| **MISSION PLAN** | | | |
| --- | --- | --- | --- |
| **FLIGHT ID** | 20220907I1 | **STORM** | AL06 / EARL |
| **MISSION ID** | 1806A | **TAIL NUMBER** | NOAA43 |
| **TASKING** | EMC | **PLANNED PATTERN** | Butterfly |
| **MISSION SUMMARY** | | | |
| **TAKEOFF [UTC]** | 2024 | **LANDING [UTC]** | 0437 |
| **TAKEOFF LOCATION** | St. Croix | **LANDING LOCATION** | St. Croix |
| **FLIGHT TIME** | 8.2 | **BLOCK TIME** | 8.4 |
| **TOTAL REAL-TIME RADAR ANALYSES**  **(Transmitted)** | 8 (8) | **TOTAL DROPSONDES (Good/Transmitted)** | 26 (26 / 26) |
| **OCEAN EXPENDABLES (Type)** | 3 AXBT (ONR) | **sUAS (Type)** | None |
| **APHEX EXPERIMENTS / MODULES** | Early Stage Experiment: AIPEX (FLAIMS), Mature Stage Experiment: Gravity Wave Module | | |
| **HRD CREW MANIFEST** | | | |
| **LPS ONBOARD** | Holbach | **LPS GROUND** | Hazelton |
| **TDR ONBOARD** | Holbach | **TDR GROUND** | Gamache |
| **ASPEN ONBOARD** | Aberson | **ASPEN GROUND** | None |
| **NESDIS SCIENTISTS** | Chang, Jelenak, Sapp, Bjorland | | |
| **GUESTS (Affiliation)** | None | | |
| **AOC CREW MANIFEST** | | | |
| **PILOTS** | Doremus, Copare, Wood | | |
| **NAVIGATOR** | Utama | | |
| **FLIGHT ENGINEERS** | Darby, Pittman | | |
| **FLIGHT DIRECTOR** | Holmes, Kalen | | |
| **DATA TECHNICIAN** | T. Richards | | |
| **AVAPS** | Warnecke, Sans Souci, *McFadden* | | |

| **PRE-FLIGHT** | |
| --- | --- |
| **Flight Plan** | Pattern: Fly butterfly pattern with 105 nmi legs  Altitude: 10 kft (pressure altitude)  Potential add-on Modules:   * Analysis of Intensity Change Processes Experiment (AIPEX) >> Vortex Alignment Module (VAM) * Analysis of Intensity Change Processes Experiment (AIPEX) >> FLAIMS Module * Convective Burst Structure and Evolution Module (CBM) * Rainband Complex Module (RCM)   Load 40 sondes (all dropsondes transmitted to the GTS); 3 ONR/NRL AXBTs- 1 deep water, 2 shallow water (all AXBTs transmitted to the AOC ground server if possible) |
| **Expendable Distribution** | Release dropsondes at endpoints, midpoints, centers; possible supplemental rapid sondes across the RMW |
| **Preflight Weather Briefing** | Earl is currently a category 1 hurricane with maximum sustained winds of 80 kt. It is still battling some moderate W/SW shear, but has been continuing to slowly strengthen. It is forecast to continue strengthening as it moves N just to the east of Bermuda over the next few days before accelerating off to the NE.  An eye appears to be trying to clear out in satellite imagery and the cloud pattern is more robust than in past days. |
| **Instrument Notes** | None noted |

| **IN-FLIGHT** | |
| --- | --- |
| **Time [UTC]** | **Event** |
| 2024 | Takeoff from St. Croix |
| 2154 | Initial Point (IP) sonde released just before entering rainband Drop #1 |
| 2202 | Just passed through rainband |
| 2208 | Midpoint Drop #2 |
| 2208 |  |
| 2217 | Estimating 50 n mi diameter eye. Can see the ocean through broken low-level cumulus. Still some cirrus above us despite satellite imagery showing Earl trying to clear out an eye. |
| 2218 |  |
| 2223 | Center combo drop #3 MSLP 971 mb winds 145/03, AXBT #1 released |
| 222846 | RMW NW 10 m winds 79 kt drop #4 |
| 223336 | RMW NW 10 m winds 72 kt (initially no launch detect but some data came in at the bottom) drop #5 |
| 222959 | RMW NW 10 m winds 75 kt drop #6 |
| 2236 | Midpoint outbound drop #7 |
| 2248 | Endpoint (EP) leg 1 drop #8 |
| 2302 | AXBT #2 released and measured an SST of 29.22C; had to wait until we were a little further south on downwind leg in clearer air to release BT |
| 2307 | Eye forming on IR |
| 2314 | Beginning to turn inbound for leg 2 |
| 2315 | IP leg 2 drop #9 |
| 2321 | West endpoint sonde had ~60% RH down to 1000 ft |
| 2325 | First TDR analysis |
| 233220 | RMW W 10 m wind 67 kts drop #10 |
| 233331 | RMW W 10 m wind 59 kts drop #11 |
| 233541 | RMW W 10 m wind 69 kts drop #12 |
| 2339 | Center drop #13 MSLP 970 mb winds 355/05 |
| 2340 | Eyewall is now somewhat open to the east and filled in more to the south. 1 satcom went down. |
| 234646 | RMW E 10 m wind 61 kts drop #14 |
| 234728 | RMW E 10 m wind 85 kts drop #15 |
| 234812 | RMW E 10 m wind 83 kts drop #16  Strong winds in the East eyewall |
| 2354 | MMR shows a more closed eyewall |
| 0003 | EP leg 2 drop #17 |
| 0024 | AXBT #3 released and measured an SST of 28.96C. Released a few minutes before IP in clearer air. |
| 0028 | Beginning to turn inbound for leg 3 |
| 0029 | IP leg 3 drop #18 no GPS initially |
| 0030 | Backup to IP drop #19 |
| 0041 | Second analysis composite |
| 004338 | RMW NE 10 m wind 72 kts drop #20 |
| 004444 | RMW NE 10 m wind 79 kts drop #21 |
| 0052 | Center drop #22 |
| 0058 |  |
| 0102 | Turning back inbound to the center for the FLAIMS module |
| 010832 | RMW SW 10 m wind 83 kts drop #23 |
| 0111 | Turning to head back out to SW |
| 0112 |  |
| 0122 | Turning to head back to center. Needed to adjust inbound track to account for unfavorable eyewall on initial track. |
| 0130 | Troubleshooting TDR. Jobfile was not making its way up to the plane |
| 0147 | IWRAP profile from earlier |
| 0155 | Special center sonde released in honor of Doc McFadden after his 600th hurricane eyewall penetration. Drop #24. |
| 0202 | Heading outbound to pt 6 after tribute to Doc McFadden |
| 0203 |  |
| 0210 | Storm is basically vertically aligned |
| 0214 | TDR jobfile problem fixed. Sonia and Todd had to reset some stuff on the ground and the plane. |
| 0216 | Midpoint drop #25 |
| 0227 | EP leg 4 drop #26 |
| 0242 | Turning back inbound for Gravity Wave module |
| 0258 | Back at pt 6. Science is complete! |
| 0437 | Landed at St. Croix |

| **POST-FLIGHT** | |
| --- | --- |
| **Mission Summary** | Earl was becoming more symmetric and strengthening throughout the flight. The eye was initially open south on the first pass through, but then closed off on the second pass.  The vortex had become much more aligned by this point, with only ~10 km of tilt. |
| **Actual Standard Pattern Flown** | Butterfly with additional FLAIMS and Gravity Wave Modules |
| **APHEX Experiments / Modules Flown** | Data collection supports the *Early Stage Experiment: Analysis of Intensification Processes (AIPEX)*, specifically the *FLAIMS (Flight-level Assessment of Intensification in Moderate Shear)* module. *The Gravity Wave Module* was also flown near the end of the pattern. |
| **Plain Language Summary** | * Earl strengthened into a category 2 hurricane with max winds of 85 kt and minimum sea-level pressure of 970 mb. |
| **Instrument Notes** | Brief issue with TDR jobfiles getting up to the plane. Required Sonia and Todd to reset some things on the ground and the aircraft. We were still able to get all of the analyses off in time. |
| **Final Mission Track** |  |