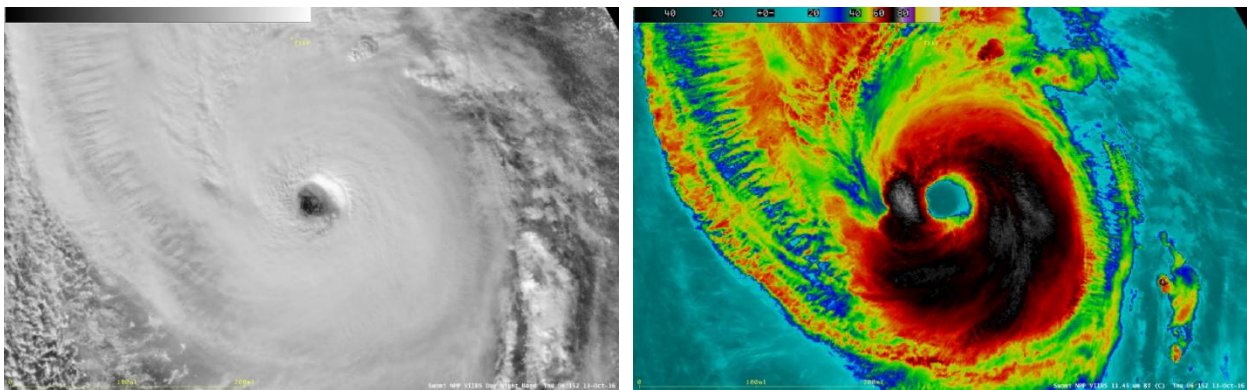


# Eyewitness account of Hurricane Nicole

*Operational Meteorologist Stephen Meloche was on shift when Major Hurricane Nicole struck Bermuda in 2016. Here he recounts what happened as the storm swept across the island, bringing Bermuda to a standstill.*

## An Eyewitness Account of Hurricane Nicole

As an Operational Meteorologist, the opportunity to work during a Major Hurricane is a “once in a lifetime” experience. I’ve had the good fortune — and responsibility — to experience two: Hugo in 1989 and Nicole in 2016. This article focuses on Hurricane Nicole, but you can read my account on Hurricane Hugo in [Weather Volume 54, Issue 4](#).



