

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

FLIGHT LOG - 20210906N1

MISSION PLAN			
FLIGHT ID	20210906N1	STORM	AL12 / LARRY
MISSION ID	WC12A	TAIL NUMBER	NOAA49
TASKING	HRD	PLANNED PATTERN	Survey + Circumnave
MISSION SUMMARY			
TAKEOFF [UTC]	1545	LANDING [UTC]	2253
TAKEOFF LOCATION	St. Croix	LANDING LOCATION	St. Croix
FLIGHT TIME	7.1	BLOCK TIME	6.8
TOTAL REAL-TIME RADAR ANALYSES (Transmitted)	3 (3)	TOTAL DROPSONDES (Good/Transmitted)	35 (35/35)
OCEAN EXPENDABLES (Type)	None	sUAS (Type)	None
APHEX EXPERIMENTS / MODULES	Mature Stage Experiment: TC Diurnal Cycle		
HRD CREW MANIFEST			
LPS ONBOARD	None	LPS GROUND	Dunion, O'Neill, Wing
TDR ONBOARD	None	TDR GROUND	Reasor, Gamache
ASPEN ONBOARD	Parrish	ASPEN GROUND	None
NESDIS SCIENTISTS	None		
GUESTS (Affiliation)	None		
AOC CREW MANIFEST			
PILOTS	Mansour, Varwig		
NAVIGATOR	None		
FLIGHT ENGINEERS	None		
FLIGHT DIRECTOR	Kalen, Parrish		
DATA TECHNICIAN	Defeo		
AVAPS	Greene		

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PRE-FLIGHT	
Flight Plan	
Expendable Distribution	Dropsondes released at all of the green points in the above plan

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Preflight Weather Briefing	As of the 11 AM EDT NHC Advisory, Hurricane Larry has maximum sustained winds of 105 kt, an MSLP of 956 mb, is located near 22.1°N / 52.9°W, and is moving northwest at 9 kt.
Instrument Notes	None

IN-FLIGHT	
Time [UTC]	Event
1530	CIMSS indicates lower vertical wind shear than yesterday

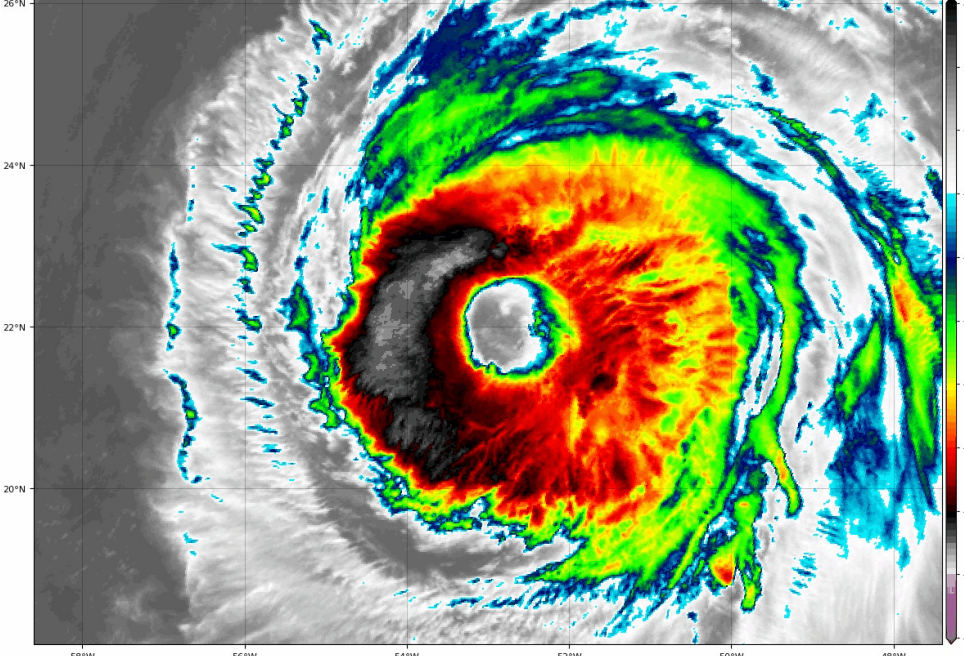
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	<p>The figure is a weather map of a tropical system, likely a hurricane, centered around 20°N, 50°W. It features several layers of data: <ul style="list-style-type: none"> Cloud Tops: Shaded areas representing cloud tops, with a color scale on the right ranging from -90 to +30 degrees Celsius. Shear Lines: Colored lines (red, yellow, green, blue) indicating wind shear. A legend below the map defines these as FAVORABLE (green), NEUTRAL (yellow), or UNFAVORABLE (red). Storm Categories: Symbols and labels for different stages: Invest Area (I), Tropical Depression (L), Tropical Storm (S), and Hurricane/Typhoon (w/category). Contours: Various contour lines (isobars, isotherms) labeled with values like 20, 25, 30, 40, 50, 60, 65. Legend: <ul style="list-style-type: none"> Low/Neve Tropical Depn Tropical STPN Category 1 Category 2 Category 3 Category 4 Category 5 I - Invest Area L - Tropical Depression S - Tropical Storm H - Hurricane/Typhoon (w/category) Shear: FAVORABLE (green), NEUTRAL (yellow), UNFAVORABLE (red) units: knots </p>
1545	Takeoff from St Croix
1600	NHC: 105 kts, moving NW at 9 kts

