



NOAA's Office of Marine and Aviation Operations (OMAO)

Hurricane Reconnaissance, Response, and Recovery Flight and Mission Info Recap

Hurricane Maria

October 3, 2017



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Aircraft Operations

NOAA's fleet of nine manned aircraft is operated, managed and maintained by NOAA's Office of Marine and Aviation Operations (OMAO) and the [NOAA Commissioned Officer Corps](#) based at OMAO's Aircraft Operations Center (AOC). Located at Lakeland Linder Regional Airport in Lakeland, Florida, the officers, crew, and scientists from AOC provide capable, mission-ready aircraft and professional crews to the scientific community. AOC is committed to the safe, efficient and economical use of NOAA aircraft and has more than four decades of experience developing, coordinating and successfully and safely conducting airborne environmental data gathering missions.

The agency's two Lockheed WP-3D Orion "hurricane hunter" aircraft, together with NOAA's Gulfstream IV-SP, significantly enhance our understanding of hurricanes and improve the accuracy of tropical cyclone forecasts. Uniquely equipped with tail Doppler radar and the ability to deploy weather data-gathering probes in flight, these highly capable and versatile aircraft also support atmospheric and air chemistry studies. NOAA's light aircraft also play a vital role in monitoring our environment. Operating nationwide, NOAA's Beechcraft King Air, Gulfstream Jet Prop Commander and De Havilland Twin Otter aircraft support emergency response, marine mammal population studies, shoreline change assessments, water resource and snow surveys, air chemistry studies, and remote sensing projects. NOAA also operates unmanned aircraft systems used to observe marine life, seabirds and their habitat.



OMAO's Gulfstream IV and Twin Otter on the ramp at the AOC in Lakeland, Florida. Photo: NOAA

Hurricane Reconnaissance Flight Info: Hurricane Hunters - WP-3 and G-IV Aircraft



OMAO's WP-3 takes off from Lakeland Linder Regional Airport, home of the Aircraft Operations Center. Photo: NOAA

NOAA's "*Hurricane Hunters*" are two [Lockheed WP-3D Orion](#) (WP-3) aircraft, together with the [Gulfstream IV-SP](#) (G-IV). These aircraft play an integral role in hurricane forecasting. Data collected during hurricanes by these high-flying meteorological stations help forecasters make accurate predictions during a hurricane and help hurricane researchers achieve a better understanding of storm processes, improving their forecast models.

When and where did the [Hurricane Hunters](#) fly during Hurricane Maria?

The [WP-3](#) (N42RF) and [G-IV](#) (N49RF) Hurricane Hunter aircraft conducted a number of flight missions September 22-26 from OMAO's Aircraft Operations Center (AOC) at Lakeland Linder Regional Airport (KLAL) in Lakeland, Florida.

The [WP-3](#) flew eight flights for a total of almost 69 hours and the [G-IV](#) flew six flights for a total of almost 38 hours in support of Hurricane Maria mission taskings.



OMAO's Gulfstream IV takes off from Florida's Lakeland Linder Regional Airport, home of the NOAA Aircraft Operations Center. Photo: Lt. Kevin Doremus/NOAA

What were the Hurricane Hunter flight paths?

Below are composite flight tracks for the WP-3 (page 7) and G-IV (pages 8, when the aircraft was forward deployed to Barbados, and page 9 for flights from Lakeland). The flight tracks also show where the planes deployed dropsondes:

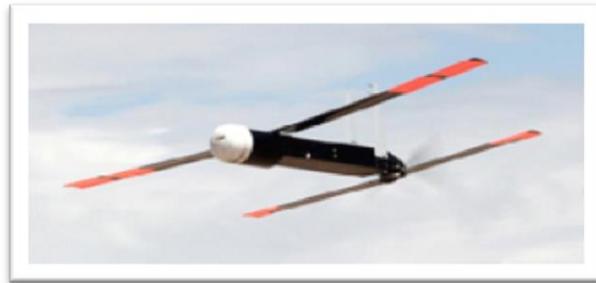
- WP-3 dropped 97
- G-IV dropped 111

A dropsonde is a scientific instrument deployed from the aircraft that descends through the atmosphere by a parachute. The dropsonde provides high-quality, high vertical resolution profiles of atmospheric pressure, temperature, relative humidity, wind speed and direction from the aircraft flight level to the surface over oceans and remote areas.

