**NOAA / AOML / Hurricane Research Division**
**2021 Hurricane Field Program**
**Advancing the Prediction of Hurricanes Experiment (APHEX)**

# FLIGHT LOG -- 20210814N1

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| MISSION PLAN | | | |
|---|---|---|---|
| **FLIGHT ID** | 20210814N1 | **STORM** | AL07 / GRACE |
| **MISSION ID** | WA07A | **TAIL NUMBER** | NOAA49 |
| **TASKING** | HRD | **PLANNED PATTERN** | Lawnmower + Fig-4 |
| **MISSION SUMMARY** | | | |
| **TAKEOFF [UTC]** | 1634 | **LANDING [UTC]** | 0018 |
| **TAKEOFF LOCATION** | Aruba | **LANDING LOCATION** | Aruba |
| **FLIGHT TIME** | 7.7 | **BLOCK TIME** | 7.9 |
| **TOTAL REAL-TIME RADAR ANALYSES (Transmitted)** | 2 | **TOTAL DROPSONDES (Good/Transmitted)** | 36 (33/33) |
| **OCEAN EXPENDABLES (Type)** | None | **sUAS (Type)** | None |
| **APHEX EXPERIMENTS / MODULES** | Genesis Experiment: PREFORM/FAM, ITOFS | | |
| **HRD CREW MANIFEST** | | | |
| **LPS ONBOARD** | None | **LPS GROUND** | Alaka |
| **TDR ONBOARD** | None | **TDR GROUND** | Reasor |
| **ASPEN ONBOARD** | Henning | **ASPEN GROUND** | None |
| **NESDIS SCIENTISTS** | None | | |
| **GUESTS (Affiliation)** | None | | |
| **AOC CREW MANIFEST** | | | |
| **PILOTS** | Waddington, De Triquet | | |
| **NAVIGATOR** | N/A | | |
| **FLIGHT ENGINEERS** | N/A | | |
| **FLIGHT DIRECTOR** | Kalen/Henning | | |
| **DATA TECHNICIAN** | Miller | | |
| **AVAPS** | Patel | | |

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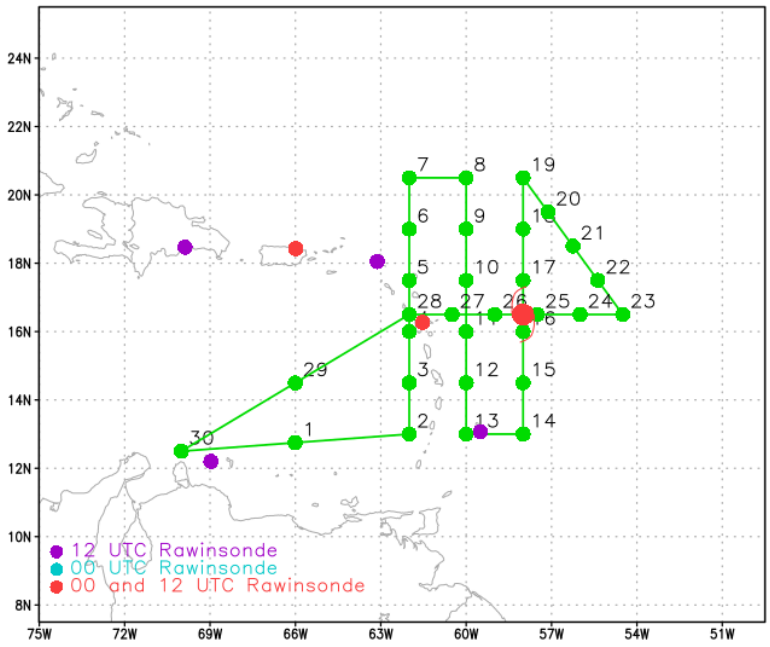
| PRE-FLIGHT | |
|---|---|
| **Flight Plan** |  <br><br>Flight plan adjustments due to lack of clearance from Venezuelan air space: Points 1,2,3 will all change, but will still be dropped. The initial leg will be NE to the latitude of Point 4, then they will turn E to Point 4 and resume the original flight plan.<br><br>Flight plan adjustments due to mission time: Point 23 *might* be dropped, with the new leg being Point 19-->24, with drops at new Points 20,21,22.<br><br>Flight altitude ~45kft<br><br>This flight is being planned in collaboration between APHEX and the ONR TCRI program |
| **Expendable Distribution** | 10 sondes for the ONR TCRI program<br>18-19 HRD sondes<br>At the green points indicated in the flight pattern above |
| **Preflight** | |

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|---|---|
| **Weather Briefing** | |
| **Instrument Notes** | |

| IN-FLIGHT | |
|---|---|
| **Time [UTC]** | **Event** |
| 1634 | Take off from Aruba |
| 1650 | Modified flight plan for Points 1,2,3 to avoid Venezuelan air space. Fly NW to 16N, 67.5W, then turn due east and drop sondes for Points 1,2,3 enroute to Point 4 (16N, 63W) |
| 1719 | Drop 1 (modified location for Venezuelan air space) |
| 1730 | Drop 2 (modified location for Venezuelan air space) |
| 1740 | Drop 3 (modified location for Venezuelan air space) |
| 1749 | Drop 4 |
| 1800 | Drop 5 |
| 1812 | Drop 6 |
| 1820 | Modified flight plan to shift Points 14-28 west by 0.5 degree to account for Grace's fast motion. This essentially shifted the Figure-4 west. The S->N leg was still a bit east of the center. |
| 1824 | Drop 7 |
| 1830 | Modified flight plan to shift Points 11,12 westward to avoid Guadeloupe air space. A westward shift of ~1.5 degrees was required to avoid the air space. Then, resume flight plan at Point 13 |
| 1837 | Drop 8 |
| 1850 | Drop 9 |
| 1903 | Drop 10 |

