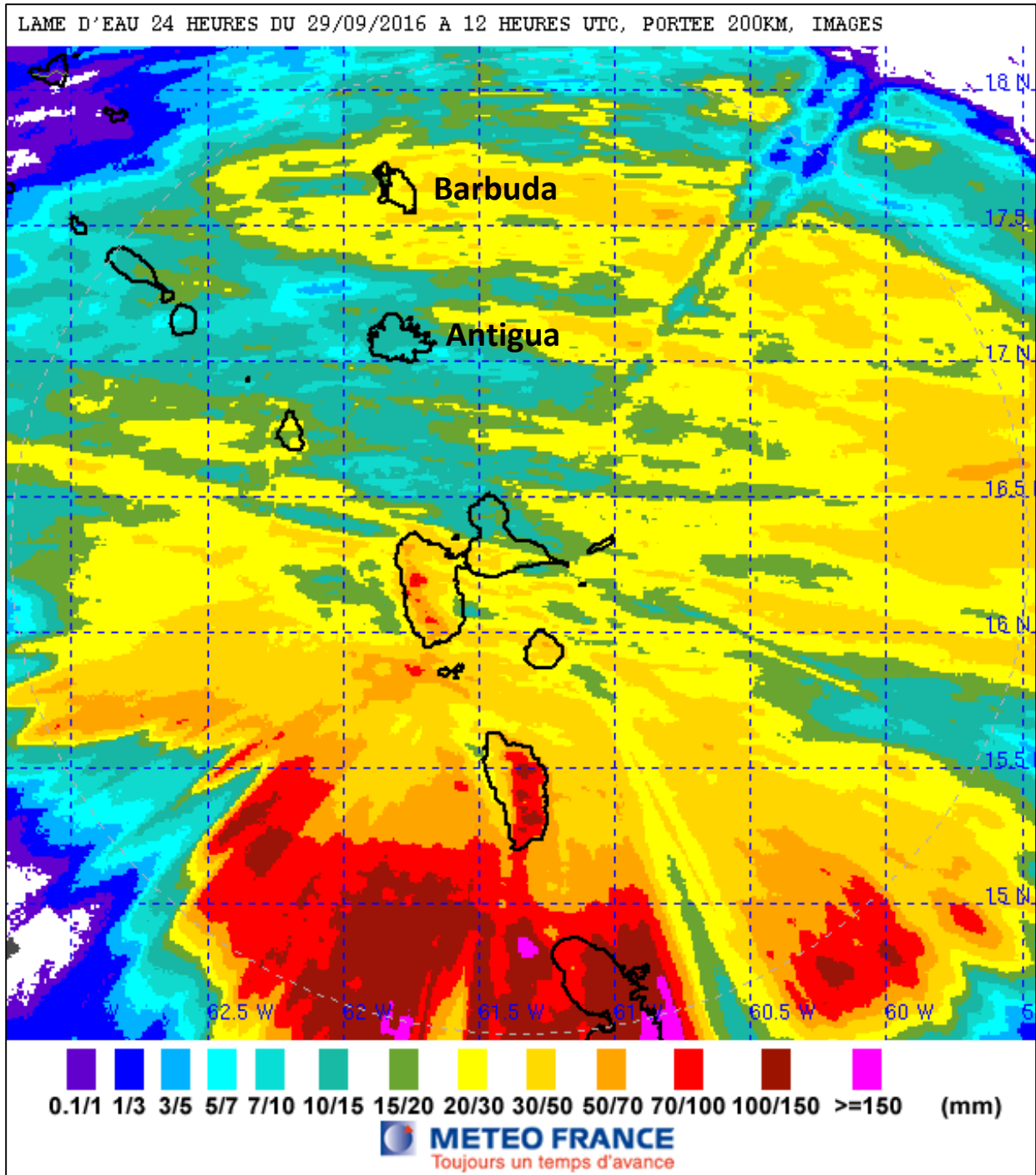


Figure 1: Radar image showing 24-hour rainfall total ending 8 am, September 29, 2016 from Major Hurricane Matthew at the time it was a tropical storm, which passed over 205 miles south of Antigua and Barbuda (image courtesy Meteo France).