What data was gathered and why is it important?

The WP-3 flights were [Environmental Modeling Center](#) (EMC) tasked Tail Doppler Radar (TDR) missions and Hurricane Research Center tasked missions that included dropsonde data for the [National Hurricane Center](#) (NHC). The aircraft collected TDR data, dropsonde data, Stepped Frequency Microwave Radiometer (SFMR) data, and Wide Swath Radar Altimeter (WSRA). All data was fed to NHC and EMC near real-time. The TDR data helps to stabilize the model which improves model forecasts of intensity and track. The dropsonde data also helps improve intensity and track forecasts. The SFMR data provides data on surface winds. The WSRA data provides unique information on the sea surface, including wave height, and rain. The aircraft also collected Doppler Wind Lidar data; the wind speed measurements from this platform supplement the TDR data.

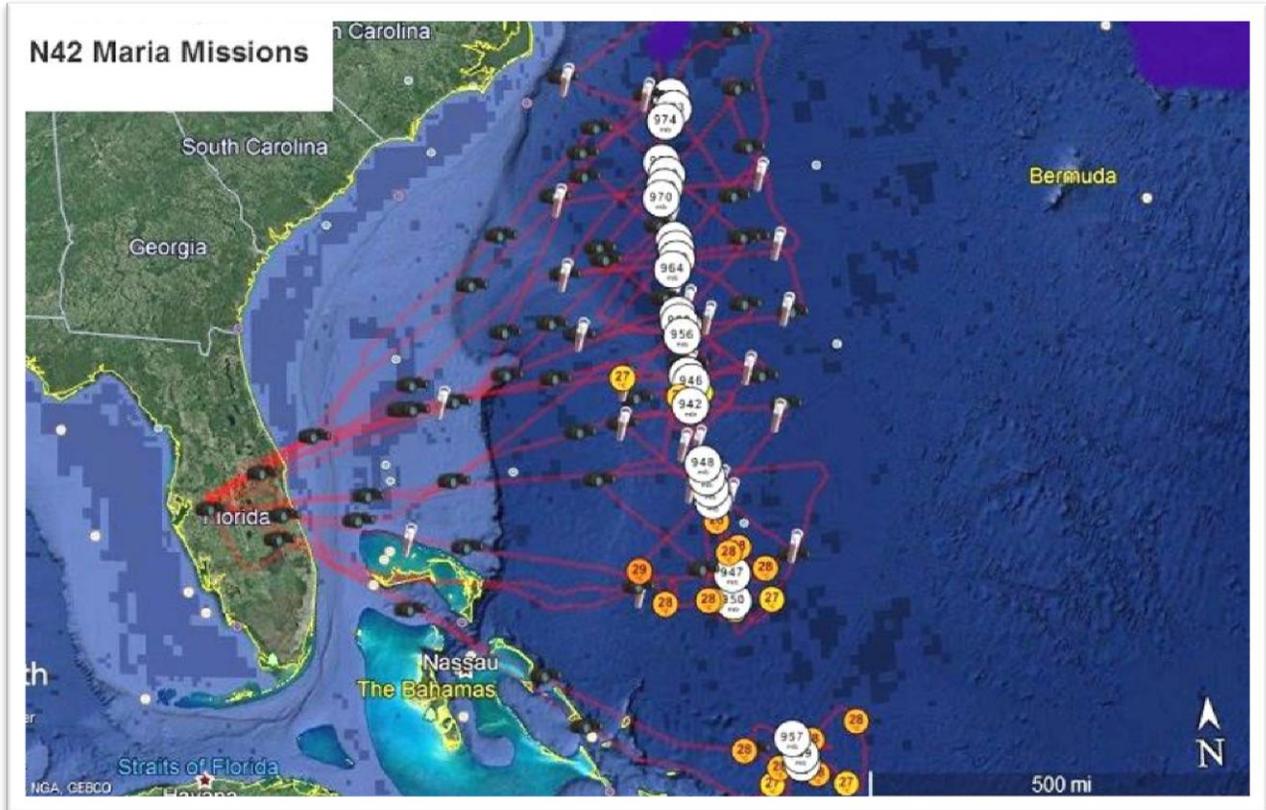
For Hurricane Maria, the WP-3 also conducted Coyote Unmanned Aerial System (UAS) flights in support of NOAA's Office of Oceanic and Atmospheric Research, Hurricane Research Division of the Atlantic Oceanic and Atmospheric Laboratory. Over the course of six Coyote UAS flights that were launched from the WP-3 aircraft into Hurricane Maria, scientists collected valuable (and highly unique) data that was sent to NHC forecasters.



