

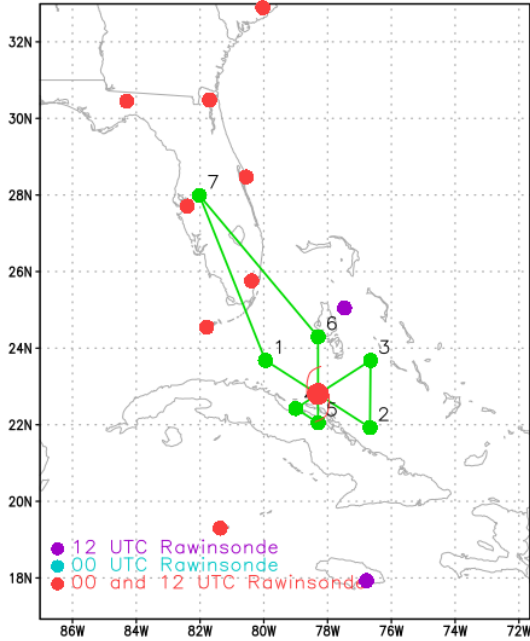
**NOAA / AOML / Hurricane Research Division  
2021 Hurricane Field Program  
Advancing the Prediction of Hurricanes Experiment (APHEX)**

**FLIGHT LOG -- 20210813H1**

MISSION PLAN			
FLIGHT ID	20210813H1	STORM	AL06 / FRED
MISSION ID	0906A	TAIL NUMBER	NOAA42
TASKING	EMC	PLANNED PATTERN	Butterfly
MISSION SUMMARY			
TAKEOFF [UTC]	0807	LANDING [UTC]	1248
TAKEOFF LOCATION	Lakeland	LANDING LOCATION	Lakeland
FLIGHT TIME	4.7	BLOCK TIME	4.9
TOTAL REAL-TIME RADAR ANALYSES (Transmitted)	3	TOTAL DROPSONDES (Good/Transmitted)	11 (11/11)
OCEAN EXPENDABLES (Type)	None	sUAS (Type)	None
APHEX EXPERIMENTS / MODULES	Early Stage Experiment: AIPEX		
HRD CREW MANIFEST			
LPS ONBOARD	Aberson	LPS GROUND	Dunion/Holbach
TDR ONBOARD	Aberson	TDR GROUND	Reasor
ASPEN ONBOARD	X. Zhang	ASPEN GROUND	N/A
NESDIS SCIENTISTS	None		
GUESTS (Affiliation)	None		
AOC CREW MANIFEST			
PILOTS	Abitbol, Shaw, Stateler		
NAVIGATOR	Utama, B. Richards		
FLIGHT ENGINEERS	Sanchez, Stokes		
FLIGHT DIRECTOR	Hathaway, Lundry		
DATA TECHNICIAN	T. Richards		
AVAPS	Warnecke		

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<b>PRE-FLIGHT</b>	
<b>Flight Plan</b>	 <p>Original plan (above) called for a modified butterfly pattern with truncated legs on the SW and S due to land. Planned FL 10 k ft. No center hunting planned.</p>
<b>Expendable Distribution</b>	Release dropsondes at endpoints (EP), midpoints (MP), center (ctr)
<b>Preflight Weather Briefing</b>	Fred continues to track along the N coast of Cuba, its inner-core wind field is still poorly organized, and based on earlier aircraft obs the mid-level circulation is displaced ~40 n mi E of the low-level center. Motion has slowed to ~295/08 and the 0900 UTC NHC center estimate of 22.0N 76.6W is ~100 n mi SE of the center used in the original track plan. Fred's current intensity is 30 kt with a slow intensification to TS strength forecast by NHC as the storm moves WNW and then more NW over the weekend. Vertical wind shear continues to plague the storm, with CIMSS showing ~25 kt of W shear and SHIPS diagnosing 22 kt at 281 deg.

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	<p><b>Tropical Depression Fred</b>  Friday August 13, 2021  5 AM EDT Advisory 15  NWS National Hurricane Center</p> <p><b>Current information: x</b>  Center location 22.0 N 76.7 W  Maximum sustained wind 35 mph  Movement WNW at 10 mph</p> <p><b>Forecast positions:</b>  ● Tropical Cyclone ○ Post/Potential TC  Sustained winds: D &lt; 39 mph  S 39-73 mph H 74-110 mph M &gt; 110 mph</p> <p><b>Potential track area:</b> Day 1-3 (solid line), Day 4-5 (dashed line)  <b>Watches:</b> Hurricane (pink), Trop Stm (yellow)  <b>Warnings:</b> Hurricane (red), Trop Stm (blue)  <b>Current wind extent:</b> Hurricane (brown), Trop Stm (orange)</p>
<b>Instrument Notes</b>	THOR instrument having issues again (PI and AOC still troubleshooting). WSRA not installed on N42 yet.

