

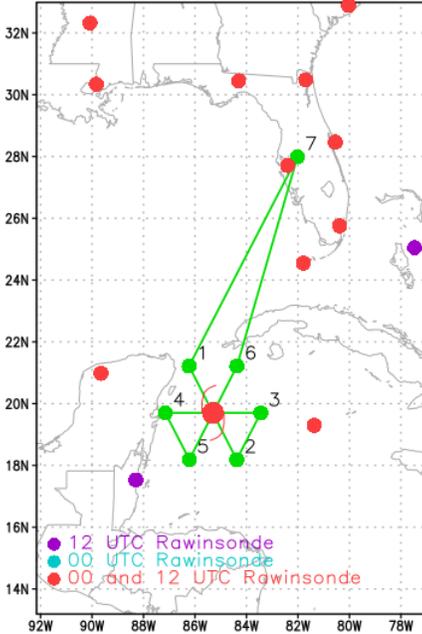
**NOAA / AOML / Hurricane Research Division
Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)**

FLIGHT LOG -- 20210818H1

MISSION PLAN			
FLIGHT ID	20210818H1	STORM	AL07 / GRACE
MISSION ID	1407A	TAIL NUMBER	NOAA42
TASKING	EMC	PLANNED PATTERN	Butterfly
MISSION SUMMARY			
TAKEOFF [UTC]	1954	LANDING [UTC]	0217
TAKEOFF LOCATION	Lakeland	LANDING LOCATION	Lakeland
FLIGHT TIME	6.4	BLOCK TIME	6.7
TOTAL REAL-TIME RADAR ANALYSES (Transmitted)	3	TOTAL DROPSONDES (Good/Transmitted)	26 (25/25)
OCEAN EXPENDABLES (Type)	5 (NRL AXBTs, 3 good)	sUAS (Type)	None
APHEX EXPERIMENTS / MODULES	Early Stage Experiment: AIPEX		
HRD CREW MANIFEST			
LPS ONBOARD	Zawislak	LPS GROUND	Hazelton
TDR ONBOARD	Zawislak	TDR GROUND	Gamache/Alvey
ASPEN ONBOARD	Sellwood	ASPEN GROUND	None
NESDIS SCIENTISTS	None		
GUESTS (Affiliation)	None		
AOC CREW MANIFEST			
PILOTS	Mitchell, Rannenberg, Copare, Legidakes		
NAVIGATOR	Freeman, Hough		
FLIGHT ENGINEERS	Darby, Wysinger		
FLIGHT DIRECTOR	Carpenter		
DATA TECHNICIAN	Mascaro		
AVAPS	Underwood		

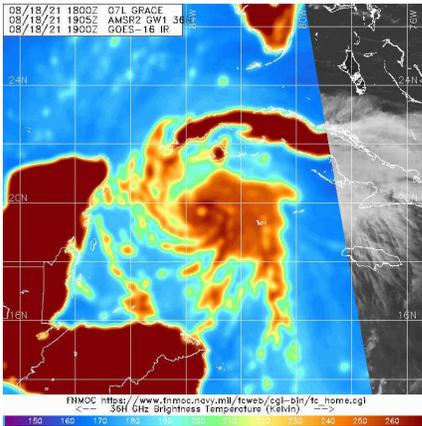
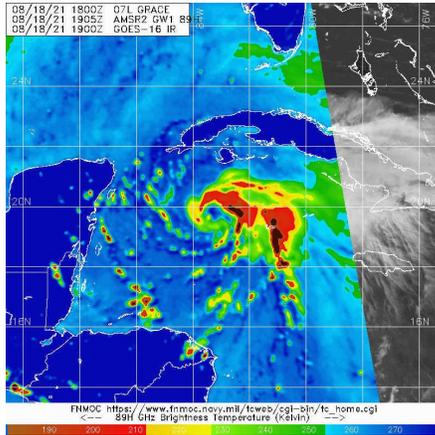
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PRE-FLIGHT	
Flight Plan	Butterfly for EMC TDR with 105 n mi radial legs at 10000 feet 
Expendable Distribution	Dropsondes at endpoints, midpoint, and centers. ONR AXBTs at the endpoints
Preflight Weather Briefing	Diurnal cycle appears to be ongoing
Instrument Notes	All instruments onboard functioning nominally, including the Compact Raman Lidar; WSRA not yet onboard