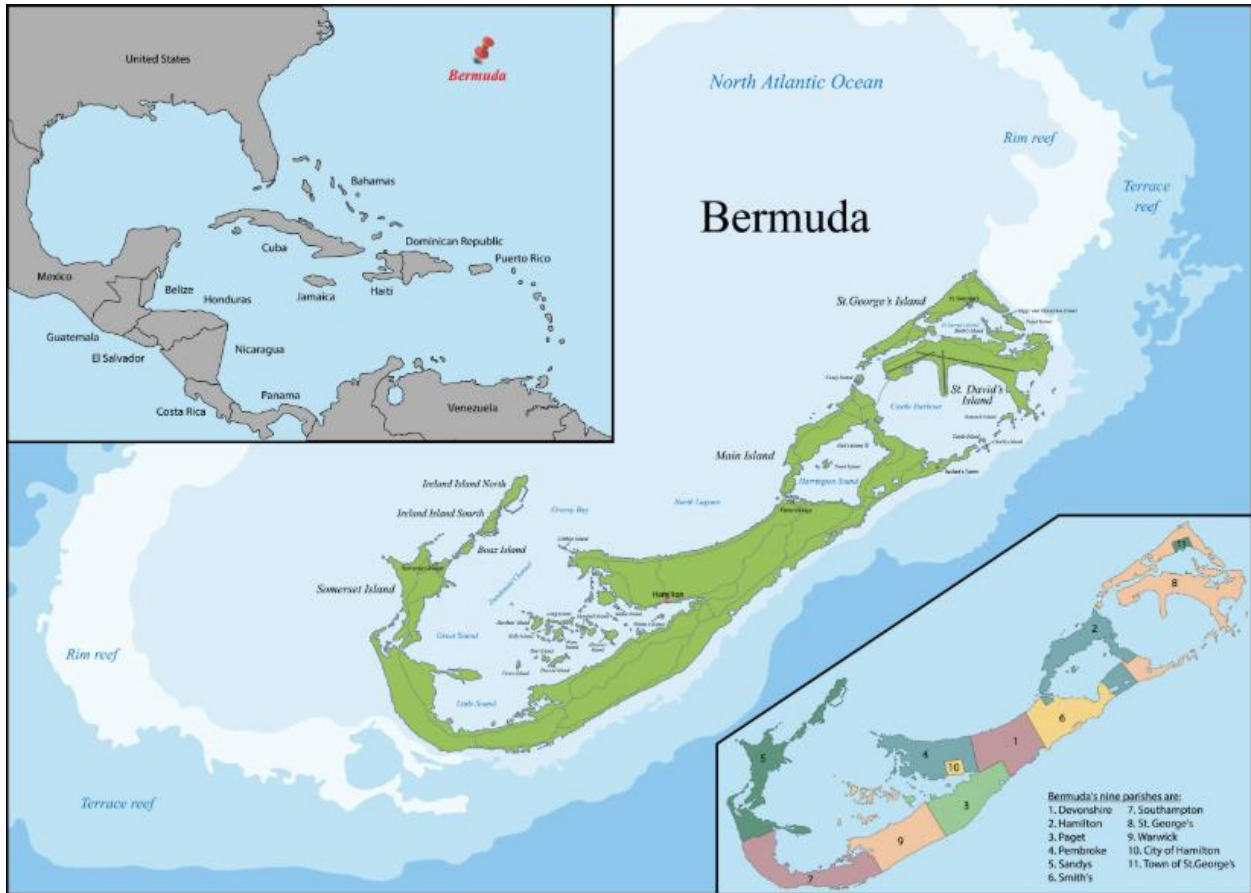
*Infrared Satellite image of Nicole at its most intense approaching Bermuda (Category 4, 950mb) at 0615UTC 13 Oct 2016 (TXKF top centre is the airport).*

<https://cimss.ssec.wisc.edu/satellite-blog/archives/22321>

## An uncertain start

In the week leading up to Nicole’s arrival, the storm meandered slowly to the south of Bermuda. However, it rapidly strengthened on 11th October as it encountered the Gulf Stream and headed north, becoming a [Major Hurricane](#) the next day.

Bermuda Weather Service (BWS) issued a Hurricane Watch on the 10th, upgrading it to a Tropical Storm Warning early on the 11th and later upgrading that to a Hurricane Warning, a full 42 hours in advance of Nicole’s arrival. Nicole would prove to become the first Major Hurricane to strike Bermuda since Hurricane Fabian in September 2003.



Bermuda sits atop an extinct volcanic seamount rising 600m from the Atlantic seabed, within the Sargasso Sea some 1000km to the east of Cape Hatteras. The islands are surrounded by an extensive reef system. Many visitors report an odd feeling on Bermuda, as the sea-level appears higher than the land, making one feel as if they're on a boat rather than an island!

### Teamwork

Before the nightshift leading into the 13th of October, most of the meteorologists (and some family members) were now sheltering in the BWS Ops Centre as part of normal contingency plans. Staff live on numerous islands and depend on a network of connecting bridges, which if damaged or destroyed, could severely hamper recovery efforts for many weeks. Some staff even routinely come to work by boat!

A team of meteorologists and IT specialists monitored our communications, power, IT systems, and the quality and consistency of our forecasting products. This reduces the risk of being overwhelmed by the workload and any blind spots in our decision making. The Bermuda Government and Media also needed consistent information to protect the population and infrastructure.

Our main responsibility was to provide services for aircraft and the airport's infrastructure. Other responsibilities included forecasting for marine operations within the shallow reef (500sq km), the 53sq km of landmass across 181 Islands with 150km of coastline and 42 bridges, including the vulnerable 140-year-old causeway (below). The causeway was damaged by Hurricane Fabian in September 2003.



*The Causeway, damaged by Hurricane Fabian, Sep 2003. ([www.royalgazette.com](http://www.royalgazette.com))*

## **Dark n Stormy**

Bermudians are nautical to the core, the country was born as English ships wrecked upon the reef during a hurricane in 1609, attempting to relieve starving colonists in Jamestown, Virginia. This was romanticised in Shakespeare's contemporary work *The Tempest*.