IN-FLIGHT	
Time [UTC]	Event
0807	Take off from Lakeland, FL
0825	GOES-16 IR

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	<p>GOES-16 Channel 13 (IR) Brightness Temperature (°C) at 07:12Z Aug 13, 2021</p> <p>TROPICALTIDBITS.COM</p>
0900	<p>CIMSS VWS showing ~25 kt W shear over Fred.</p> <p>TROPICAL CYCLONE FORMATION/INTENSIFICATION IS GENERALLY: FAVORABLE/NEUTRAL/UNFAVORABLE GOES-EAST WIND SHEAR (KTS) 0600 UTC 13AUG21 UW-CIMSS/NESDIS</p>
0924	Initial Point (IP), Drop #1: 22.78N 78.56W
0935	Planning to deviate slightly left of track to avoid some large cells 20-30 n mi ahead on this inbound leg.

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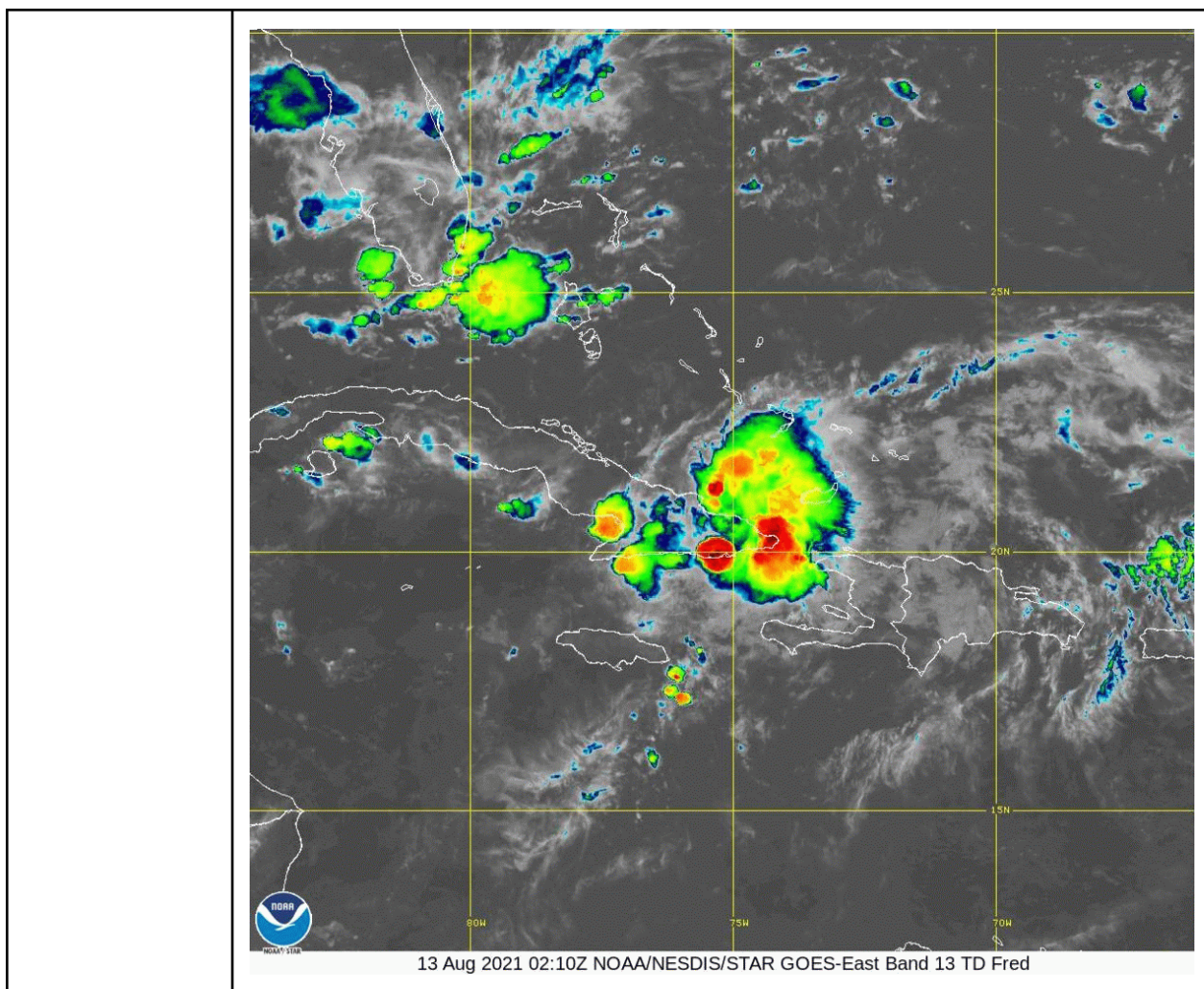
**FLIGHT LOG -- 20210813H1**

