

NOAA's "Hurricane Hunter" Aircraft: Lockheed WP- 3D Orions (P- 3s) and Gulfstream IV SP (G- IV) Jet



Specially equipped National Oceanic and Atmospheric Administration (NOAA) aircraft play an integral role in hurricane forecasting. Data collected during hurricanes by these flying meteorological stations and from a variety of other sources are fed into computer models to help forecasters predict how intense a hurricane will be, and when and where it will make landfall. These computer models help forecasters make accurate predictions during a hurricane; and help hurricane researchers achieve a better understanding of storm processes, thereby improving their forecast models.

NOAA's Gulfstream IV SP (Special Performance) jet, conducts hurricane surveillance missions in support of forecasters at NOAA's National Hurricane Center. The jet, which can fly high, fast and far with a range of 4,000 nautical miles and a cruising altitude of 45,000 ft., paints a detailed picture of weather systems in the upper atmosphere surrounding developing hurricanes. This operational data is used in computer models that help forecasters make current predictions. The G-IV's data also supplements the critical low-altitude research data that is collected by NOAA's two WP-3D Orion turboprop aircraft. The P-3's mission is to provide data for NOAA's Hurricane Research Division as it continues to improve its hurricane prediction computer models.

P-3 Aircraft - Into the Storm Slicing through the eyewall of a hurricane, buffeted by howling winds, blinding rain, hail, and violent updrafts and downdrafts before entering the relative calm of the storm's eye, NOAA's two P-3 turboprop aircraft probe every wind and pressure change, repeating the grueling experience again and again during the course of a ten-hour mission.

Scientists aboard the aircraft deploy instruments called Global Positioning System (GPS) dropwindsondes via parachute as the P-3 flies through the hurricane. These devices continuously radio back measurements of pressure, humidity, temperature, and wind direction and speed as they float toward the sea, providing a detailed look at the structure of the storm and its intensity.

For years, NOAA has flown P-3s into hurricanes at low altitudes (1,500-10,000 ft.) to collect research-mission data critical for computer models that predict hurricane intensity and landfall. This information is used differently than the hurricane reconnaissance information provided to the National Hurricane Center by U.S. Air Force WC-130s. Information from both types of flights, however, directly contribute to the safety of Americans living along the vulnerable Atlantic and Gulf coasts.

G-IV Jet - Seeking the Storm's Path The G-IV flies missions around every Atlantic-based hurricane that poses a potential threat to the United States. The jet's mission covers thousands of square miles surrounding the hurricane, gathering, with GPS dropwindsondes, vital high-altitude data needed for improved numerical forecast models. The G-IV has added a vital dimension as it maps the steering currents that influence the movement of hurricanes.

Data from GPS dropwindsondes that measure pressure, temperature, humidity, and wind information are relayed to the aircraft for transmission by satellite to the National Hurricane Center in Miami and the National Centers for Environmental Prediction in Camp Springs, Md. There the data are available for many numerical forecast models, providing important information about regions in which there are no other sources of weather data.

After hurricane season, NOAA's interest in severe weather becomes focused on the winter storms affecting the western, central and northeastern United States. NOAA has used the G-IV to help monitor and study these storms to advance our understanding of them and improve winter storm forecasts. The G-IV has also been used to study clear air turbulence, a condition that threatens the safety of air traffic, helping scientists increase their ability to understand and predict this potentially deadly phenomenon.

The G-IV and P-3s - Working Together During recent hurricane seasons, the high-altitude G-IV was joined by the P-3s, which fly at much lower altitudes and collect data that complement the G-IV data. Together, these aircraft provided the most comprehensive data coverage ever collected in the environment of hurricanes. The missions not only provided hurricane forecasters with critical data via the numerical model forecasts, but also gave real-time indicators of the overall weather conditions working together that were thought to be influencing the tracks of the hurricanes. These data will also enable researchers to investigate the factors related to hurricane track forecasts and gain further knowledge in this scientific field of study.