I was amazed by their natural awareness of the weather, sea states and tides. There were no signs of panic as they prepared for Nicole's arrival with efficiency, having done so many times during their four centuries on the Islands. The "Dark n Stormy" (black rum, ginger beer, ice and a slice of lime) is famously regarded as Bermuda's national drink.

On the 12th October 2016, the Government of Bermuda cancelled the arrival of all aircraft and evacuated others to the USA's east coast. The public were told to "stop-up" their rain-harvesting roof systems, as rainfall during the storm would be contaminated with salty seawater, making the water in their cisterns (mandated by law) undrinkable. Bermuda has no significant freshwater sources, so they've developed [pragmatic solutions to collect rainwater](#).

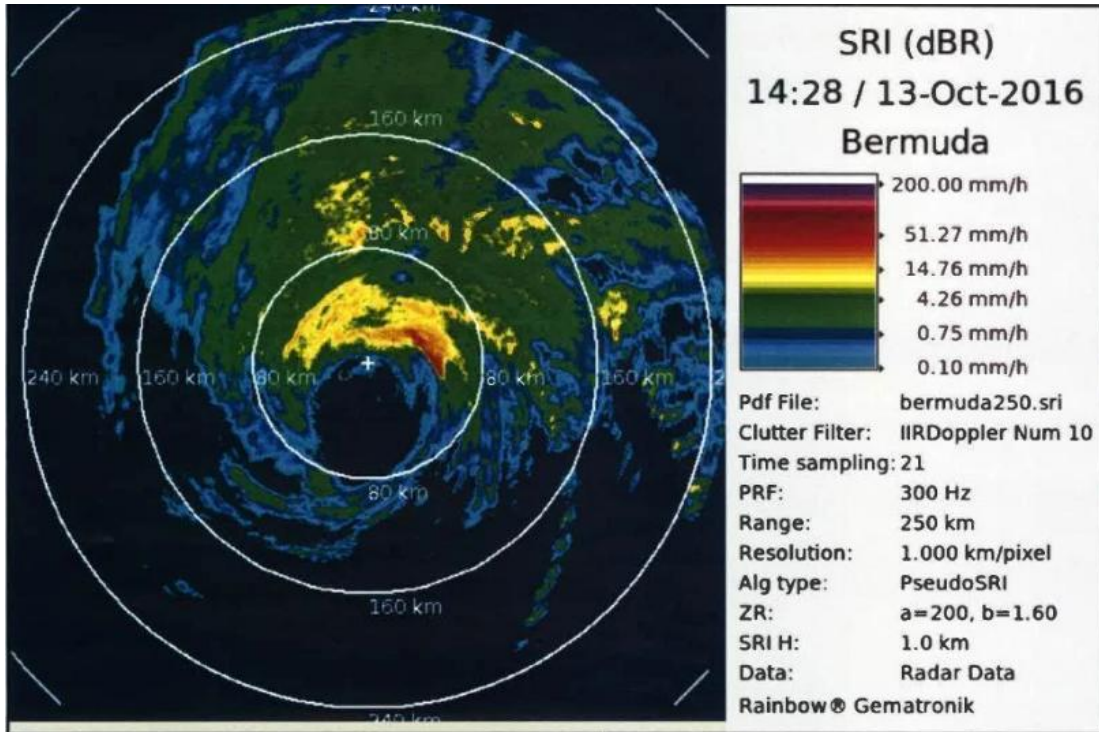
## **Heads down**

During the nightshift before landfall, numerous weather observations, forecasts, advisories and warnings had to agree and overlap seamlessly, taking a lot of collaboration among the meteorological team, which held over 250 years of combined experience from Bermuda, the UK, USA and Canada.

We were in constant contact with the USA's [National Hurricane Center](#) throughout the previous few days and the [US Air Force Hurricane Hunters](#) were now on their way to interrogate the storm "up close".