0936	Drop #2 (IP-ctr midpoint): 22.75N 77.75W
0951	Drop #3 (center), 25 kt FL wind: 22.16N 76.73W
1001	Drop #4 (ctr-WP 2 midpoint): 21.91N 76.08W
1007	Drop #5 (ctr-WP 2 midpoint): 21.75N 75.69W
1016	Drop #6 (WP 2): 21.53N 75.12W
1016	<p>TDR 1.0 km Swath for leg 1 indicating center to SW of flight track</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>210813H1 (FRED) 092500 to 101623 UTC Reflectivity (dBZ) at 1.0 km</p> <p>Center Fix: 22.05, -76.80</p> </div> <div style="text-align: center;"> <p>210813H1 (FRED) 092500 to 101623 UTC Wind Speed (kt) at 1.0 km</p> <p>Center Fix: 22.05, -76.80</p> </div> </div>
1030	GOES-16 IR and Cuban radar (courtesy Brian McNoldy, Univ. of Miami/RSMAS)



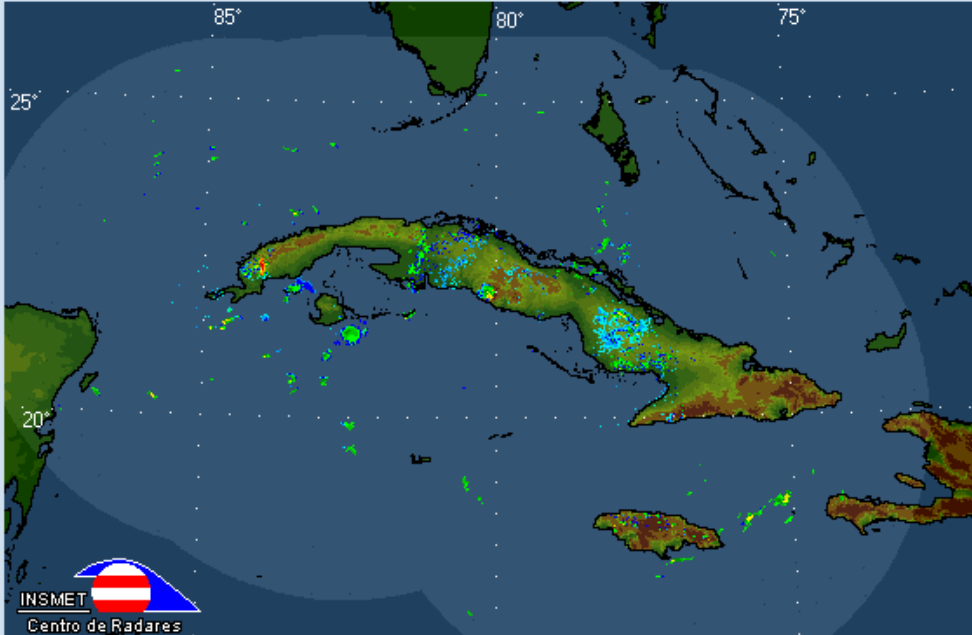
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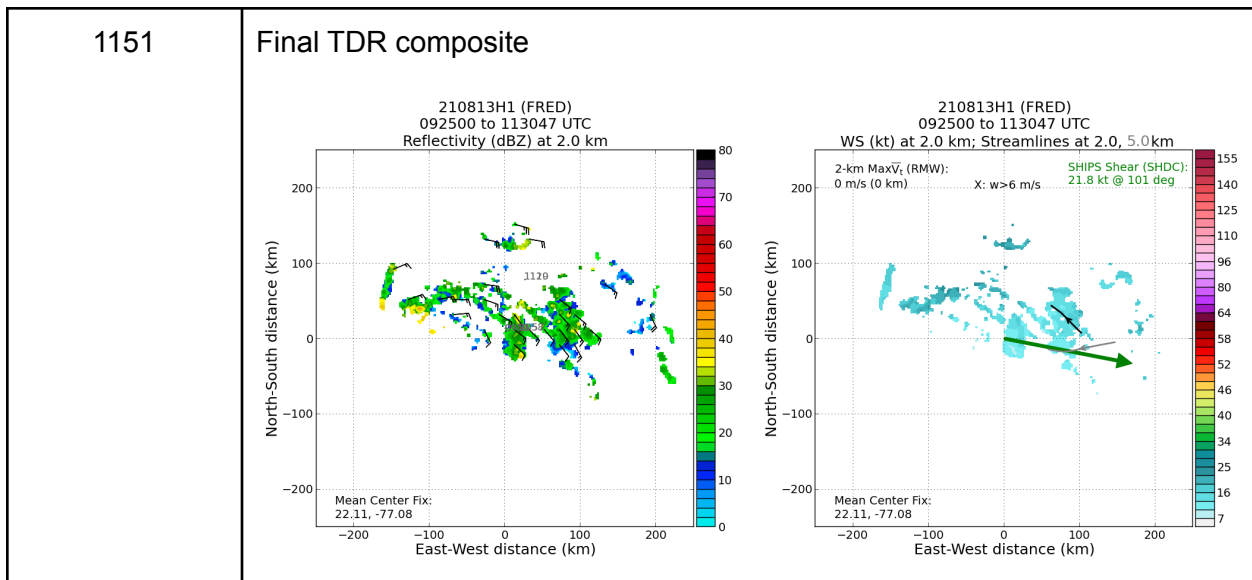
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	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: right;">Fecha: 12/08/2021 <span style="float: right;">Hora local: 10:10 am</span></p>  <p style="text-align: center;"><b>Escala de intensidades (dBZ)</b></p> <table border="0" style="width: 100%; text-align: center;"> <tr> <td style="width: 15%;">20.0 débil</td> <td style="width: 15%;">35.0 moderado</td> <td style="width: 15%;">50.0 fuerte</td> <td style="width: 15%;">65.0 severo</td> <td style="width: 15%;">80.0</td> </tr> <tr> <td>15.0</td> <td>30.0</td> <td>45.0</td> <td>60.0</td> <td>75.0</td> </tr> <tr> <td>10.0</td> <td>25.0</td> <td>40.0</td> <td>55.0</td> <td>70.0</td> </tr> </table> </div>	20.0 débil	35.0 moderado	50.0 fuerte	65.0 severo	80.0	15.0	30.0	45.0	60.0	75.0	10.0	25.0	40.0	55.0	70.0
20.0 débil	35.0 moderado	50.0 fuerte	65.0 severo	80.0												
15.0	30.0	45.0	60.0	75.0												
10.0	25.0	40.0	55.0	70.0												
1035	Drop #7 (WP 3): 22.89N 75.30W															
1047	Drop #8 (WP 3 - center midpoint): 22.50N 76.11W															
~1050	Flight Director reported 2-min HRD center: 22.7N 76.29W about 22.55 n mi north of the marked center. Lowest extrap pressure of 1010 mb and minimum wind speed of 12.271 kt (A lot of uncertainty as to where the “center” actually is in this storm)															
1100	Planning to skip WP5 and head directly to WP6 keeping band of convection off right wing															
1105	Drop #9 (WP 4): 21.89N 77.30W															
1123	Drop #10 (WP 4 - WP 6 midpoint): 23.1N 77.11W															
1134	Drop #11 (WP 6): 23.91N 77.05W															
1135	Turning to head home															
1140	Ascending for ferry back to LAL															