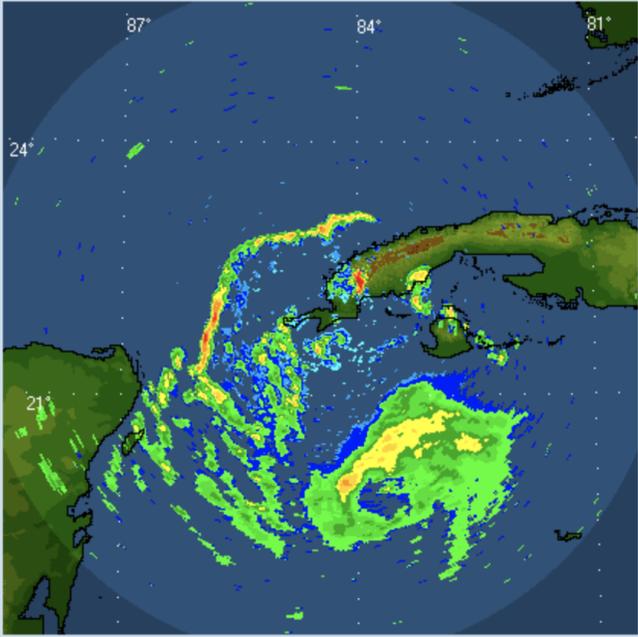
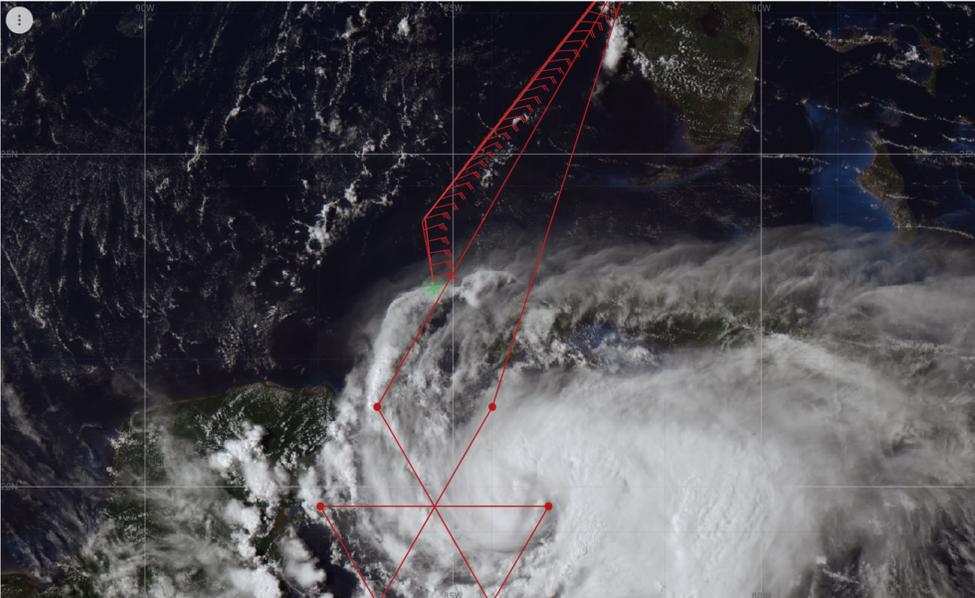
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IN-FLIGHT	
Time [UTC]	Event
1954	Takeoff from Lakeland
2005	<p>1905 microwave imagery shows a small symmetric eye structure at 37 GHz (low-levels) but a more sheared/asymmetric 89 GHz signal (upper levels)</p> <div style="display: flex; justify-content: space-around;">   </div>
2020	Cuban radar shows the same shear-relative structure with an eye attempting to close.