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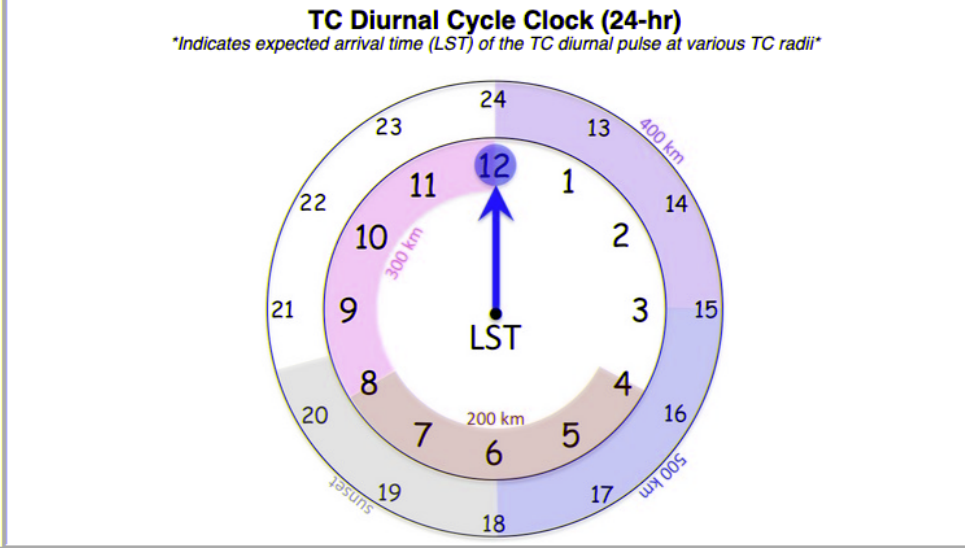
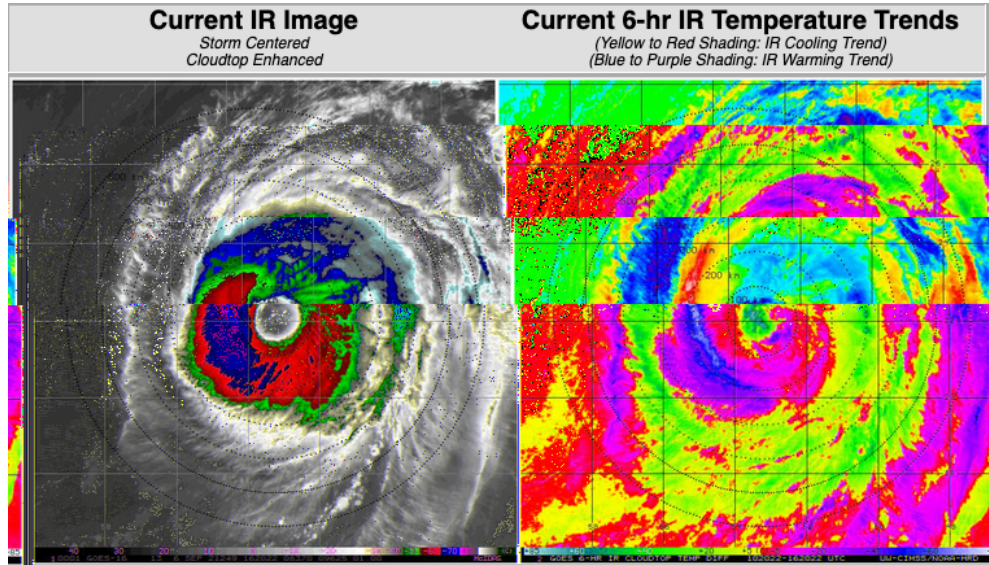
1630	<p>GOES-16 Channel 13 (IR) Brightness Temperature (°C) at 13:55Z Sep 06, 2021</p>  <p>TROPICALTIDBITS.COM</p>
1640	First dropsonde (1612 UTC) at boundary of mid-latitude dry air and Saharan Air Layer (SAL)