The G-IV flights were surveillance taskings. The dropsonde data measures the atmosphere around the hurricane providing data that improves track forecast by up to 15%. This data is fed to NHC and EMC and fed into the models and track and intensity forecasts. Understanding the weather around the hurricane is critical to understanding its formation, intensification and track.

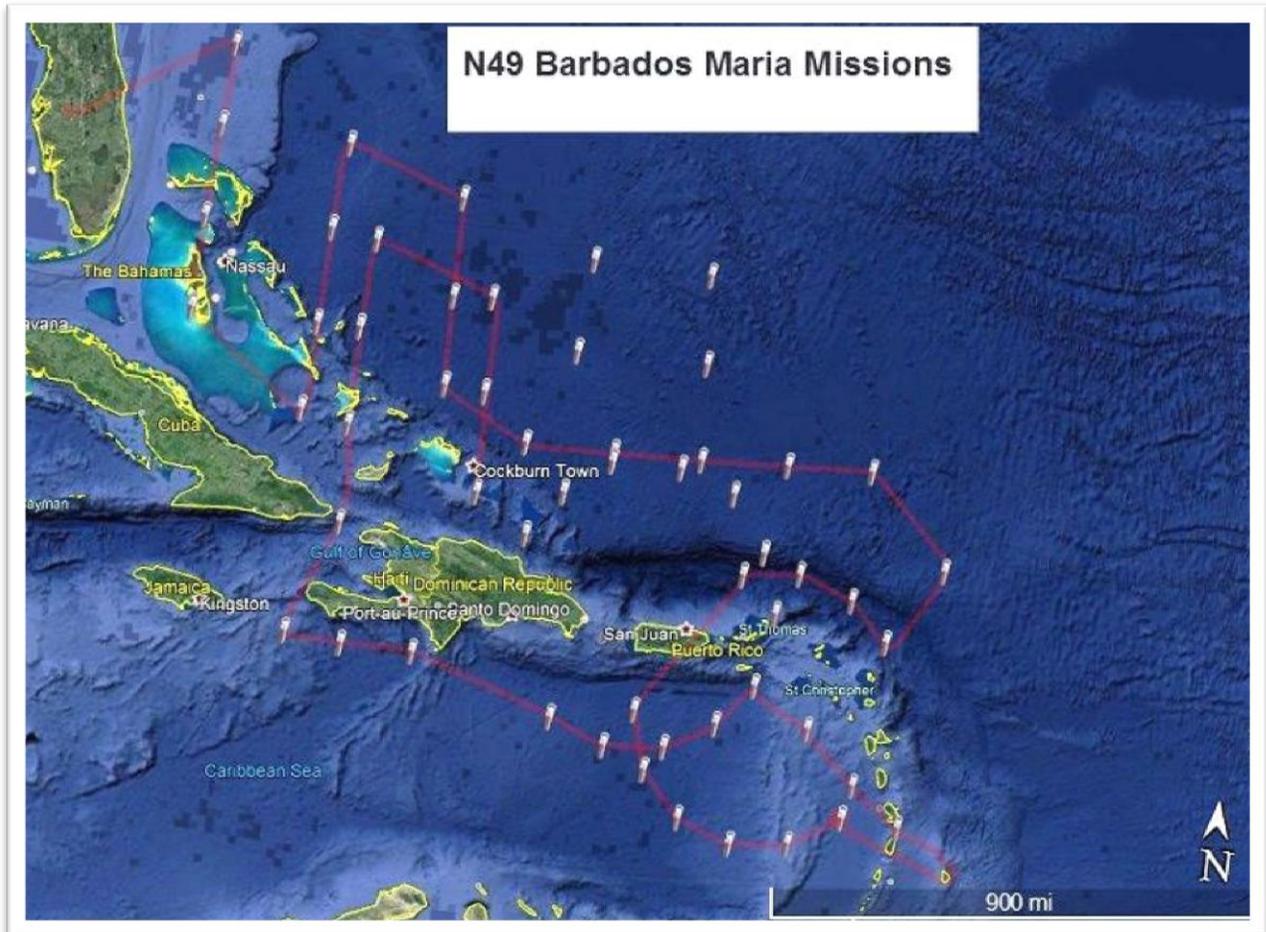
WP-3 (N42RF) Flight Paths

The red lines show the flight paths. The cylinders are the dropsonde locations.



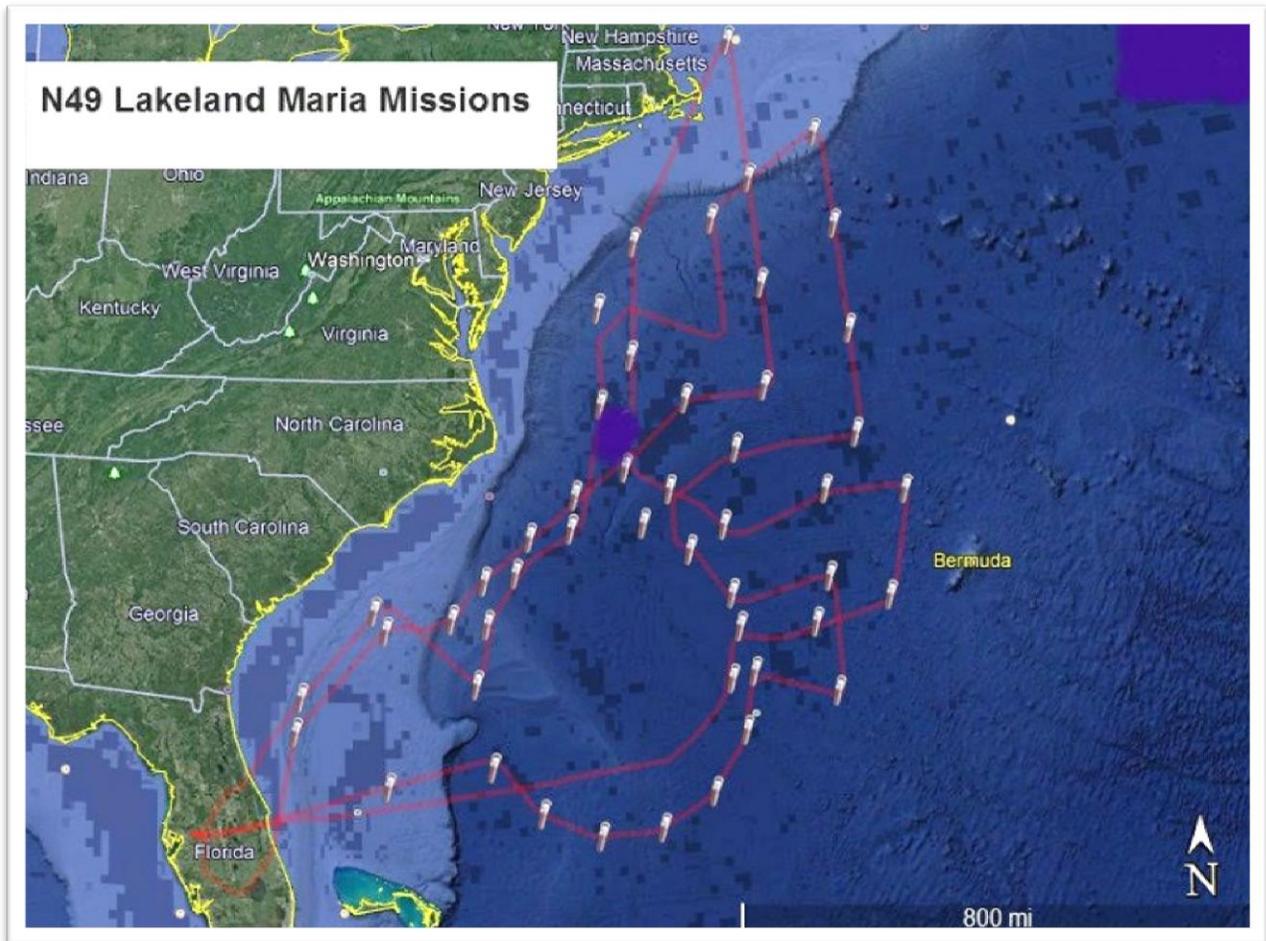
G-IV (N49RF) Flight Paths – from Barbados