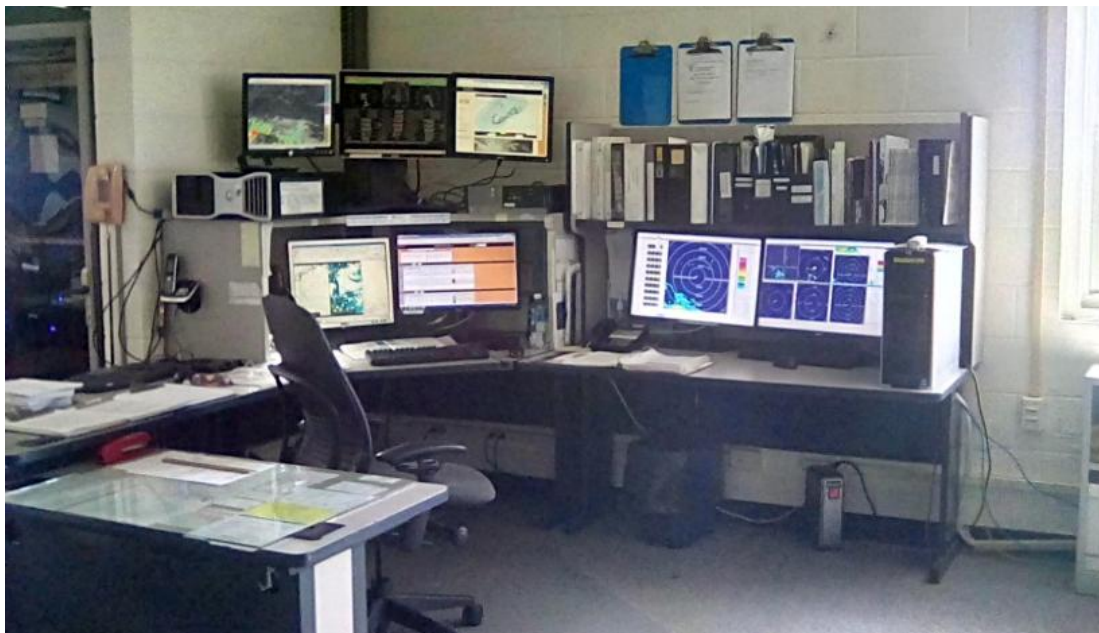
We worked overnight and into the morning (with the help of a lot of coffee) in very much a "heads-down" shift, constantly liaising with the Police, Fire, Hospital, Ambulance services, National Guard, the Bermuda Premier's Office and the Media. We also dedicated efforts to counter misinformation on "social media".

## **Uniquely Bermuda**



*[Bermuda Weather Service](#) Doppler Radar showing the airport (+) within the eyewall of Hurricane Nicole at 1428UTC, 13 Oct 2016*

By mid-morning, it became too dangerous to go outside, as windblown debris was now striking the Ops Centre and the distinct howling of the wind became constant. The eyewall of Nicole was visible on Doppler radar, helping the NHC to get an accurate fix on the storm.



*The Bermuda Weather Service Forecasters desk in Summer 2016 © Stephen Meloche*

The Observer and Forecaster desks are beside two large shatterproof windows in order to see the runway which was dredged from the shallow waters of Castle Harbour during WWII. BWS and Air Traffic Control sit atop the southern flank of St David's Island, 15-20m above the runway.



*Air Traffic Control Tower, L.F. Wade International Airport looking south from BWS Ops Centre (Met enclosure in foreground) © Stephen Meloche, summer 2016*

By noon, we entered the eyewall. Our ears popped and the wind rapidly subsided. The Observing team went into action, being safe to launch a weather balloon. The first attempt failed, but a second was launched successfully, returning a good set of data. I've only heard of this being attempted once before, again on Bermuda (during Hurricane Gonzalo in 2014), showing the unique place we hold in Meteorological and Oceanographic research.

## **Eye of the storm**

During the 90 minutes spent within the eye of the hurricane, we ventured outside. I had done this around midnight during Hurricane Hugo when I was at Charleston AFB, South Carolina, but being in the eye of a major hurricane during daylight was a completely different experience. The sight and scent of shredded plant material lying about the grounds and plastered onto fences and buildings was shocking. The atmosphere seemed calm, stiflingly humid and with a strong scent of sea salt.



