

2019 NOAA/AOML/HRD Hurricane Field Program - IFEX

MATURE STAGE EXPERIMENT *Flight Pattern Descriptions*

Experiment/Module: NESDIS Ocean Winds

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Requirements: Categories 2–5

Mature Stage Science Objective(s) Addressed:

- 1) Develop and refine measurement technologies that provide improved real-time monitoring of TC intensity, structure, and environment [*IFEX Goal 2*]

P-3 Pattern 1:

What to Target: The highest-wind region of a TC.

When to Target: The ideal ocean winds storm would typically be a developed hurricane (category 1 and above) where a large range of wind speeds and rain rates would be found. However, data collected within tropical depressions and tropical storms would still provide very useful observations of rain impacts.

Pattern: Start with a survey pattern (Figure-4 or Butterfly). Then execute a racetrack or Lawnmower pattern over a feature of interest such as a rain band or wind band. Constant bank circles of 10–30 degrees: inserted along flight legs where the desired environmental conditions were present (region of no rain and where we might expect the winds to be consistent over a range of about 6–10 miles, about the diameter of a circle). This would not be something we would want to do in a high gradient region where the conditions would change significantly while we did the circle.

Flight altitude: The sensitivity of the IWRAP system defines the preferred flight altitude to be below 10 kft to enable the system to still measure the ocean surface in the presence of rain conditions typical of tropical systems. With the Air Force typically flying at 10 kft pressure altitude, we have typically ended up with an operating altitude of 7 kft radar.

Leg length or radii: Initial survey extends 20–50 n mi (35-95 km) from the storm center. The actual distance would be dictated by the storm size and safety of flight considerations. The racetrack/Lawnmower legs are just long enough to cover the feature of interest.

Estimated in-pattern flight duration: Typically 8-9 hr for full-duration mission.

Expendable distribution: GPS dropsondes dropped in high-wind regions.

Instrumentation Notes: Operating at a constant radar altitude is desired to minimize changes in range and thus measurement footprint on the ground. Higher altitudes would limit the ability of IWRAP consistently see the surface during precipitation, but these altitudes would provide useful data, such as measurements through the melting layer, to study some of the broader scientific questions. Straight and level flight with a nominal pitch offset unique to each P-3 is desired during most flight legs.