## Tropical Cyclone in the Monitored Area

### MH Matthew

By definition, Matthew passed so far away to be considered even to have brushed Antigua and Barbuda. However, it entered the monitored area and eventually passed over 205 miles south of Antigua on September 28 and 29. Notwithstanding the distance it passed away from Antigua, there were impacts which were minor. At the V. C. Bird International Airport (VCBIA) in Antigua, the maximum 1-minute sustained wind from Matthew was around 41 mph with maximum gusts around 49 mph. Rainfall totals from the system for Antigua and Barbuda were 19 to 60 mm (0.75-2.36 in) and 150-200 mm (6-8 in) respectively over the period September 26-30. At the VCBIA 19.4 mm (0.76 in) was measured over the same period.

Matthew developed from a tropical wave which emerged off the coast of Africa on September 22. The disturbance became organization enough to be declared Tropical Storm Matthew by 11 am (15:00 UTC) on September 28 near [Saint Lucia](#). Continuing westward, the storm steadily intensified to become Hurricane Matthew by 11 am on September 29. Very low wind shear and other favourable environmental conditions allowed Matthew to go through a period of rapid intensification. It went from a Category 1 hurricane with winds of 80 mph to Category 5 with winds of 160 mph in about 24 hours – making it the first hurricane to reach this strength in the North Atlantic basin since [Felix](#) in 2007.

Matthew weakened but remained a powerful Category 4 hurricane for several days, making landfall in Haiti around 7 am (11:00 UTC) on October 4 and Cuba around 8 pm (00:00 UTC) on October 4. The mountains of Cuba and Haiti briefly weakened Matthew to Category 3, as it began to accelerate north-westward through [the Bahamas](#). However, it re-strengthened and impacted [Freeport](#) with Category 4 winds of 140 mph. Afterward, the system started on its final weakening procession, it eventually made landfall at around 11 am (15:00 UTC) on October 8 on [Cape Romain National Wildlife Refuge](#), near [McClellanville, South Carolina](#) with Category 1 winds of 75 mph. Soon after, it lost its tropical characteristics and ceased being a tropical cyclone on October 9, just off the coast of North Carolina.

In total, up to 1,659 deaths have been attributed to the storm, including 1,600 in Haiti, making it the deadliest Atlantic hurricane since [Stan](#) in 2005, which killed more than 1,600 in Central America and Mexico.



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Name	Date	Max Wind (mph)	Deaths	Antigua/Barbuda Damage - US\$Million
1. H Alex	Jan 12-15	85	1	0
2. TS Bonnie	May 27-Jun 4	45	2	0
3. TS Colin	Jun 5-7	50	6	0
4. TS Danielle	Jun 19-21	45	1	0
5. H Earl	Aug 2-6	80	67	0
6. TS Fiona	Aug 16-23	50	0	0
7. MH Gaston	Aug 22-Sep 3	120	0	0
8. H Hermine	Aug 28-Sep 1	80	5	0
9. TS Ian	Sep 12-16	60	0	0
10. TS Julia	Sep 14-18	40	0	0
11. TS Karl	Sep 14-25	70	0	0
12. TS Lisa	Sep 19-25	50	0	0
13. MH Matthew	Sep 28-Oct 9	160	1659	Minimal
14. MH Nicole	Oct 4-18	130	2	0
15. Otto	Nov 21-26	110	22	0

Table 1: The Atlantic Hurricane Season Summary - 2016. Totals: 15 Named Storms, 7 Hurricanes and 3 Major Hurricanes. The season caused over 1750 deaths and around US\$40 billion dollars in damage. (Sources – NOAA, Wikipedia.com, ABMS Climate Section).