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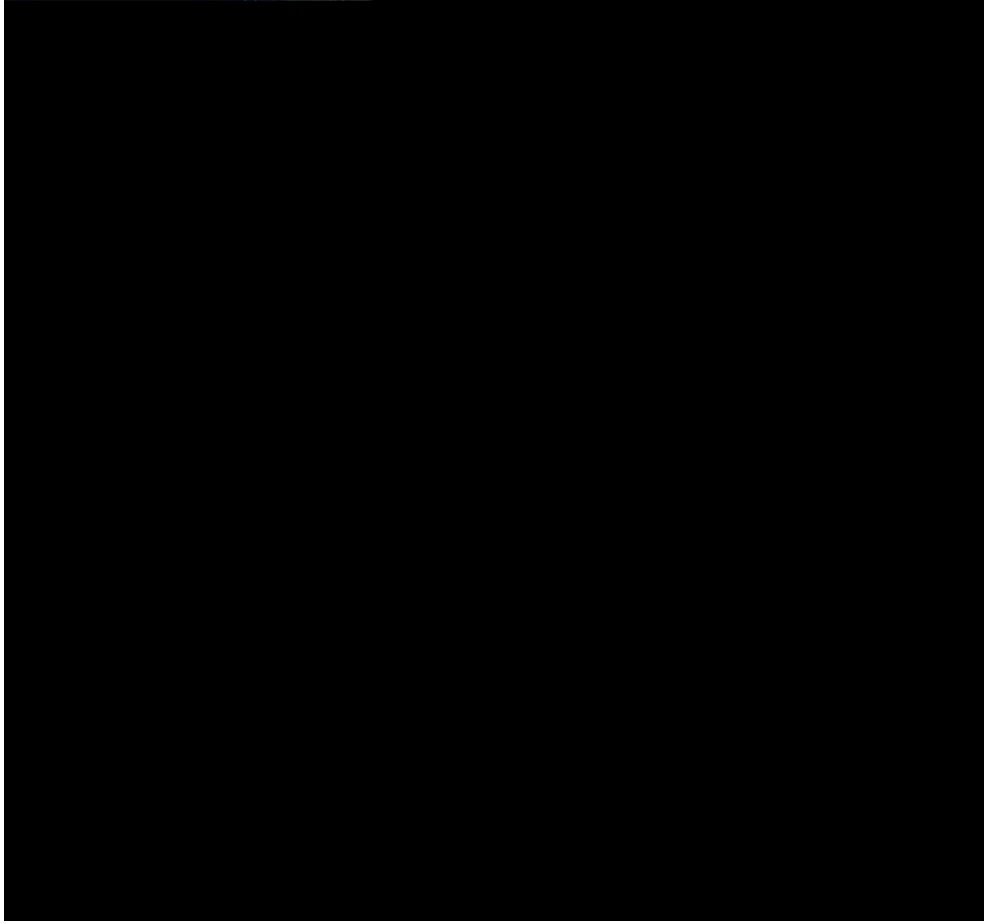
1651

