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

Hurricane Surveillance and Reconnaissance Flight and Mission Info Recap

Hurricane Lane

August 27, 2018

Contents

Aircraft Operations

The National Oceanic and Atmospheric Administration's (NOAA) 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 OMAO'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, OMAO'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 Lane?

The WP-3 (N42RF) and G-IV (N49RF) Hurricane Hunter aircraft conducted a number of flight missions August 19-22 from Daniel K. Inouye Airport (PHNL) in Honolulu, Hawaii.

The WP-3 flew four (4) flights for a total of almost 33 hours and the G-IV flew four (4) flights for a total of almost 33 hours in support of Hurricane Lane 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 (page 8), when both aircraft were forward deployed to Honolulu. The flight tracks also show where the planes deployed dropsondes:

- WP-3 dropped 78
- G-IV dropped 123

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

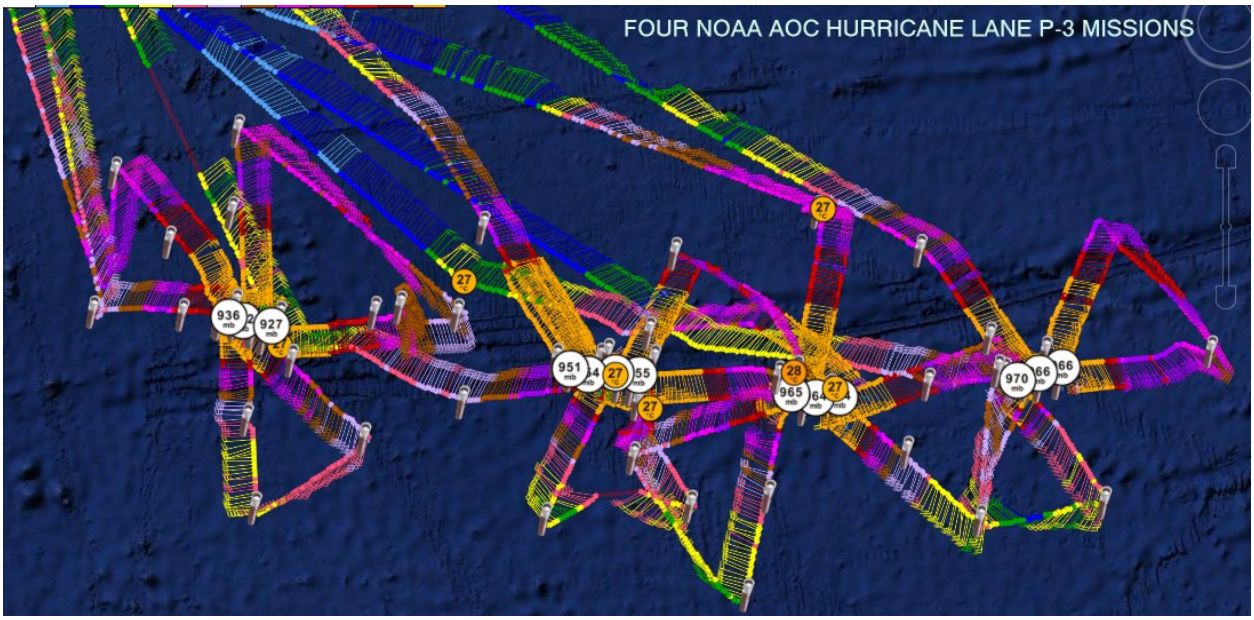
near real-time. The TDR data helps to stabilize the model which improves model forecasts of intensity and track. The dropsonde data also helps improve intensity and track forecasts. The SFMR data provides data on surface winds. The WSRA data provides unique information on the sea surface, including wave height, and rain. The aircraft also collected Doppler Wind Lidar data; the wind speed measurements from this platform supplement the TDR data.

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.

Example of this improvement described in the following Central Pacific Hurricane Center discussion, "…based on the first P-3 flight and G-IV flight into the storm, **the data provided by these missions have been invaluable**. Based on satellite intensity estimates ranging from 87 to 102 knots and Lane's poor representation in satellite imagery, **we might have considered weakening the hurricane. Instead, the aircraft found peak flight-level and SFMR winds of 113 knots in the northwest quadrant. In addition, a dropsonde estimated surface wind of 117 knots was also found in the northwest eyewall. Based on these aircraft observations, we have increased the initial intensity to 110 knots."**

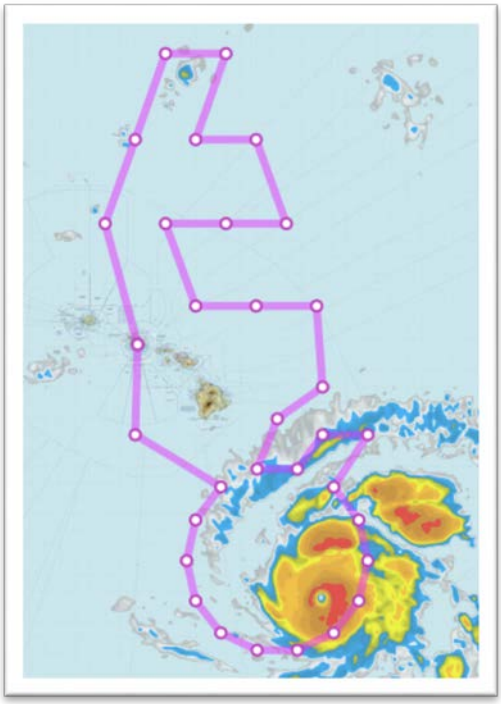
WP-3 (N42RF) Flight Paths

The multicolored lines show the wind direction across the four flight paths. The cylinders are the dropsonde locations marking the center of the hurricane (eye) during each flight.

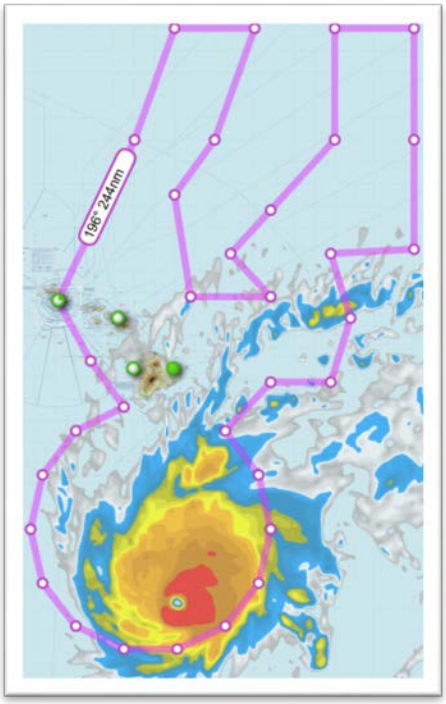


G-IV (N49RF) Flight Paths

August 21, 2018 - The purple lines show the planned flight paths overlaid on an IR satellite image. The cylinders are the dropsonde locations.



August 22, 2018 - The purple lines show the planned flight paths overlaid on an IR satellite image. The cylinders are the dropsonde locations.



Composite Flight Paths: WP-3 (N42RF) G-IV (N49RF)

The multicolored lines shows the WP-3 flights and the black lines show the G-IV flight paths.