| **MISSION PLAN** | | | |
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| **FLIGHT ID** | 20240804H1 | **STORM** | AL04 / TD4 |
| **MISSION ID** | 0404A Debby | **TAIL NUMBER** | NOAA-42 |
| **TASKING** | NHC/EMC TDR | **PLANNED PATTERN** | Rotated-Fig 4 |
| **MISSION SUMMARY** | | | |
| **TAKEOFF [UTC]** | 0859 | **LANDING [UTC]** | 1534 |
| **TAKEOFF LOCATION** | Lakeland | **LANDING LOCATION** | Lakeland |
| **FLIGHT TIME** | 06:35 | **BLOCK TIME** |  |
| **TOTAL REAL-TIME RADAR ANALYSES**  **(Transmitted)** | 4 | **TOTAL DROPSONDES Deployed (Transmitted)** | 21 (21) |
| **OCEAN EXPENDABLES (Type)** | 3 AOC AXBTs  (3 good) | **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** | Aberson | **LPS GROUND** | Hazelton/Looney |
| **TDR ONBOARD** | N/A | **TDR GROUND** | Reasor |
| **ASPEN ONBOARD** | N/A | **ASPEN GROUND** | Dunion |
| **NESDIS SCIENTISTS** | Chang | | |
| **GUESTS (Affiliation)** | Sparks/ Trivedi | | |
| **AOC CREW MANIFEST** | | | |
| **PILOTS** | Doremus/Mitchell/ Ellis/ Taraboletti | | |
| **NAVIGATOR** | Miller/ Meier | | |
| **FLIGHT ENGINEERS** | Tyson/ Wysinger/ Ripp | | |
| **FLIGHT DIRECTOR** | Zawislak/ Englert | | |
| **DATA TECHNICIAN** | McAlister | | |
| **AVAPS** | Kotz/Brannigan | | |

| **PRE-FLIGHT** | |
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| **Flight Plan** | Rotated Figure-4 |
| **Expendable Distribution** | *21 dropsondes, endpoints, midpoints, centers* |
| **Preflight Weather Briefing** | *Debby is moving to the north west of Tampa. The storm is slowly intensifying, but not rapidly intensifying yet. The inner-core is starting to develop, but is not closed off yet.*  *Shear is fairly low today, although there is some dry air to the west of the storm, which may slow the symmetrization process.* |
| **Instrument Notes** | *Instruments seem to be functioning normally* |