Diurnal cycle ahead of schedule:



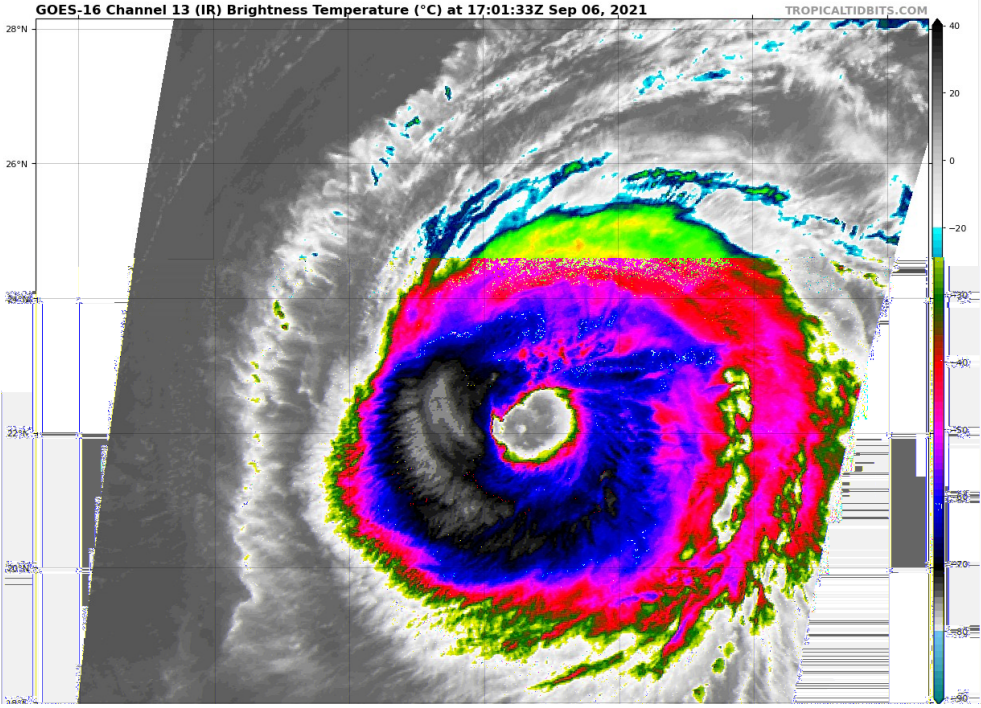
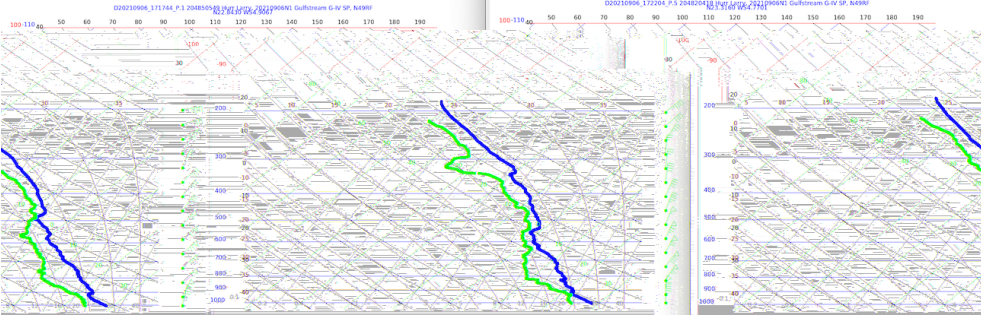
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1653	First few dropsondes all very similar trade wind BL structure, inversion a bit higher as moving northeast
1712	Flight level winds seem to be very wrong again: 