## FLIGHT LOG -- 20210814N1

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|---|---|
| 1922 | Drop 11 (modified location for Guadeloupe air space) |
| 1933 | Drop 12 (modified location for Guadeloupe air space) |
| 1950 | Drop 13 |
| 2000 | After consulting TCRI scientists, two additional drops were added: one between Points 25-26 and the other between Points 26-27. This is to better resolve the inner core on the final E->W pass. Both sondes charged to TCRI |
| 2004 | Drop 14 (shifted N to avoid Barbados) |
| 2014 | Drop 15 |
| 2026 | Drop 16 |
| 2039 | Drop 17 |
| 2051 | Drop 18 |
| 2102 | Drop 19 |
| 2113 | Drop 20 |
| 2125 | Drop 21 |
| 2138 | Drop 22 |
| 2148 | Drop 23 |
| 2159 | Drop 24 |
| 2212 | Drop 25 |
| 2217 | Drop 26 (added for TCRI) |
| 2223 | Drop 27 |
| 2228 | Drop 28 (added for TCRI) |
| 2231 | Drop 29 |
| 2254 | Drop 30 |
| 2303 | Drop 31 (added for TCRI) |

## FLIGHT LOG -- 20210814N1

| | |
|---|---|
| 2312 | Drop 32 |
| 2324 | Drop 33 |
| 0015 | Land at Aruba |

| POST-FLIGHT | |
|---|---|
| **Mission Summary** | Although Grace had already been declared a tropical storm by NHC, much uncertainty still existed about the structure of the cyclone, particularly near the surface. This mission collected environmental data in the path ahead of, and over, Grace. Data from above 40kft showed that outflow was healthy in all directions around the storm core. Although a direct overpass of Grace's center was planned, the fast motion of the system (~19 kt) prevented this from occurring on the S->N pass. The final E->W pass proved to be lucrative as the aircraft came very close to the inner core, only deviating to the north to avoid hazardous convection. TCRI requested extra dropsondes to improve sampling near the inner core.<br><br>Dropsonde data revealed an unsurprising meridional moisture gradient, with soundings saturated throughout the entire column south of the storm, and "onion" soundings north of the storm, consistent with a Saharan air layer.<br><br>It should be noted that many logistical issues related to air space caused deviations to the planned flight pattern. On the initial ferry to Grace, avoidance of Venezuelan air space caused a deviation to the north, which was advantageous because it allowed for more sampling of the environment that Grace was directly moving into. On the N->S lawnmower leg, a westward deviation was required to avoid Guadeloupe air space.<br><br>36 total sondes were released with 33 transmitted; 21 charged to HRD and 15 charged to ONR. |
| **Actual Standard Pattern Flown** | Lawnmower for data collection for the *Genesis Experiment: FAM* and a Figure-4 for the *Genesis Experiment: PREFORM* |
| **APHEX Experiments / Modules Flown** | Data was collected in support of the *Genesis Experiment: PREFORM* and *FAM*, *ITOFS*, and was in collaboration with the ONR TCRI program |
| **Plain Language** | • Tropical Storm Grace continued to show healthy deep convection |

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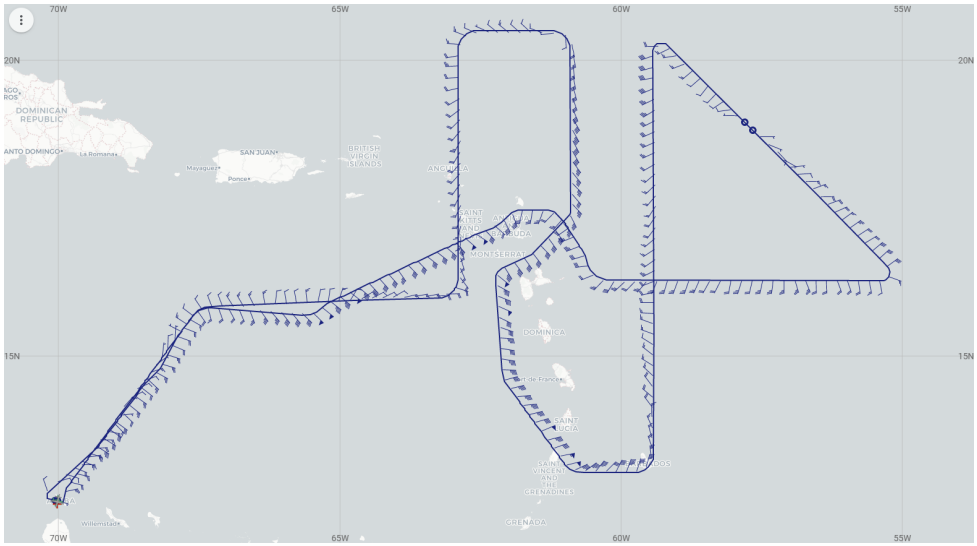
|---|---|
| **Summary** | despite a lack of inner core organization. This was likely related to healthy outflow that was measured during this mission.<br>● Good TDR coverage was achieved in the Fig. 4 pattern |
| **Instrument Notes** | Issues with INE. TDR data is OK |
| **Final Mission Track** |  |