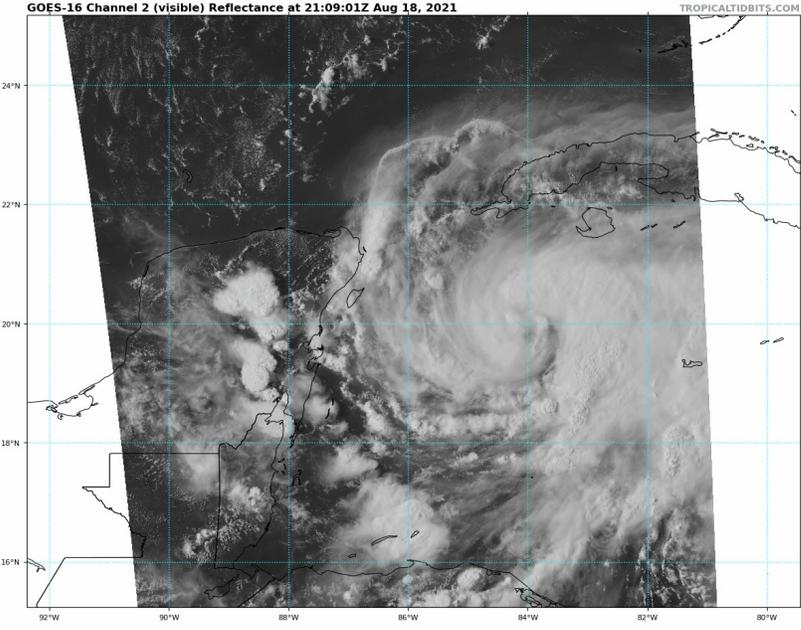
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2102	<p>Passing through an arc cloud/outer ring</p> 																																												
2127	<p>Initial Point (IP) NW, Sonde #1 (endpoint), BT 1</p>																																												

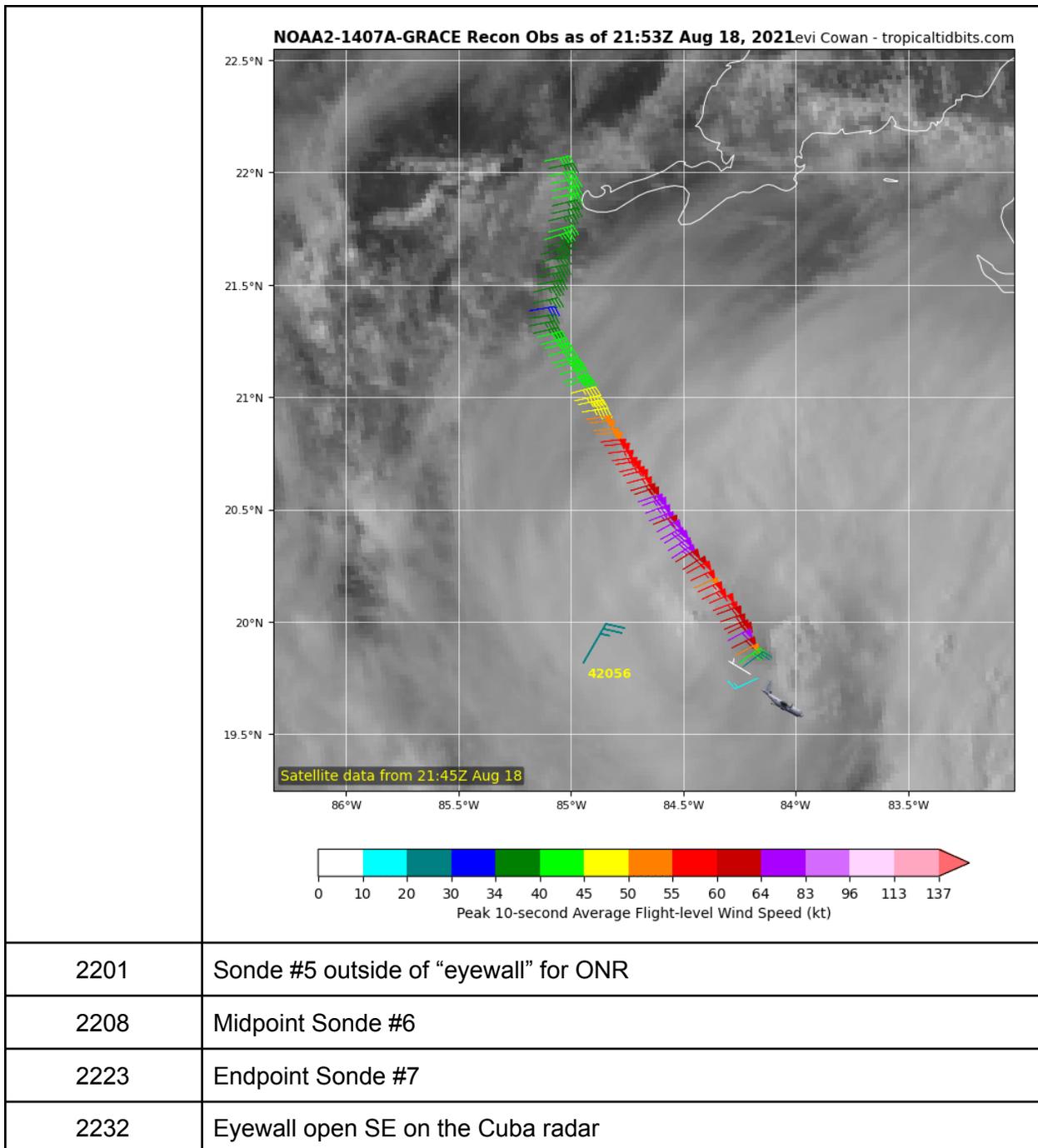
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2136	Sonde #2 (midpoint, just NW of midpoint)
2137	<p>Some CBs pulsing up and down</p>  <p>GOES-16 Channel 2 (visible) Reflectance at 21:09:01Z Aug 18, 2021 TROPICALIDBITS.COM</p>
2145	Sonde 3 quarterpoint sonde NW (for TCRI)
2152	Sonde #4 Center
2155	Large area of 55-70 kt FL winds NW of center. Sort of double wind max.