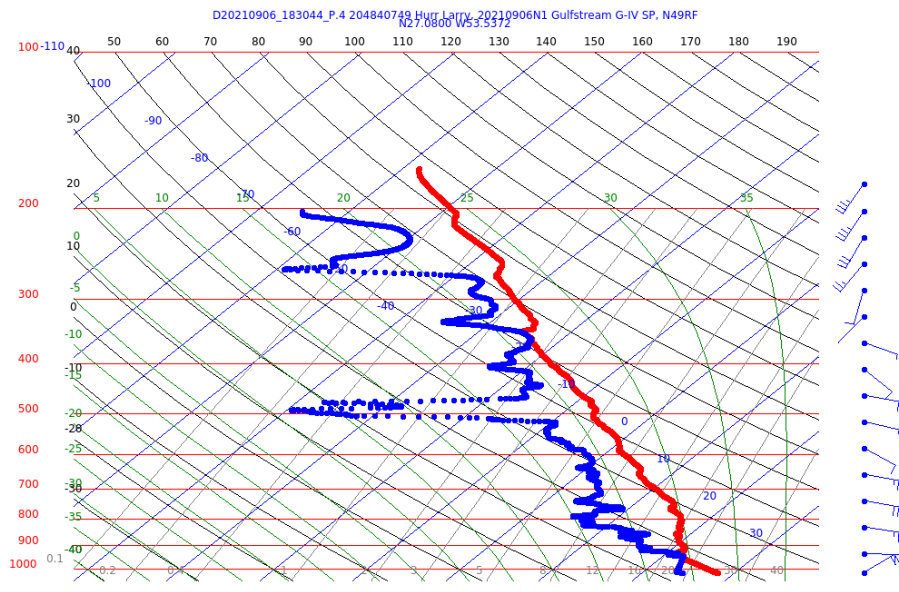
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<p>1729</p>	<p>Larry has potentially been exhibiting a “cloud cliff” feature for over an hour, featuring a straight-line feature from the 1pm position in the eye outward approximately ESE</p>  <p>Actually, I can see two of these, another is emanating from the noon position in the eye to ENE</p>
<p>1808</p>	<p>Some mid-level dry air in the inner circumnavigation west of center (sondes 9-10 at 1717 UTC & 1722 UTC, respectively) but not to the same extent as yesterday</p> 