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POST-FLIGHT	
<b>Mission Summary</b>	<p>Observations from this flight were pretty unremarkable. The TDR showed evidence of a low-level cyclonic circulation. However, the actual “center” appeared to be southwest of the pattern near the Cuban coast. IR imagery showed a huge burst of convection south of Cuba, so it is possible that the storm may be going through a reorganization. It will be interesting to see if the center reforms south of Cuba under the area of deep convection. In hindsight, it may have been more interesting to have flown a survey pattern for this flight covering the north and south sides of Cuba.</p> <p>In total, 11 dropsondes were deployed and transmitted (all charged to NWS) along with 3 TDR analyses. There were very few deviations from the planned pattern except for repositioning on the vortex center, skipping WP 5 as noted in the log above, and some slight deviations around convection on leg 1.</p>
<b>Actual Standard Pattern Flown</b>	Modified butterfly
<b>APHEX Experiments / Modules Flown</b>	Data collected could support research for the <i>Early Stage Experiment: AIPEX</i>



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<b>Plain Language Summary</b>	<ul style="list-style-type: none"><li>• P-3 mission into TD Fred sampled the northern portion of the circulation on the north side of Cuba</li><li>• Large area of thunderstorms formed on the south side of Cuba overnight, which may lead to a reorganization of the storm.</li></ul>
<b>Instrument Notes</b>	Instruments worked well. Some excessive flagging of the SFMR in the HDOBs. Workstation had to be rebooted to generate a synoptic map.
<b>Final Mission Track</b>	