

2021 NOAA/AOML/HRD Hurricane Field Program - APHEX

MATURE STAGE EXPERIMENT *Flight Pattern Description*

Experiment/Module: Eye-eyewall mixing

Investigator(s): Sim D. Aberson

Requirements: Very intense tropical cyclones, intensity category 4 or 5

Mature Stage Science Objective(s) Addressed:

- 1) Collect observations targeted at better understanding internal processes contributing to mature hurricane structure and intensity change [*APHEX Goals, 1-3*].

P-3 Pattern #1:

What to Target: This module requires a category-4 or category-5 TC with a clearly defined, visible eye, closed eyewall, and inversion and an eye diameter of at least 30 n mi.

When to Target: The module should only be attempted during daytime missions. It can be included within any missions during aircraft passage through the eye.

Pattern: This is a break-away pattern that is compatible with any standard pattern with an eye passage (all P-3 patterns except the Square spiral or Lawnmower). The eye must be ≥ 25 n mi in diameter, and for asymmetric or non-circular eyes, the narrowest cross section from eyewall to eyewall must be ≥ 25 n mi. Additionally, a 2-n mi standoff distance should be maintained from the radar displayed inner eyewall. The P-3 will penetrate the eyewall at the standard-pattern altitude. Once inside the eye, the P-3 will maintain the flight level of the main mission and perform a single orbit of the eye with a separation distance of approximately 2 n mi from the inner edge of the eyewall. The flight level of the orbit and 2 n mi minimum distance from the edge of the eyewall can be adjusted for safety considerations at the pilot's discretion. For non-circular eyes, maintaining a circular orbit is preferred (i.e., portions of the orbit could be >2 n mi from the eyewall). If a center fix is required, this pattern can be done either before or after the center fix.

Flight altitude: The flight altitude will largely be the same as the standard pattern altitude, but can be adjusted for safety reasons.

Leg length or radii: The P-3 will circumnavigate the eye about 2 n mi from the edge of the eyewall.

Estimated in-pattern flight duration: Depending upon the size of the eye, this pattern should take between 0.25 and 0.5 h.

Expendable distribution: No expendables required.

Instrumentation Notes: No special instructions for operation.

2021 NOAA/AOML/HRD Hurricane Field Program - APHEX

MATURE STAGE EXPERIMENT *Flight Pattern Description*

P-3 Pattern #2:

What to Target: Any category-4 or category-5 hurricane with a well-defined eyewall.

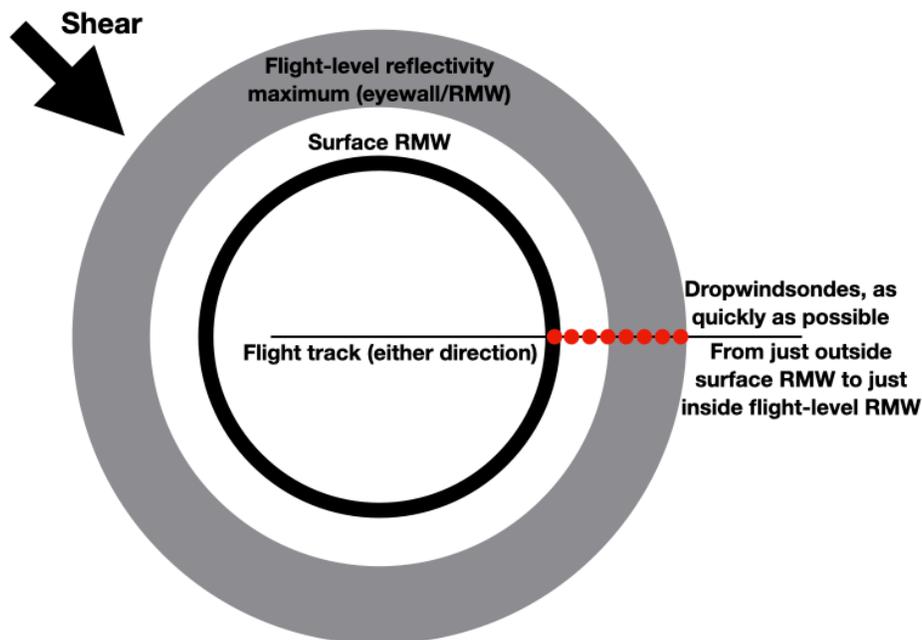
When to Target: During any transit across what is believed to be the strongest region of the eyewall.

Pattern: The pattern will not deviate from the regular eyewall penetration during any mission.

Flight altitude: A regular altitude for the main purpose of the flight.

Leg length or radii: N/A

Estimated in-pattern flight duration: This module does not add any time to the mission.



Expendable distribution: 7 or 8 dropwindsondes will be dropped as quickly as possible across the wind-speed maximum of the eyewall. The sondes should be spaced as close together as possible. *The goal is to have the second-outermost sonde to be coincident with the flight-level radius of maximum wind speed, and the second-innermost sonde to be coincident with the surface radius of maximum wind speed.*

Instrumentation Notes: The goal is to have as many sondes as possible in the air at the same time to investigate the structure of an individual miso- or meso-scale vortex.