

# 2022 NOAA/AOML/HRD Hurricane Field Program - APHEX

## MATURE STAGE EXPERIMENT *Flight Pattern Description*

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**Experiment/Module:** NESDIS Ocean Winds

**Investigator(s):** Paul Chang (PI, NOAA/NESDIS/STAR), Zorana Jelenak (NOAA/NESDIS/STAR), Joe Sapp (NOAA/NESDIS/STAR)

**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*].
- 2) Collect observations targeted at better understanding the response of mature hurricanes to their changing environment, including changes in vertical wind shear, moisture and underlying oceanic conditions [*APHEX Goals 1, 3*].
- 3) 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:** The entire storm.

**When to Target:** Tropical cyclones with hurricane strength winds with rain are preferred, but weaker tropical cyclones are still useful.

**Pattern:** Figure-4, Rotated Figure-4, or Butterfly

**Flight altitude:** 7 - 10 kft radar altitude. Constant radar altitude is strongly preferred.

**Leg length or radii:** 50nmi from the storm center

**Estimated in-pattern flight duration:** 1 – 1.5 hours

**Expendable distribution:** Dropsondes preferred at the RMW and center, but only at the PI's discretion if not already prescribed.

**Instrumentation Notes:** Straight and level flight with a 2° nominal pitch offset required to maintain radar altitude and consistent speed. Maintain consistent ground speed as safety permits. Data link to ground systems for near-real-time data transmission throughout the pattern is important, but not critical. Regular, real-time center fixes transmitted to ground systems available to the PI are required as safety permits.

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**P-3 Pattern #2**

**What to Target:** The highest wind **or** rainy areas of the storm, typically the eyewall.

**When to Target:** Hurricane wind conditions with rain are preferred, but rain-free conditions are still useful.

**Pattern:** Flight legs performed to and from the storm center radially. The PI will typically call the turns. Loitering may occur at the furthest point from center or in the eye.

**Flight altitude:** 7 - 10 kft radar altitude. Constant radar altitude is strongly preferred.

**Leg length or radii:** Any length of legs from the storm center, but typically 50 n mi from the center **or** until the surface winds are at least 50% of the peak winds observed during the leg (at PI's discretion).

**Estimated in-pattern flight duration:** 10 – 30 minutes per radial.

**Expendable distribution:** Dropsondes at the PI's discretion; often in the highest wind conditions **or** where there is both significant rain and strong winds.

**Instrumentation Notes:** Straight and level flight with a 2° nominal pitch required to maintain radar altitude and consistent speed. Maintain consistent ground speed as safety permits. Data link to ground systems for near-real-time data transmission throughout the pattern is important, but not critical. Regular, real-time center fixes transmitted to ground systems available to the PI are required as safety permits.