2023 NOAA/AOML/HRD Hurricane Field Program - APHEX

MATURE STAGE EXPERIMENT
Flight Pattern Description

Experiment/Module: Gravity Wave

Investigator(s): Jun Zhang (PI) and David Nolan (co-PI)

Requirements: Categories 2–5

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: Sample the inner core and near environments of the TC

When to Target: Any strength TC; no land restrictions. This module ideally should be conducted in quadrant with the least rainband activity, typically the upshear right or right-real quadrant. The best opportunity is at the end of a standard Figure-4 pattern, when the last leg terminates in a quadrant with less rainbands.

Pattern: Any standard P-3 pattern that provides symmetric coverage (e.g. Rotated Figure-4, Figure-4 Butterfly, etc.). At the end of the last leg, continue outward to distance of 160 n mi (295 km) from the center, or further if possible (see Fig. MA-1). Then turn the P-3 around and head directly back to the eye, retracing the previous leg in the opposite direction

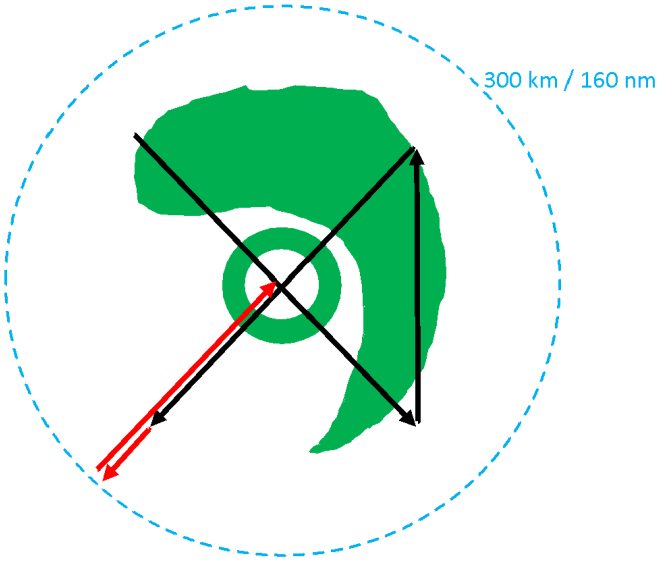

Figure MA-1. *Depiction of the Gravity Wave module in which the P-3 flies an extended leg [160 n mi*
Flight altitude: 5-10 kft as high as possible. The module should be conducted below the freezing level

Leg length or radii: Leg lengths should extend to at least 160 n mi (295 km) from the center, or further if time permits, including the turn leg back to the center.

Estimated in-pattern flight duration: ~40 min – 1 hr

Expendable distribution: Dropsonde and AXBTs are not a requirement

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits. After finishing the outbound leg, please turn as fast as possible as safety permits.

P-3 Pattern 2:

What to Target: Sample the inner core and near environments of the TC

When to Target: Any strength TC; no land restrictions. This module ideally should be conducted in quadrant with the least rainband activity, typically the upshear right or right-real quadrant. The best opportunity is at the end of a standard Figure-4 pattern, when the last leg terminates in a quadrant with less rainbands.

Pattern: Any standard P-3 pattern that provides symmetric coverage (e.g. Rotated Figure-4, Figure-4 Butterfly, etc.). At the end of the last leg (outbound or downwind leg), continue outward to distance of 90 n mi (165 km) from the end point, or further if possible (see Fig. MA-2). Then turn the P-3 around and head directly back toward the starting point of the outbound leg, retracing the previous leg in the opposite direction to the end point before starting next radial leg or downwind leg.

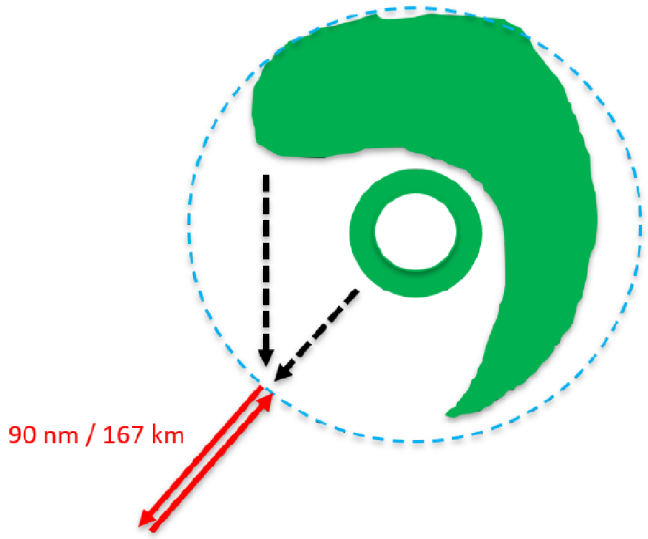

Figure MA-2. *Depiction of the Gravity Wave module in which the P-3 flies an extended leg (90 n mi) (red path) and reverses course along the same azimuth back toward the storm center.*

Flight altitude: 5-10 kft as high as possible. The module should be conducted below the freezing level

Leg length or radii: Leg lengths should extend to at least 90 n mi from the end point, or further if time permits, including the turn leg back to the previous end point.

Estimated in-pattern flight duration: ~40 min – 1 hr

Expendable distribution: Dropsondes and AXBTs are not a requirement.

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits. After finishing the outbound leg, please turn as fast as possible as safety permits.