The red lines show the flight paths. The cylinders are the dropsonde locations.



G-IV (N49RF) Flight Paths – from Lakeland

The red lines show the flight paths. The cylinders are the dropsonde locations.



Response and Recovery Flight Info for Hurricane Maria

OMAO's [Beechcraft King Air 350CER](#) (N68RF) is a versatile, twin-engine, extended-range turboprop aircraft. It primarily supports coastal mapping and emergency response missions. Equipped with the latest aircraft technology, this King Air Special Mission aircraft's main feature is the two large, downward-facing sensor ports that can support a wide variety of remote sensing systems, including digital cameras, multispectral and hyperspectral sensors, and topographic and bathymetric LIDAR systems. Other aircraft features include a cargo door, bubble windows, two window blanks, and additional mission power. **For Hurricane Maria, from September 21-26 the [King Air](#) flew 12 flights for a total of almost 47 hours, in support of [NOAA's National Ocean Service, National Geodetic Survey](#).** The [King Air](#) collected more than 12,000 aerial oblique images covering more than 1,500 square kilometers affected by Hurricane Maria. In addition to the U.S. Virgin Islands, covered areas of Puerto Rico include Culebra Island, Vieques Island, the east central portion of the main island, and its south and north coasts.

Since August 27, 2017 NOAA has collected close to 65,000 images, covering over 24,000 sq km, and utilizing 195 flight hours in response to Hurricanes Harvey, Irma, and Maria. The information collected is used by FEMA, state, and local emergency managers to prioritize limited resources. This link and information is available to the public and has been used extensively by home owners and business owners to survey their property; and this tool allows property owners to survey their sites remotely without pressuring emergency managers for immediate re-entry into dangerous or strained areas. The images of storm impacted areas may be viewed at:

<https://storms.ngs.noaa.gov/storms/maria/index.html#7/18.056/-64.824>

<https://storms.ngs.noaa.gov/storms/irma/index.html#6/28.139/-81.547>

<https://storms.ngs.noaa.gov/storms/harvey/index.html#7/28.400/-96.690>



OMAO's King Air prepares for takeoff at MacDill AFB in Tampa, Florida. Photo: David Hall/NOAA