The eye of Hurricane Nicole passing over Bermuda, as seen from a WC-130J Hurricane Hunter aircraft of the US Air Force Reserve 53rd Weather Reconnaissance Squadron, 13 Oct 1500UTC. © Leesa Forelich

Watching the weather balloon disappear out of sight, we heard the drone of the [Hurricane Hunters aircraft circling 10,000ft above](#). It was an experience that made you think, "Should I really be here?" Eventually we felt the wind increasing from the N-NW (previously from the E-SE), returned to our duties inside and got ready for Round 2. We notified the Police, Fire, Ambulance and Power crews to retreat from their callouts to the safety of their ops centres.

The backside of the storm didn't seem as bad as the front had been, probably as we were more accustomed to the noise and chaos by now. Nicole pulled away to the

northeast and weakened steadily. By early evening the population began emerging from shelter to start recovery efforts.

## Aftermath

Although 90% of the population lost electricity, it was soon restored. There were no fatalities and only 7 people were hospitalised with minor injuries. Dozens of boats were damaged or sunk. The people of Bermuda were well prepared for Nicole. None of the 42 bridges were significantly damaged and the Causeway remained intact. In 2003, Hurricane Fabian claimed the lives of 4 Police Officers who were swept off the Causeway as they maintained a roadblock, so this was an ever-present thought.



*Barge lifting a damaged boat out of St George's Harbour. Image taken from Stephen Meloche's home on Emily's Bay © Stephen Meloche*

Over the coming days, we noticed how the lush green of Bermuda turned brown as most plant-life suffered from the salt-water spray whipped up by the storm. It was as if Autumn had come to these islands that never see Autumn! The lead-up to Christmas saw a bedraggled Bermuda re-bounding and putting on typically colourful light displays, cheering up the island's resilient population, as they were left on their own, long after the summer tourists had disappeared and forgotten them.