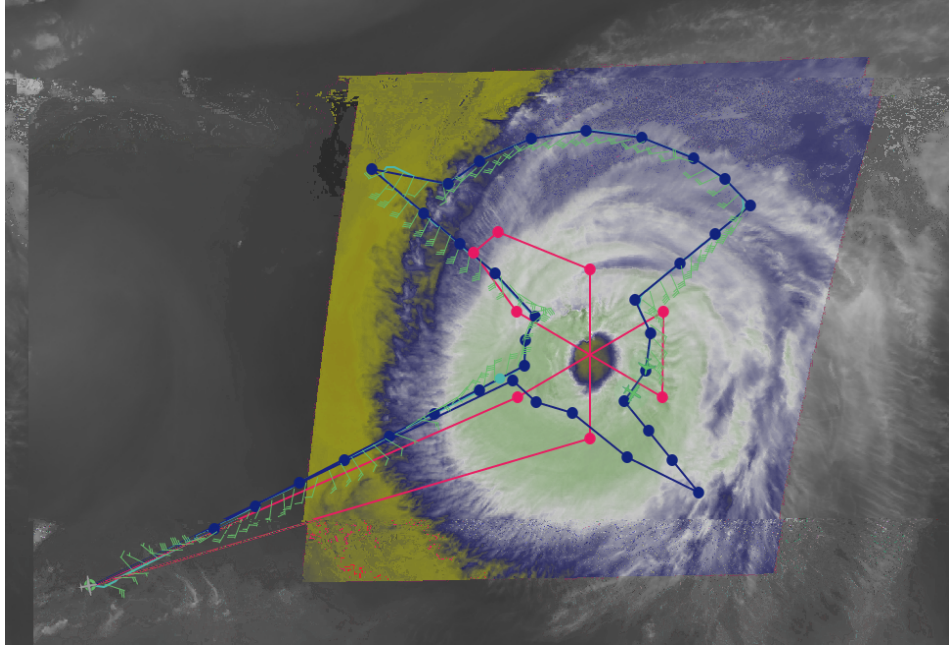
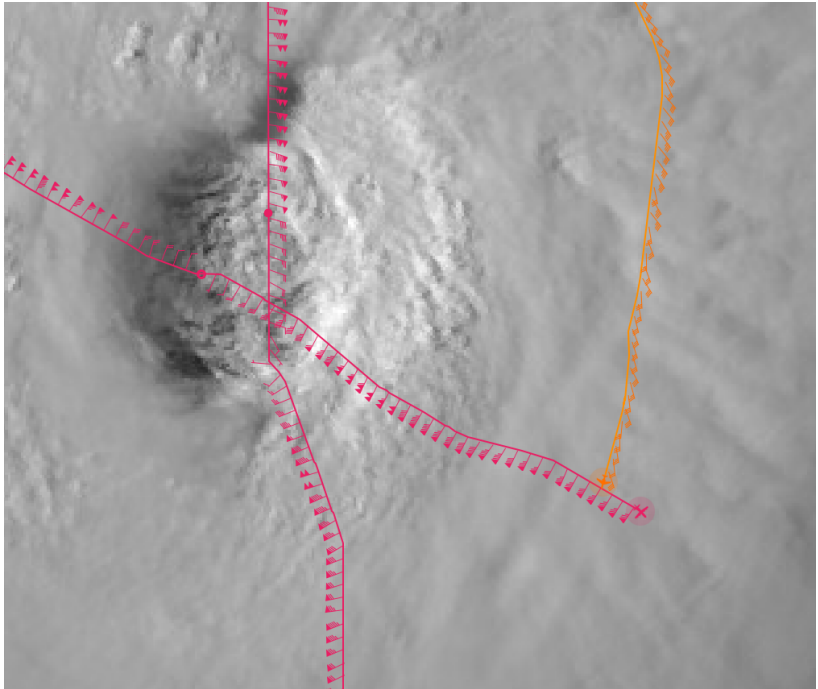
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1843	Sondes 12-16 (1738Z, 1746Z, 1755Z, 1807Z, 1813Z) in the NW corner seem to have caught the outflow layer, fairly shallow southerly flow in upper most ~50 mb in sonde 12, then somewhat deeper SW flow in 13-16. 14 was dropped in the turn, pretty much in clear air, scattered Cu below per Flight Director
1900	<p>Sonde 18 (1830 UTC) is notably moister than sonde 17 (1822 UTC) and 19 (1839 UTC) (all in Northern arc)</p>  <p style="font-size: small;">D20210906_183044_P.4 204840749 Hurr Larry_20210906N1 Gulfstream G-IV SP, N49RF N27.0800 W53.5372</p> <p style="font-size: x-small;">Aspen V3.4.6, 06 Sep 2021 18:50 UTC</p>
1927	At WP25, turning into inner circumnav on East side of storm, at location of where that cloud cliff was, but not much visible anymore on satellite there (and no visual from the plane, in cloud)
1937	The G-IV and P-3 are near each other

