

MATURE STAGE EXPERIMENT
Flight Pattern Description

Experiment/Module: TDR Analysis Evaluation Module

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Requirements: Categories 2–5

Mature Stage Science Objective(s) Addressed:

- 1) Test new (or improved) technologies with the potential to fill gaps, both spatially and temporally, in the existing suite of airborne measurements in mature hurricanes. These measurements include improved three-dimensional representation of the hurricane wind field, more spatially dense thermodynamic sampling of the boundary layer, and more accurate measurements of ocean surface winds [*APHEX Goal 2*]

P-3 Pattern #1

What to Target: Eyewall region and near-core vortex

When to Target: The eyewall *must* fit within a standard TDR swath [*maximum* distance from the flight track to the edge is 27 n mi (50 km)]. Optimal eyewall radius is 16 n mi (30 km). Note that for eyewall radii much less than the optimal scale (< 10 n mi), rapid changes in crab angle will lead to degraded analysis coverage in the eyewall region. With this degradation, module objectives may still be met. Ideally, precipitation should be sufficiently symmetric to maximize TDR analysis coverage (> 75%), especially within the eyewall.

Pattern: Any standard P-3 pattern with inbound-outbound radial legs. Two P-3s will fly simultaneously through the eyewall region with perpendicular flight tracks: as one P-3 reaches the storm center, the other P-3 samples the maximum winds of the eyewall (inbound or outbound). Timing is critical, as the TDR of the “center P-3” must sample at large range the maximum winds being sampled simultaneously by the TDR of the “eyewall P-3”. Ideally, simultaneous sampling is repeated on subsequent passes.

Flight altitude: One P-3 should be near a standard flight altitude (ideally, 10 kft) and the other as close to that level as is operationally permitted (e.g., 8 or 12 kft).

Leg length or radii: Minimum radius from center is 30 n mi (55 km). Analysis comparison is possible only out to the TDR swath edge, so sampling beyond 30 n mi is unnecessary for module objectives.

Estimated in-pattern flight duration: 2-5 h

Expendable distribution: No expendables are required. Dropsondes launched at any point within the module could, however, be used for TDR evaluation purposes.

Instrumentation Notes: The flight pass should be as close to a straight line as possible to minimize reductions in TDR coverage due to maneuvering. No center hunting should be performed, ensuring straight and level flight is maintained during an eyewall pass. Ideally, this module should not be conducted along with other modules requiring extraordinary coordination.