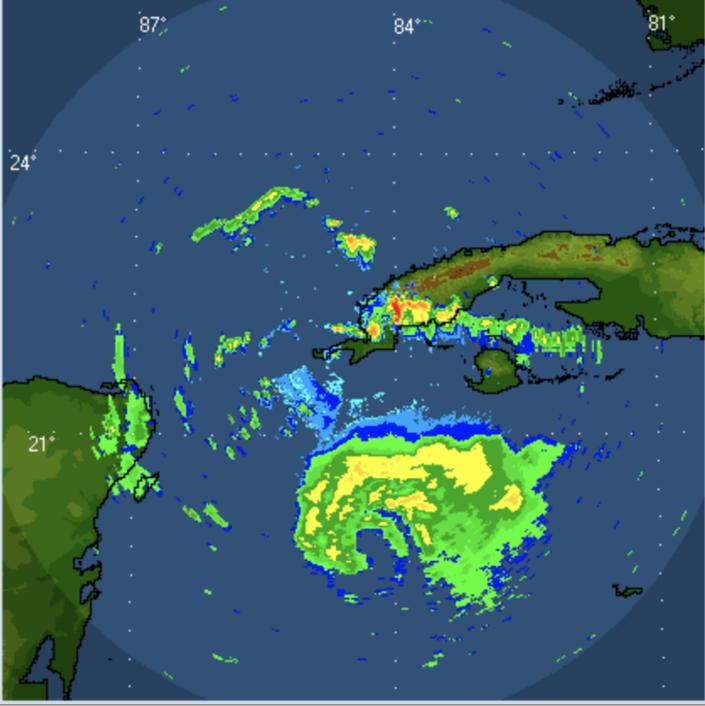
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2248	Painting the rainband SE on the TDR - could be a solid "rain band" module																																										
2248	Endpoint sonde #8, E, inbound from E-W																																										
2257	Midpoint sonde #9 E																																										
2303	Shear-relative asymmetry in the radial flow along that first NW-SE pass																																										