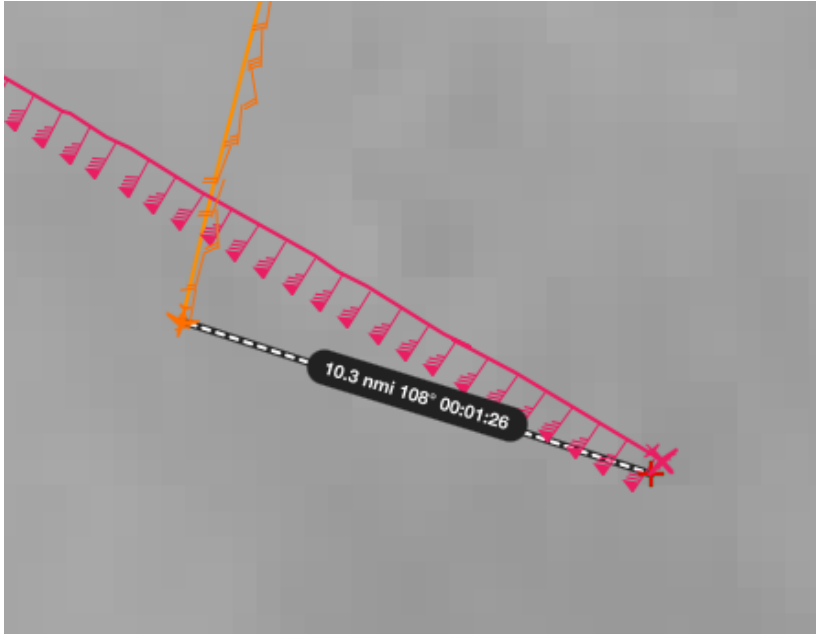
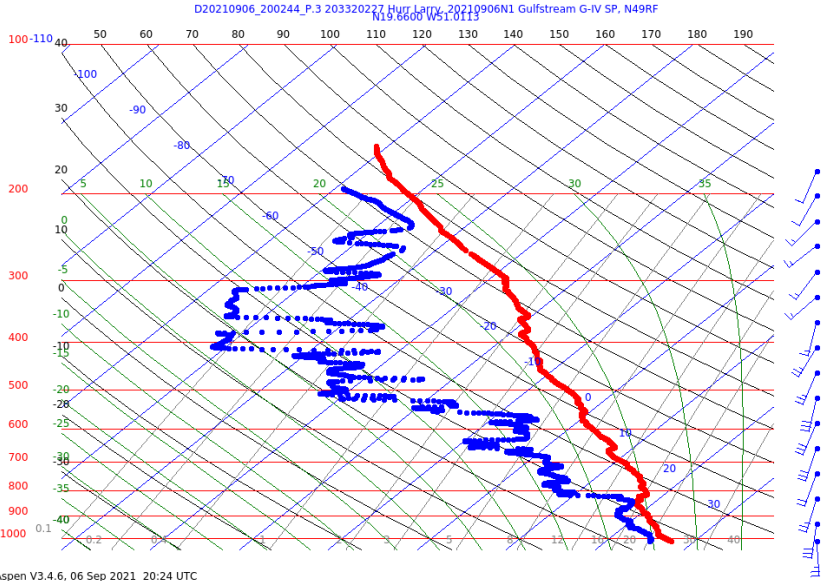
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	 A satellite image of a hurricane with several flight paths overlaid. The paths are represented by lines with circular markers. One path is blue, another is red, and a third is green. The hurricane's eye is visible in the center, surrounded by a dense ring of clouds.
1939	Crew sees convective cells right on point 28, will do their best to drop at the CPA (closest point approach) on the way to point 29
1941	 A satellite image of a hurricane with flight paths overlaid. The paths are represented by lines with triangular markers. One path is red, another is orange, and a third is yellow. The hurricane's eye is visible in the center, surrounded by a dense ring of clouds.

