**12. Analysis of Intensification Processes Experiment (AIPEX)**

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**Mission Description:** Collect precipitation, kinematic, thermodynamic, and ocean observations within the environment, near environment (~100 km, or 60 nmi), and inner core regions of tropical cyclones (TCs) that have a reasonable potential for intensification (based on statistical and/or numerical model forecast guidance), with a particular focus on the early stages (i.e., TD, TS, weak hurricane). When possible (i.e., subject to range, timing, and other logistical constraints), missions will begin at least 24 h prior to the expected onset of intensification.

**G-IV Module 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.

**P-3 Module 1**

**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 (5 kft is minimum altitude for dropsonde launches)

**Leg length or radii:** 105 n mi

**Estimated in-pattern flight duration: ~** 5 h

**Expendable distribution:**

[*optimal*] (up to 28 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.

[*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 regionsof 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):



**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 (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.