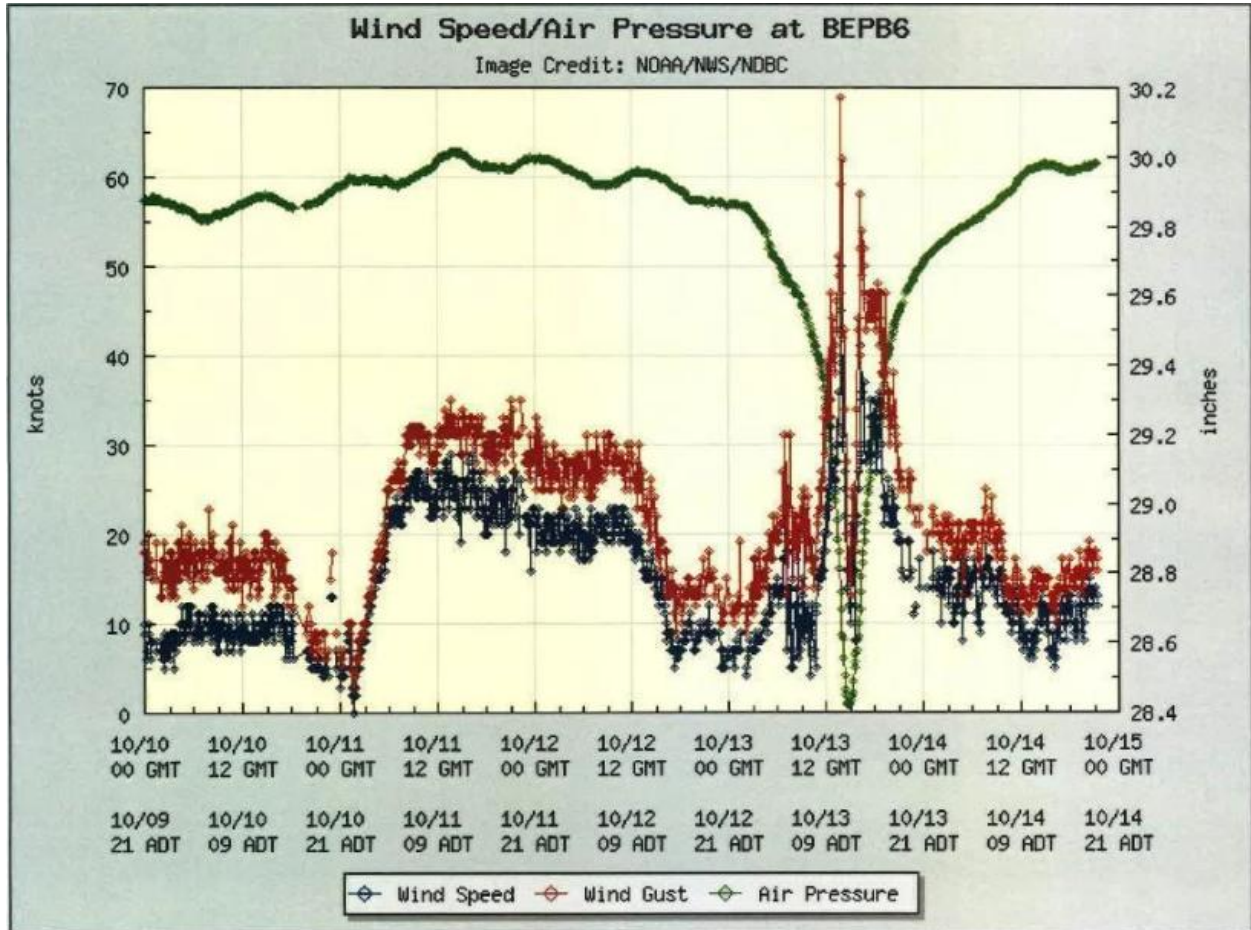


*Bermuda Premier Michael Dunkley with Operational Meteorologist Stephen Meloche in the BWS Ops Centre the day after Nicole's strike on Bermuda in 2016*