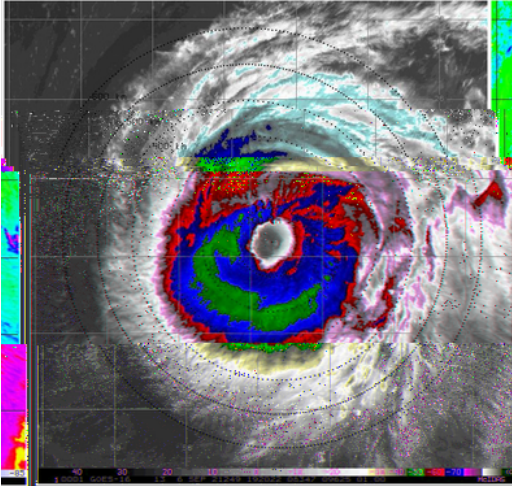
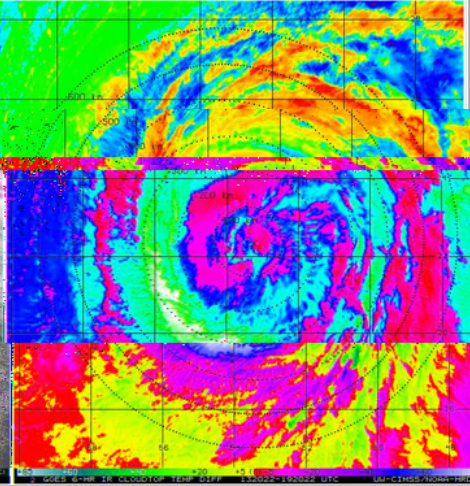
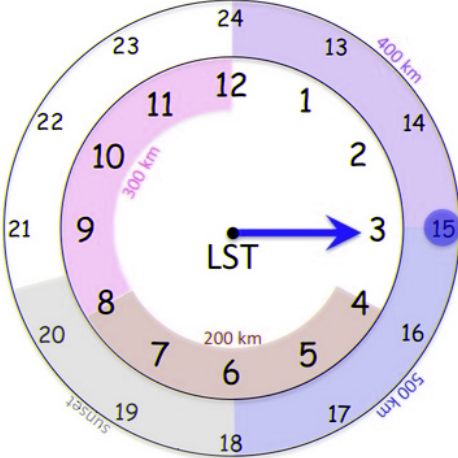
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	<p>G-IV & P-3 about to intersect</p>  <p>Closest was about 8 nmi.</p>
<p>2004</p>	<p>FD: in the CDO for point 31 (Southeast corner). near the top of it though, very bright, just can't see below. The sonde was pretty dry though (what we wanted with that SE corner).</p>  <p>Aspen V3.4.6, 06 Sep 2021 20:24 UTC</p>

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2020	Crew reports “gnarly convection within FL ORM (flight level operational risk management) at point 33”, they will do a CPA. there was a banding feature that went up pretty high which they had to avoid
2025	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Current IR Image <i>Storm Centered Cloudtop Enhanced</i></p>  </div> <div style="text-align: center;"> <p>Current 6-hr IR Temperature Trends <i>(Yellow to Red Shading: IR Cooling Trend) (Blue to Purple Shading: IR Warming Trend)</i></p>  </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>TC Diurnal Cycle Clock (24-hr) <i>*Indicates expected arrival time (LST) of the TC diurnal pulse at various TC radii*</i></p>  </div>
2035	Flight crew says “drop 32 looks like it lost its winds below 7500 ft. RH and temp are still there though.”
2049	Last sonde away. Great sequence of TCDC flights!

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POST-FLIGHT	
Mission Summary	35 total dropsondes were released; 10 for HRD and 25 for Stanford Univ. collaboration.
Actual Standard Pattern Flown	Survey pattern with 3 Radius 90 n mi partial circumnavigations
APHEX Experiments / Modules Flown	<i>TC Diurnal Cycle Experiment</i>
Plain Language Summary	
Instrument Notes	
Final Mission Track	<p><i>Planned track with drop points (blue), actual flight track (red)</i></p> 