| **IN-FLIGHT** | |
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| **Time [UTC]** | **Event** |
| 0859 | Take off from KLAL |
| 0911 | *This shows the dry air west of the core* |
| 0917 | Going to target SD-1057 to the N before full pattern |
| 0931 | Flyover of SD-1057: Winds of 22-24 knots, gusting 25-28, Pressure: 1010.1, Air temp: 29.2 C, SST 31.4 C, SSS: 36.7, SIG Wave: 1.8 m  SFMR was ~30 kts |
| 0931 | Drop 1 over Saildrone    Nearly exact same as SD values  Air temp within 0.2 C , RH within 2%, pressure same, winds exact same |
| 0943 | Looks like flight is going to pass between SD-1083 and NDBC 42099 (wave drifter) |
| 0945 | Flew 17.5 km E of NDBC 42099 (wave buoy) and 32 km W of SD-1083 |
| 0947 | Reached IP at 10 k ft @ when entering region of echos |
| 0947 | Drop 2 Endpoint N |
| 0959 | Drop 3 Midpoint N |
| 1003 | Handful of moorings nearby flight track |
| 1007 | Drop 4 center with AXBT (SST 30.74)  Dropsonde 1003 mb, 090/8 knots |
| 1010 | Looks like on this next leg, may fly over NDBC 42023/COMPS C13 @ 26.012 ° N 83.09 ° W. Has a lot of additional obs and ADCP onboard. Data recorded every 30 min (05 and 35 past the hour) |
| 1016 | May also fly near COMPS C22/NDBC NDBC 42026 @ 25.17 ° N 83.479 ° W, lower winds |
| 1018 | AMVs show limited outflow west of the center due to dry westerly shear |
| 1019 | Drop 5 midpoint S |
| 1031 | Drop 6 endpoint S |
| 1038 | Highest FL and SFC outbound was at end point to the S, turned early slightly because of convection. Seeing red (likely 45 db) to the right of flight, can see on NEXRAD as well, which shows strongest winds in a band E of the center |
| 1045 | Flight went ~ 7.8 n mi to the E of COMPS C22. Last data recorded there was 10:35z, which was: Air temp of 28.5 C, Pres 1003.3 mb, RH 75.8%, winds 17.5 knots gusting 23.2 knots, SST 30.5 C, SSS 36.5 PSU |
| 1051 | Zorana stating SFMR is showing 5 m/s high bias compared to KU band, but SFMR also has lower rain rate that c-band, which could cause SFMR to be a little higher |
| 1059 | SFMR showing 55 knots, FL ~60 knots (MTS showing 55 knots) |
| 1102 | >30 C Ocean temp down to 30 m (no measurements deeper) 30 n mi to west of flight |
| 1106 | Drop 7 Endpoint E, beginning inbound |
| 1107 | Seeing a bit of wrapping on radar now, not clear if it’s around the LLC or MLC |
| 1115 | Flight passing ~13.6 n mi to the S of COMPS C13 |
| 1116 | TDR suggests 15 km of tilt to the ENE |
| 1118 | Drop 8 with AXBT, midpoint |
| 1125 | Drop 9 (was going to be center, but flight got center fix a bit west of that sonde) |
| 1127 | Center fix was 26.16 deg N 083.96 deg W, but noted it was NOT a great center fix |
| 1129 | FL winds showing a very broad and ill-defined center. Slow switch in FL wind direction (and very weak) |
| 1136 | Drop 10, mid point W |
| 1145 | Drop 11, endpoint W with BT (S of 30.7)  Turned early since clear to the W of the center |
| 1153 | Flight notes: Lots of shallow cumulus in the western semicircle with very limited vertical development |
| 1158 | Drop 12, IP of inbound leg SW |
| 1200 | 12Z NHC update put center at 26.3N 84.2W with intensity of 50 kts |
| 1206 | Drop 13, mid point SW |
| 1212 | SD at 27.26756N 83.76468W, pending outbound endpoint and turn, could be close and valid for coordination |
| 1213 | Drop 14, center, but super elongated and likely ill defined center |
| 1224 | Looks like there could be a near direct overflight of COMPS C10 near timing of data collection |
| 1226 | Drop 15, mid point NE |
| 1233 | Drop 16 end point, begin turning to the E-W cross leg |
| 1234 | Flight 6 n mi of COMPS C10 at data collection time  COMPS data: Wind 30.5 kts, gusting 38.3 kts, RH of 99.9%, air temp of 27.4 C, pressure of 1007.3 mb, SST of 31.2C, SSS 35.6 PSU |
| 1245 | SFMR on NOAA and SFMR on AF showing very different peaks in NE..NOAA showing 50-55 with FL of 50. AF showing FL 55-60, SFMR of 35-40 |
| 1303 | Some CBs near the MLC attempting to wrap. Wondering if this will tug the LLC to the NE. |
| 1306 | Drop 17, IP on NW-SE final leg |
| 1309 | Looking better on satellite, lots popping up in NW area. Looking more aligned from TDR |
| 1319 | Drop 18, midpoint NE |
| 1325 | Some vorticity and stronger updrafts near the MLC, to the NE of the LLC. Could be relocating there. |
| 1330 | Drop 19, center (still messy center) |
| 1344 | Drop 20, MP to SE |
| 1350 | Onboard LPS reports a possible SAR after completion of the pattern |
| 1356 | Drop 21, EP to the SE |
| 1358 | Air Force plane confirms center relocation |
| 1400 | TDR is up and running and they fly back through the center of the convection |
| 1422 | Currently overtop vessel in distress acting as comms relay until USCG Helo arrives in ~30 min. |
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|  | << INSERT ADDITIONAL ROW AS NEEDED >> |

| **POST-FLIGHT** | |
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| **Mission Summary** | *We flew a successful TDR mission in Tropical Storm Debby in the Southeast Gulf of Mexico. The storm was slowly intensifying, but some structural issues noted below seem to be preventing RI for now.*  *-There was some vortex tilt to the NE.*  *-The west side was pretty dry with precipitation having trouble wrapping upshear.*  *-The RMW was rather broad, with strongest FL winds found well East of the center*  *The center was very broad and ill-defined early in the flight. It looked like a more robust MLC was forming by Pass 3, and it appeared to be tugging the LLC in that direction as well.* |
| **Actual Standard Pattern Flown** | *Rotated Figure 4* |
| **APHEX Experiments / Modules Flown** | *CHAOS (saildrone overflight)* |
| **Plain Language Summary** | *We flew a successful mission into Tropical Storm Debby to collect Tail Doppler Radar data.*  *The storm was slowly getting organized, but was not rapidly intensifying yet, because of some lingering tilted and broad structure.* |
| **Instrument Notes** | *Instruments seemed to work correctly during the flight. There was the note of SFMR estimating ~5 m/s higher than IWRAP* |
| **Final Mission Track** |  |