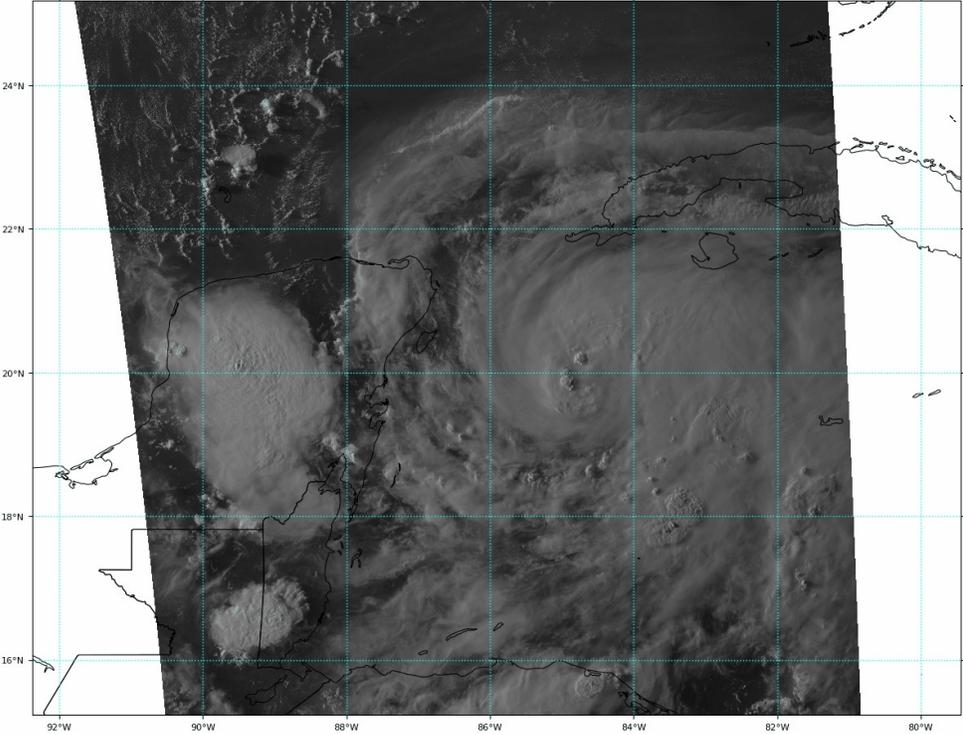
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	<p style="text-align: center;">210818H1 (GRACE) 212600 to 215226 UTC</p> <p style="text-align: center;">210818H1 (GRACE) 215226 to 222400 UTC</p> <p style="text-align: center;">Vr-shaded (m/s)</p> <p style="text-align: center;">azi=327</p> <p style="text-align: center;">azi=139</p>
2304	Quarterpoint Drop #10 E
2306	Eyewall Drop #11 E
2313	Center Combo Drop, Sonde #12, BT #2
2320	RMW Drop #13 for ONR
2323	Sonde #14 quarterpoint for ONR
2326	CBs firing in the eyewall

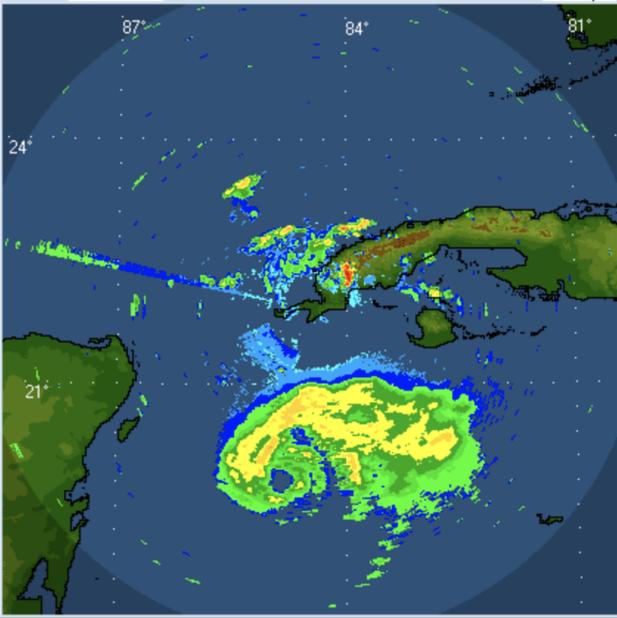
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	<p style="font-size: small;">GOES-16 Channel 2 (visible) Reflectance at 23:10:01Z Aug 18, 2021 TROPICALTIDBITS.COM</p> 
2327	Sonde #15 Midpoint west
2338	Combo Sonde #16 Endpoint west (with BT), 30C SST
0001	Combo Sonde #17 Endpoint SW inbound (with BT). Bad BT
0003	Eye is trying to symmetrize

