EARLY STAGE EXPERIMENT
Flight Pattern Descriptions

Experiment/Module: Analysis of Intensity Change Processes Experiment (AIPEX)

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Requirements: TD, TS, Category 1

Early Stage Science Objective(s) Addressed:

1) Collect datasets that can be used to improve the understanding of intensity change processes, as well as the initialization and evaluation of 3-D numerical models, particularly for TCs experiencing moderate vertical wind shear [*IFEX Goals 1, 3*]

P-3 Pattern 1 (coordinated with the G-IV):

What to Target: Sample the inner core region of a TC

When to Target: Every 12 h [*optimal*] or every 24 h [*minimal*], preferably in coordination with a corresponding G-IV mission (G-IV Module 1 or G-IV Module 2).

Pattern: Rotated Figure-4

Flight altitude: [*optimal*] 10–12 kft, either radar or pressure (5 kft is minimum altitude for dropsonde launches)

Leg length or radii: 105 n mi (195 km)

Estimated in-pattern flight duration: ~ 5 h

Expendable distribution: [*optimal*] (up to 32 dropsondes total) Modify standard by moving the mid-point dropsonde to half the radius of innermost G-IV radii. AXBTs preferably paired with dropsondes at mid- and turn points and center. If radius of maximum wind (RMW) is significantly different (> 10 n mi) from any of the standard dropsonde locations, release dropsonde there, and also release dropsonde at 1.5 x RMW, subject to same constraint regarding proximity to standard dropsonde locations. No AXBTs need to be coordinated with these RMW-based drops. Release additional dropsonde along radial leg between principal rainband and RMW if a rainband exists and location is > 10 n mi (19 km) from existing drop location, not to exceed > 4 additional dropsondes per mission. [*minimal*] (10–12 dropsondes total) Modify standard as stated in [*optimal*], keeping only midpoint drops, as well as center drops on the first and last pass. AXBTs preferably paired with dropsondes at midpoints and center.

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits. Inbound-outbound passes should be uninterrupted. DWL should be downward looking, 20° off nadir.

P-3 Module 2: No coordination with the G-IV; TC experiencing a precipitation asymmetry

What to Target: Sample the inner core and near environment regions of a TC when the inner core precipitation distribution is asymmetric and when the G-IV is not available for coordination

When to Target: Every 12 h [*optimal*] or every 24 h [*minimal*]

Pattern:
[optimal] P-3 Circumnavigation with rotated Figure-4 (modified from the standard). [minimal] P-3 Circumnavigation with single Figure-4 (standard).

Note: The circumnavigation can be adjusted for hazard avoidance; e.g., if pattern in downshear hemisphere is not possible, the circumnavigation can be abbreviated to the upshear hemisphere with a pass over the center (see example below: Figure-4 in green, circumnavigation in orange, shear vector heading in black, 'X' is a dropsonde location).

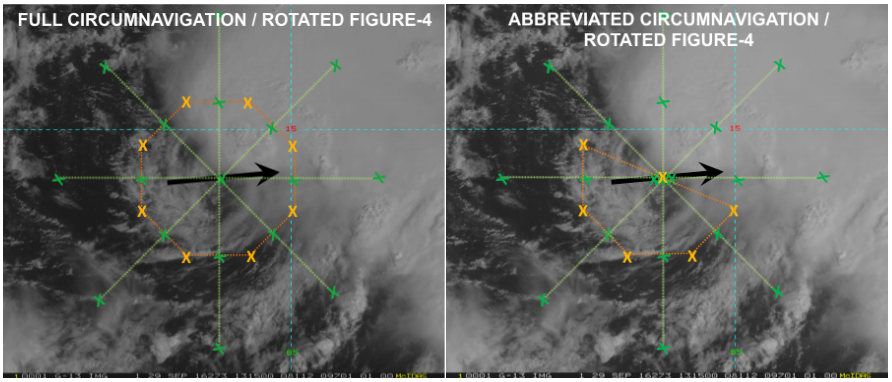

Figure AIPEX1

Flight altitude: Figure-4: [*optimal*] 10–12 kft (5 kft is minimum altitude for dropsonde launches). Circumnavigation: As high as possible [*optimal*] above 25 kft [*minimal*]

Leg length or radii: 105 n mi (195 km) leg length. Radius of circumnavigation is preferably as close to the inner-core precipitation shield as safety allows.

Estimated in-pattern flight duration: [*optimal*] Circumnavigation with rotated Figure-4, ~6 h; [*minimal*] Circumnavigation with single Figure-4, ~ 4 h

Expendable distribution:
[*optimal*] Use the standard for P-3 circumnavigation (8 dropsondes), as well as for rotated Figure-4 (20 dropsondes, 28 total with circumnavigation) or single Figure-4 (10 dropsondes, 18 total with circumnavigation). AXBTs preferably paired with dropsondes at mid- and turn points and center.

[*minimal*] Use the standard for P-3 circumnavigation (8 dropsondes), and modify standard Figure-4 by keeping only turn point drops, as well as center drops on the first and last pass (for rotated Figure-4, 10 dropsondes, 18 total with circumnavigation; for single Figure-4, 6 dropsondes, 14 total with circumnavigation). AXBTs preferably paired with dropsondes at turn points and center.

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits. Inbound-outbound passes should be uninterrupted. DWL should be downward looking, 20° off nadir.

2019 NOAA/AOML/HRD Hurricane Field Program - IFEX

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G-IV Pattern 1:

What to Target: Sample the environment and near environment of the TC

When to Target: Every 12 h [*optimal*] or every 24 h [*minimal*], preferably in coordination with a corresponding P-3 mission (P-3 Module 1).

Pattern: G-IV Circumnavigation (octagon [*optimal*], hexagon [*minimal*]). Should be storm centered and oriented such that the left and right of shear semicircles are sampled equally by dropsondes.

Flight altitude: 40–45 kft

Leg length or radii: 200 n mi (370 km), 120 n mi (222 km), and 60 n mi (111 km) (radii)**.** The innermost radii can be adjusted outward if necessitated by hazard avoidance (outer two radii rings should be similarly adjusted, if time allows).

Estimated in-pattern flight duration: ~ 5–6 h

Expendable distribution: Dropsonde at each turn point; 24 in total (octagon) [*optimal*], or 18 in total (hexagon) [*minimal*]

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits.

G-IV Module 2:

What to Target: Sample the surrounding environment of the TC

When to Target: Every 12 h [*optimal*] or every 24 h [*minimal*]

Pattern: G-IV Star (with circumnavigation if no coordination with P-3)

Flight altitude: 40–45 kft

Leg length or radii: 210 n mi (388 km) outer, 90 n mi (167 km) inner radii (*standard*). Depending on the time of day, aircraft duration limitations, and safety considerations, the lengths of the inner (outer) points could be shortened (extended) if an opportunity to sample a diurnal pulse presents itself (see TC Diurnal Cycle Experiment).

Estimated in-pattern flight duration: ~ 4 h (~ 5 h with circumnavigation)

Expendable distribution: Dropsonde at each turn point; 13 dropsondes total (20 with circumnavigation)

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits.