| **MISSION PLAN** | | | |
| --- | --- | --- | --- |
| **FLIGHT ID** | 20240702I1 | **STORM** | AL02 / BERYL |
| **MISSION ID** | 0802A | **TAIL NUMBER** | (NOAA-43) |
| **TASKING** | (EMC/NHC/HRD) | **PLANNED PATTERN** | Rotated Figure-4 |
| **MISSION SUMMARY** | | | |
| **TAKEOFF [UTC]** | 0831 | **LANDING [UTC]** | 1553 |
| **TAKEOFF LOCATION** | STX | **LANDING LOCATION** | STX |
| **FLIGHT TIME** | Fractional hr, Takeoff to Landing Time | **BLOCK TIME** | Get from onboard LPS or Flight Director |
| **TOTAL REAL-TIME RADAR ANALYSES**  **(Transmitted)** | 4 (4) | **TOTAL DROPSONDES Deployed (Transmitted)** | 27(27) |
| **OCEAN EXPENDABLES (Type)** | n/a | **sUAS (Type)** | N/A |
| **APHEX EXPERIMENTS / MODULES** | Exact name of the Experiment in the HFP Plan; identify relevant experiments / module even if not a research tasking | | |
| **HRD CREW MANIFEST** | | | |
| **LPS ONBOARD** | J. Zhang | **LPS GROUND** | Dunion/Montgomery  Looney CHAOS coord |
| **TDR ONBOARD** | J. Zhang | **TDR GROUND** | Fischer |
| **ASPEN ONBOARD** | Sellwood | **ASPEN GROUND** |  |
| **NESDIS SCIENTISTS** |  | | |
| **GUESTS (Affiliation)** |  | | |
| **AOC CREW MANIFEST** | | | |
| **PILOTS** | Doremus/Wood/Taraboletti | | |
| **NAVIGATOR** | Schaefer/Meier | | |
| **FLIGHT ENGINEERS** | Tyson/Wysinger/Ripp | | |
| **FLIGHT DIRECTOR** | Kalen, Q. | | |
| **DATA TECHNICIAN** | Richards,T. | | |
| **AVAPS** | Patel | | |

| **PRE-FLIGHT** | |
| --- | --- |
| **Flight Plan** | *[Insert image of submitted flight pattern here]*    *[Insert image of ONR/TCRI detailed pattern image, if available]*    *[If you want, briefly describe the pattern in words]*  Pattern: Fly Rotated Fig-4 pattern with 105 NM legs  Altitude:   * 10 kft preferred - 8 kft if AF deconfliction is required (pressure altitude)   Potential add-on Modules: (time permitting)   * Early Stage >> Stratiform Spiral (aka Microphysics Spiral) * CHAOS >> Saildrone and Hurricane Glider coordination |
| **Expendable Distribution** | *[Describe planned dropsonde, ocean buoy, sUAS deployment locations; e.g., “Dropsondes/AXBT combo drops at endpoints, midpoints, and center”*  *Expendables:*   * *Load 35 dropsondes*   + *Release at endpoints, midpoints, centers, RMWs (if requested by NHC) >> charged to NWS*   + *1 sonde deployed at top of the Microphysics Spiral >> charged to HRD*   + *1 sonde deployed near Saildrone 1041 >> charged to GOMO*   + *1 sonde deployed near Hurricane Glider RU29 >> charged to GOMO*   + *All dropsondes transmitted to the GTS* * *Load 19 Skyfora sondes - deployed at the discretion of the HRD LPS* * *No AXBTs* |
| **Preflight Weather Briefing** | *[Notes from the Flight Crew Preflight Briefing and other relevant notes about the current and forecasted storm state from the most recent NHC advisory (location, intensity, MSLP, movement, possible intensity change during the flight)]*  *Data from a NOAA-P3 Hurricane Hunter aircraft tonight has been quite*  *helpful in assessing Beryl's structure and intensity. Within the*  *past hour, the aircraft measured a peak 700-mb flight-level wind of*  *157 kt in the northeastern quadrant. A typical 90 percent reduction*  *translates to a maximum sustained wind of 140 kt, which makes Beryl*  *a potentially catastrophic Category 5 hurricane. This is the*  *earliest Category 5 hurricane observed in the Atlantic basin on*  *record, and only the second Category 5 hurricane to occur in July*  *after Hurricane Emily in 2005.*  *Beryl continues to move quickly to the west-northwest, even a bit*  *faster than earlier, estimated from plane fixes to be 290/19 kt. A*  *well-established subtropical ridge oriented ESE-to-WNW of Beryl is*  *expected to continue to steer the small but potent hurricane quickly*  *west-northwestward into the central Caribbean over the next several*  *days.*    *[Briefly describe the relevant environmental drivers.]*  *It is possible another eyewall replacement cycle (ERC) could begin like we saw last night, with UW-CIMSS MPERC model giving another ERC a 50-75 percent probability based on the last few microwave passes. With that said, after the next 24 hours, both the GFS and ECMWF remain insistent*  *that significant mid-level westerly shear (above 30 kt) will begin*  *to undercut Beryl's outflow layer. The HAFS-A/B regional-hurricane*  *models, which did a good job predicting Beryl's peak intensity*  *today, are also insistent this shear will start to disrupt the*  *hurricane after the next 24 hours. There is evidence of this less*  *favorable upper-level pattern on GOES-16 water vapor imagery upwind*  *of Beryl's track, and thus a faster rate of weakening is forecasted*  *from 36-72 hours.*  *[Copy in GIF of recent (~6 hr) satellite loops (https://www.star.nesdis.noaa.gov/GOES/index.php)]* |
| **Instrument Notes** | *[What instruments are working, not working, not functioning nominally, not installed?]* |

| **IN-FLIGHT** | |
| --- | --- |
| **Time [UTC]** | **Event** |
| 0831 | Take-off from STX 0831 |
| 0831 | Saildrone coordination Sonde updated by Lev Looney |
| 0831 | SD-1041: 16.42209 N, 66.81368 W at 10:15 Z and headed SW at ~4 kts; Extreme measurements in past 3 hrs: Winds (~3m) of 43.6 kts, gusts 53.5 kts, Waves 5.5m, pressure 1010.2 hPa, SST 29.0 ˚C  RU29 Glider: 15.649 N, 68.999 ˚W at 09:08 Z and holding station; SST 29.6 ˚C  NDBC 42059: 15.300 N 67.483 W anchor location, as of 09:50 UTC, wind speed max of 46.6 kts, gusts 54.4 kts, pressure 1000.0 hPa, waves of 7.5 m |
| 0853 | Wind Radii Estimates based on Advanced Dvorak Technique (34-64kt) |
| 0910 | Orbiting to wait for streamsonde computer to reboot  Will drop streamsonde and GPS sonde combo |
| 0914 | Sonde #1 + streamsonde combo - over saildrone 1041 |
| 0915 | Sonde 1 used as the IP sonde |
| 0925 | Crossing the rainband on the N side |
| 0923 | Puerto Rico Radar Loop with northern bands of Beryl and northern edge of eyewall depicted |
| 0930 | Sonde #2 MP N |
| 0936 | Satellite imagery depicting lightning on northern and western eyewall |
| 0939 | Saw lightening out of the window |
| 0940 | Flight level wind 160 kt + lightning |
| 0941 | Sonde #3 RMW N + 4 streamsondes |
| 0941 | Sonde #3 |
| 0944 | Sonde #4 1st center surface pressure 933 mb |
| 0945 | Sonde #5 RMW S + 4 streamsondes |
| 0953 |  |
| 0956 | NOAA Fix: extrapolated surface pressure 928.2 mb, peak inbound N quadrant. |
| 0959 | Sonde #6 MP S |
| 1012 | Sonde #7 EP S |
| 1022 | NDBC 42059 still reporting data (~30 min lag) at 11:00 UTC. 1-min winds 60.2 kts increasing, gusting over 77.7 kts, wave height 11.6 m, pressure 992.2 hPa and falling rapidly. Anchor location: 15.300 N 67.483 W  Likely true location ~15.31N, 67.52W  RU29 Glider: 15.6505 N, 68.999 ˚W at 11:08 Z and holding station |
| 1028 | Significant pressure drops after the first eyewall pass |
| 1045 |  |
| 1046 |  |
| 1046 | Sonde #8 IP of E-W pass |
| 1051 | IR Satellite depicting lightning on the NW-N quadrant of the eyewall |
| 1055 |  |
| 1057 | Sonde #9 MP E |
| 1108 | Sonde #10 RMW E + 4 Streamsondes |
| 1109 | Sonde #10 data |
| 1111 | Sonde #11 2nd center |
| 1114 | Sonde #12 RMW W + 4 streamsondes |
| 1115 | Flight pattern showing the first and second passes. |
| 1115 | Sonde #12 Data |
| 1122 | Sonde #13 MP W |
| 1121 | AVAPS confirmed 16 out of 17 streamsondes worked based on raw data |
| 1122 | NDBC 42059 still reporting data (~30 min lag) at 11:00 UTC. 1-min winds 60.2 kts increasing, gusting over 77.7 kts, wave height 11.6 m, pressure 992.2 hPa and falling rapidly. Anchor location: 15.300 N 67.483 W  Likely true location ~15.31N, 67.52W  RU29 Glider: 15.6505 N, 68.999 ˚W at 11:08 Z and holding station |
| 1123 |  |
| 1133 | Sonde #14 EP W |
| 1135 | TC diurnal cycle imagery- diurnal pulse is moving out and “on the clock” |
| 1135 | Convective band at the end of this center-west leg is the diurnal pulse- very convectively active. |
| 1141 | 2 Streamsondes left; will not deploy this flight due to the pilots discretion and preference of not being depressurized the entire flight - will deploy another day |
| 1145 | NOAA Fix: extrapolated surface pressure 930.9 mb, peak inbound E quadrant during second pass. |
| 1155 | Sonde #15 IP of SW - NE pass |
| 1204 | Sonde #16 MP SW |
| 1216 | Sonde #17 RMW SW |
| 1220 | Sonde #18 3rd center |
| 1221 | Sonde #18 dropsonde sounding data |
| 1224 | Sonde #19 RMW NE |
| 1238 | Sonde #20 MP NE |
| 1249 | Sonde #21 EP NE |
| 1155 | Visible satellite just S-SW of PR |
| 1157 |  |
| 1210 |  |
| 1223 | Circled in the eye to find a spot for next eyewall outbound leg  Saw pink colored dbz eyewall  Penetrated through right next to the very strong eyewall features |
| 1230 | NDBC 42059 has not reported data in >80 minutes. Status unknown (may have sustained damage, but also may just have comms issues due to TC).  Lev talked with NDBC, unsure status at this time, likely took some damage, but hopefully just unable to transmit data due to conditions    RU29 Glider: 15.6505 N, 68.999 ˚W at 11:08 Z and holding station (position updates received every ~2 hours)  Saildrone is at 16.31492 N, 66.87837 W and headed almost due S at 1.5 knots (12:50 Z) |
| 1240 | NOAA Fix: extrapolated surface pressure 932.9 mb during third pass. |
| 1240 |  |
| 1315 | Glider Location: 15.64833 N, 69.001 W as of 13:11 Z  SD Location: 16.30833 N, 66.87935 W as of 13:14 Z  NDBC 42059: Still no data since 11:10 Z |
| 1327 | Sonde #22 IP of NW-SE pass |
| 1346 | Sonde #23 MP NW glider coordination; Thanks to NAV Jacob for calling the sonde launch to be close to the glider |
| 1356 | Sonde #24 RMW NW |
| 1400 | Sonde #25 RMW SE |
| 1403 |  |
|  |  |
|  |  |
| 1415 | Sonde #26 MP SE |
| 1413 | A band of lightning strikes along the N-NE eyewall |
| 1418 | Third and fourth pass observations |
| 1440 | SD-1041 located at 16.28321 N, 66.88149 W at 14:55 Z  Glider coordination was ~2 NM apart, major success.  NDBC 42059 still no data since 11:10 Z |
| 1428 | Sonde #27 EP SE last drop |
| 1553 | All radar analyses transmitted |
|  |  |
|  |  |
|  |  |
|  | << INSERT ADDITIONAL ROW AS NEEDED >> |

| **POST-FLIGHT** | |
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| **Mission Summary** | *[Short description of interesting observations from the flight; what objectives were successful? What was unsuccessful? Was the planned pattern flown? What deviations occurred?*  *[Don’t forget to fill in Tables on page 1]*  *[Sonde and ocean expendable accounting: how many total of each? How many are charged to each account?]* |
| **Actual Standard Pattern Flown** | *[Butterfly, Rotated Figure-4, Lawnmower, etc]*  *Rotated Figure-4* |
| **APHEX Experiments / Modules Flown** | *[Linked to HFP Plan; fill in regardless of whether the mission was operationally or research tasked]*  *CHAOS (multiple patterns flown) and RICO SUAVE* |
| **Plain Language Summary** | We flew an operational mission this morning into Category 5 Hurricane Beryl as it passed south of Puerto Rico and the U.S. Virgin Islands in the Caribbean. The mission collected data for assimilation into NOAA forecast models and for forecasters at the National Hurricane Center. We also tested experiential ultra lightweight weather instruments called Streamsondes that were deployed from the P-3 and also overflew and coordinated with a NOAA Hurricane Saildrone within TS force conditions and a Rutgers Glider ocean probe that was measuring ocean conditions in Beryl’s northwest eyewall. |
| **Instrument Notes** | *[Notes about instrument status from during and after the mission]*  Deployed 17 out of the 19 available Streamsondes. AVAPS confirmed 16 out of 17 Streamsondes worked based on raw data. 2 Streamsondes leftover. Streamsondes were not deployed this flight due to the pilot's discretion and preference of not being depressurized the entire flight - will deploy another day.  Had issue with TDR data collection during first pass. The SSA ran a “CAM restart” that caused no data to be collected for approximately 1–2 minutes during the outbound portion of the leg. In the hrd-status channel, INE errors were raised. The TDR analysis still ran successfully, just with a small gap in coverage corresponding to the time of the CAM restart. The analysis looked good otherwise. |
| **Final Mission Track** |  |