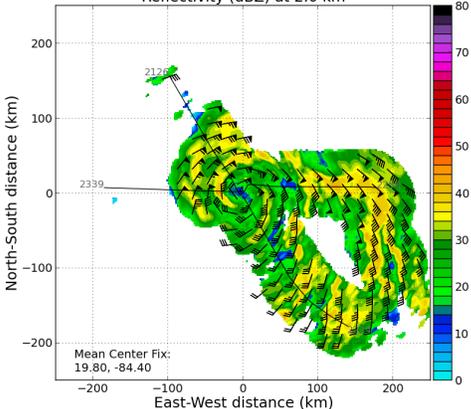
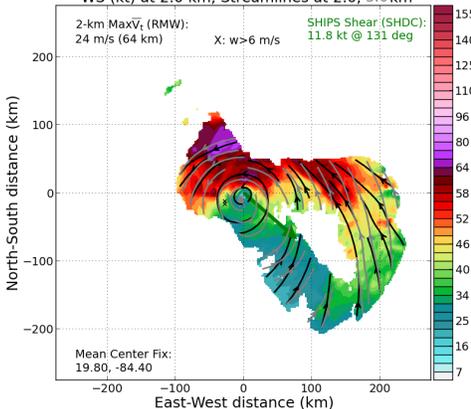
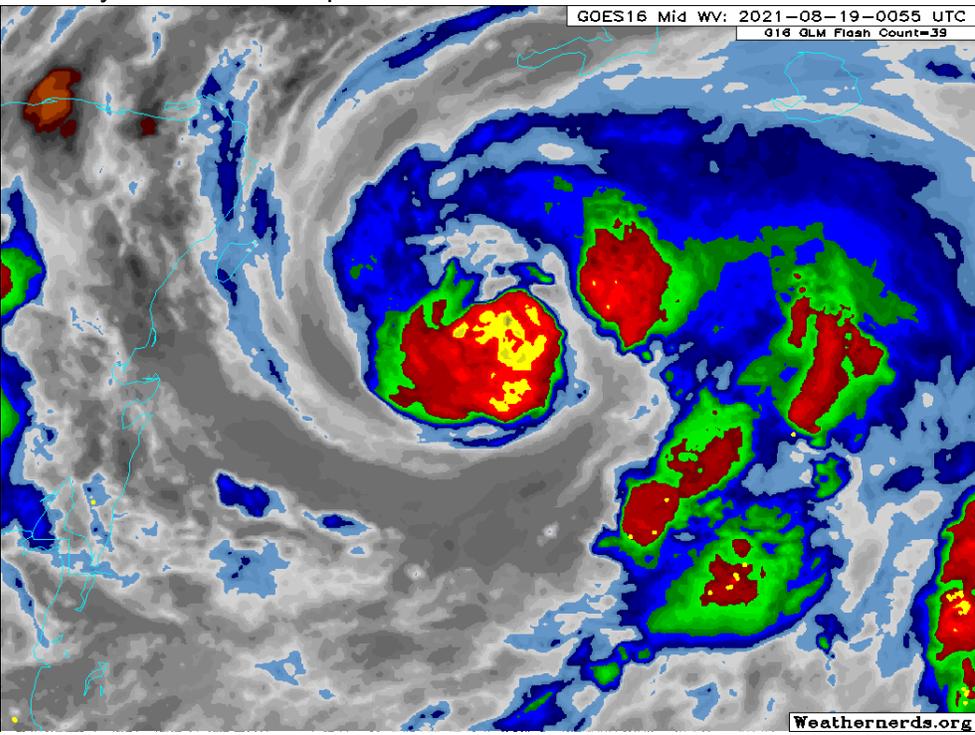
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0010	Sonde #18 Midpoint SW										
0018	Sonde #19 Quarterpoint SW										
0021	Sone #20 Eyewall SW										
0022	Sonde #21 Center										
0024	Sondes #22 and #23 (Backup for LLD) Eyewall NE for ONR										
0029	Sonde #24 Quarterpoint NE for ONR										
0037	TC is aligned but wind field is still asymmetric										

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	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>210818H1 (GRACE) 212600 to 233900 UTC Reflectivity (dBZ) at 2.0 km</p>  <p>Mean Center Fix: 19.80, -84.40</p> </div> <div style="text-align: center;"> <p>210818H1 (GRACE) 212600 to 233900 UTC WS (kt) at 2.0 km; Streamlines at 2.0, 5.0 km</p>  <p>2-km MaxV_z (RMW): 24 m/s (64 km) SHIPS Shear (SHDC): X: w>6 m/s 11.8 kt @ 131 deg</p> <p>Mean Center Fix: 19.80, -84.40</p> </div> </div>
0037	Sonde #25 Midpoint NE
0049	Combo Drop (Sonde #26), BT, Endpoint NE, Bad BT
0112	<p>Clear dry slot on water vapor satellite</p> 