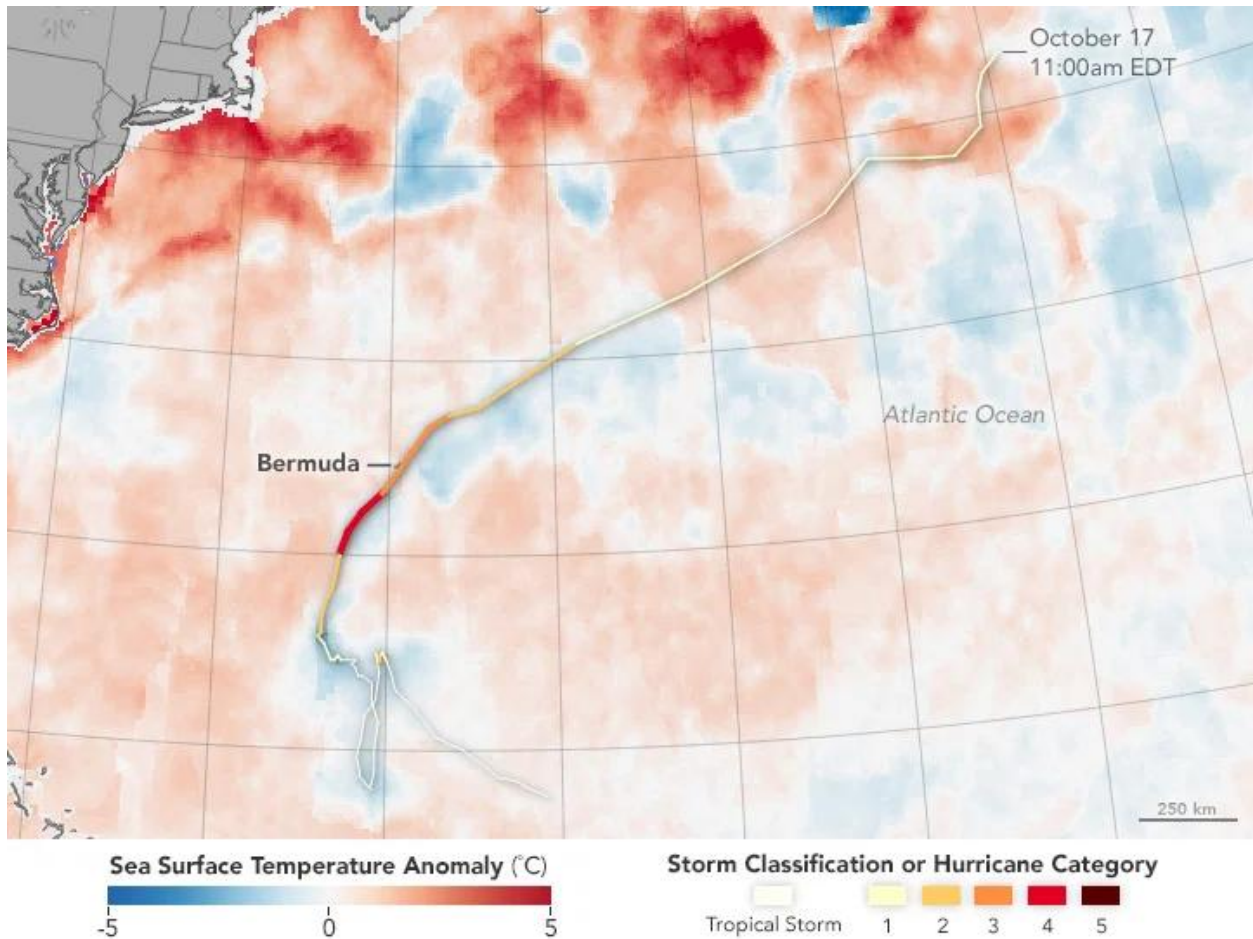
## **Nicole's Bermudian Stats**

- Total precipitation: 6.77in (172mm) at the airport. 8.96in (228mm) at Cedarville.
- Minimum pressure: 960.2mb on Pearl Island at 1354UTC. 962.1mb at the Airport at 1441UTC

- Highest wind speeds: 87kt at 1341UTC gusting to 111kt at Commissioners Point. 72kt at 1354UTC gusting to 91kt at the Airport
- Sea surface temperature fell by 3C as Nicole increased cold water upwelling around the seamount.



Bermuda, BP Esso Pier (BEPB6 - 2695540, 10 Oct -15 Oct), Barometric pressure (inches) and wind speed and gusts (knots). © [NOAA/NDBC](https://www.noaa.gov/)



*Sea Surface Temperature anomalies following the passage of Hurricane Nicole in October 2016.*

*The waters south of Bermuda reflect its slow advance for a week of development before it became a full-blown hurricane. The cold water wakes are evenly distributed on both sides of the storm track, a sign of its plodding pace and the ocean mixing occurring below. The cool water even reflects the loop in Nicole's path that temporarily weakened the storm. As the storm sped up—as it approached and moved past Bermuda—colder water mostly appears on the right side of the track.*

© NASA Earth Observatory image by Jesse Allen, using MWIROI-SST data from Frank Wentz, Remote Sensing Systems

## For more information

[Country Report from Bermuda for the 39th Session of the WMO Regional Association IV Hurricane Committee](#)

[NOAA NHC Tropical Cyclone Report on Hurricane Nicole, 4 - 18 October 2016](#)

## About the author



**Stephen Meloche** began his career in meteorology as a Weather Observer with the US Air Force in 1981, becoming a Forecaster in 1985, and attaining the rank of Staff Sergeant. He has been a meteorologist for the US, UK, Bermuda and Jersey Civil Services as well as numerous private companies, within the Aviation, Marine, Industrial and Media fields. Stephen has also served with NATO forces in Afghanistan (Operation Herrick, 2007) as a senior meteorologist.

A life-long student of Ecology, Earth System Science and Sustainability, Stephen is an active member of the Moray Climate Action Network and enjoys rewilding their 4 acres of coastal land in northern Scotland.

Posted to the Air Weather Association website from the Royal Meteorological Society's Met Matters website at [Eyewitness account of Hurricane Nicole | Royal Meteorological Society](#) by the author's request.