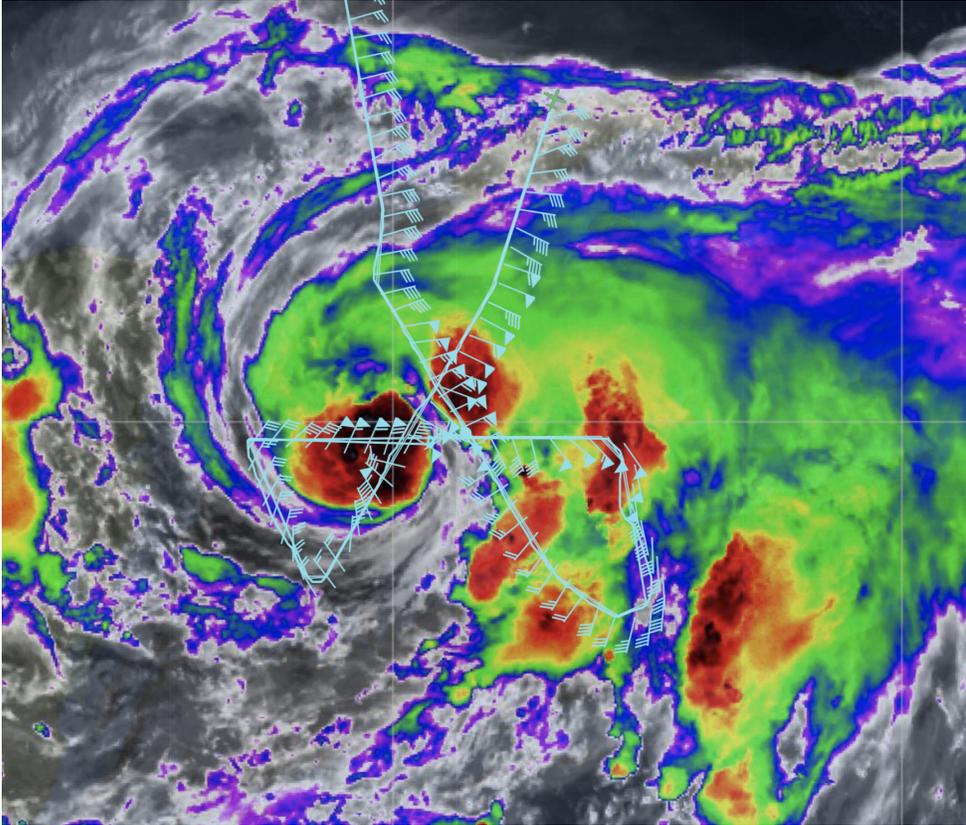
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POST-FLIGHT	
Mission Summary	<p>Grace was slowly intensifying throughout the day, but still had the general broad wind pattern that was seen in the mission earlier in the day. The inner-core slowly rebuilt itself throughout the flight, but deepening was still slow rather than rapid. Towards the end of the flight a dry slot could be seen working its way around the downshear side.</p> <p>This mission raised some questions as to whether it was 10-15 kt of moderate NW shear, some dry air in the environment, or the asymmetric wind field that was responsible for Grace not as rapidly intensifying as some guidance had suggested.</p> <p>Several inner-core (“quarterpoint” -- between the midpoint and center drops, and RMW) sondes were done for ONR TCRI collaborators. 26 sondes were released in total, with 15 being charged to NWS and 11 to ONR.</p> <p>TDR data showed that vortex tilt was not an issue (the circulation was aligned), but did further reveal the asymmetric nature of the wind field.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>210818H1 (GRACE) 212600 to 245100 UTC Reflectivity (dBZ) at 2.0 km</p> </div> <div style="text-align: center;"> <p>210818H1 (GRACE) 212600 to 245100 UTC WS (kt) at 2.0 km; Streamlines at 2.0, 5.0 km</p> </div> </div>
Actual Standard Pattern Flown	Butterfly
APHEX Experiments / Modules Flown	The data could potentially serve as a null case for the <i>Early Stage Experiment: AIPLEX</i> and was flown collaboratively with ONR TCRI.
Plain Language Summary	<ul style="list-style-type: none"> This mission collected radar data for the models and also data to support the ONR TCRI collaboration, as we flew in a strengthening

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	<p>Hurricane Grace.</p> <ul style="list-style-type: none">• Although Grace slowly strengthened during the day, it did not rapidly intensify, perhaps due to some dry air around it.
<p>Instrument Notes</p>	<p>Compact Raman Lidar worked well 26 sondes (25 transmitted): 15 NWS, 11 ONR TCRI 5 AXBTs (3 good) for ONR TCRI</p>
<p>Final Mission Track</p>	

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