

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

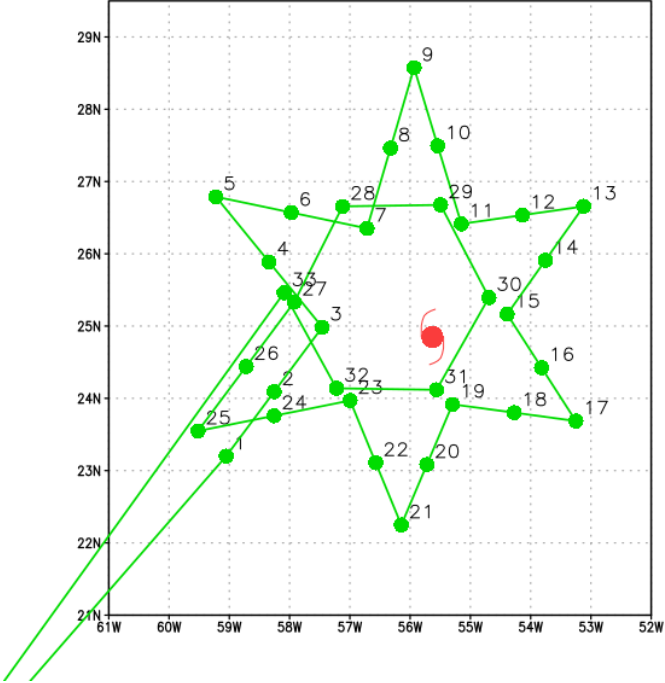
**FLIGHT LOG - 20210907N1**

MISSION PLAN			
FLIGHT ID	20210907N1	STORM	AL12 / LARRY
MISSION ID	WD12A	TAIL NUMBER	NOAA49
TASKING	HRD	PLANNED PATTERN	Star + Circumnavigation
MISSION SUMMARY			
TAKEOFF [UTC]	1442	LANDING [UTC]	2155
TAKEOFF LOCATION	St. Croix	LANDING LOCATION	St. Croix
FLIGHT TIME	7.2	BLOCK TIME	7.4
TOTAL REAL-TIME RADAR ANALYSES (Transmitted)	3 (3)	TOTAL DROPSONDES (Good/Transmitted)	35 (33/33)
OCEAN EXPENDABLES (Type)	None	sUAS (Type)	None
APHEX EXPERIMENTS / MODULES	Satellite Validation Experiment: NESDIS JPSS		
HRD CREW MANIFEST			
LPS ONBOARD	None	LPS GROUND	Dunion
TDR ONBOARD	None	TDR GROUND	Reasor
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**

<b>Flight Plan</b>	<div style="text-align: center;">  </div> <p style="text-align: center;">First fly the Star pattern, then proceed into a clockwise inner core circumnavigation. The pattern is timed to provide measurements for the Aqua and NOAA-20 overpasses.</p>
<b>Expendable Distribution</b>	Dropsondes released at all of the green dots in above image
<b>Preflight Weather Briefing</b>	As of the 11 AM EDT NHC Advisory, Hurricane Larry has maximum sustained winds of 100 kt, central pressure of 967 mb, is moving northwest at 8 kt, and is located near 24.4N / 55.6W. The storm appears to have weakened somewhat since yesterday with the Air Force finding somewhat lower winds and higher pressure in their fix flight this morning. The appearance of Larry has also degraded somewhat given that the

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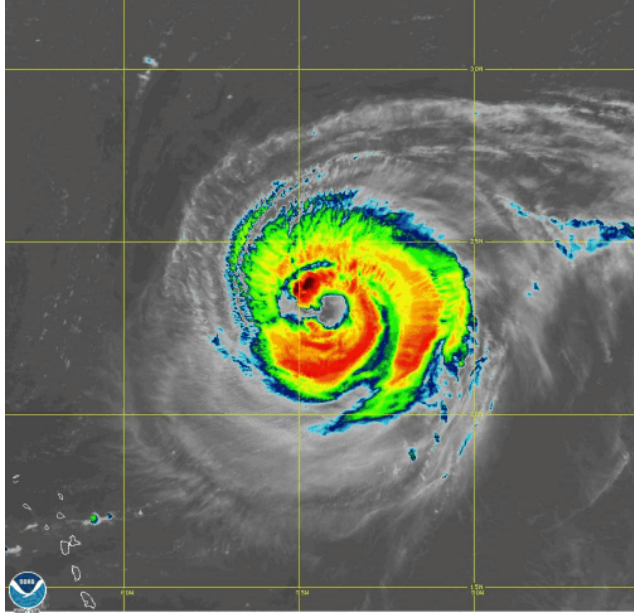
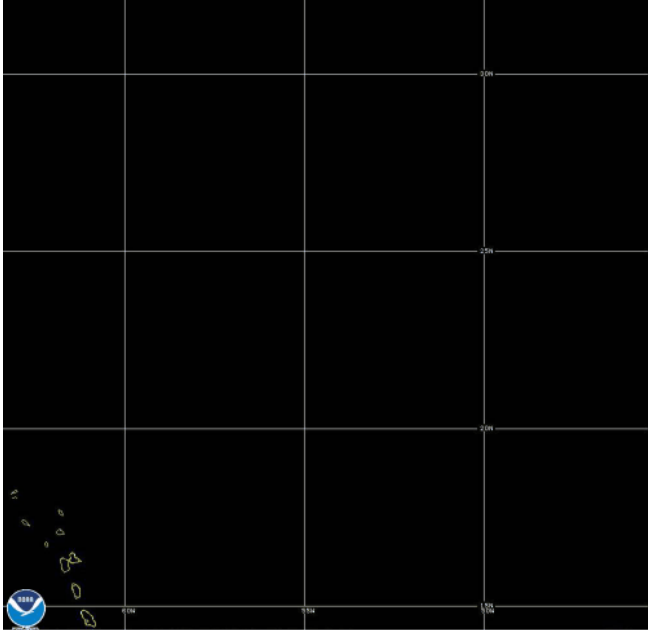
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	<p>inner core and eye has a more ragged appearance compared to yesterday. It's possible that dry air may be reaching the eyewall region. The deep-layer shear appears low, instead the dry air and perhaps ocean cooling could be contributing to the slow weakening that is now occurring.</p> <p>The goal of the flight is to collect environmental dropsonde data timed with the Aqua satellite overpass, which will provide data for the NUCAPS retrieval of temperature and moisture intercomparison. The dropsondes from this flight will be used to validate the measurements from the NUCAPS retrieval.</p>
<b>Instrument Notes</b>	None

IN-FLIGHT	
Time [UTC]	Event
1442	Takeoff from St. Croix
1500	Satellite imagery from this morning showing the somewhat less impressive inner core today compared to yesterday:

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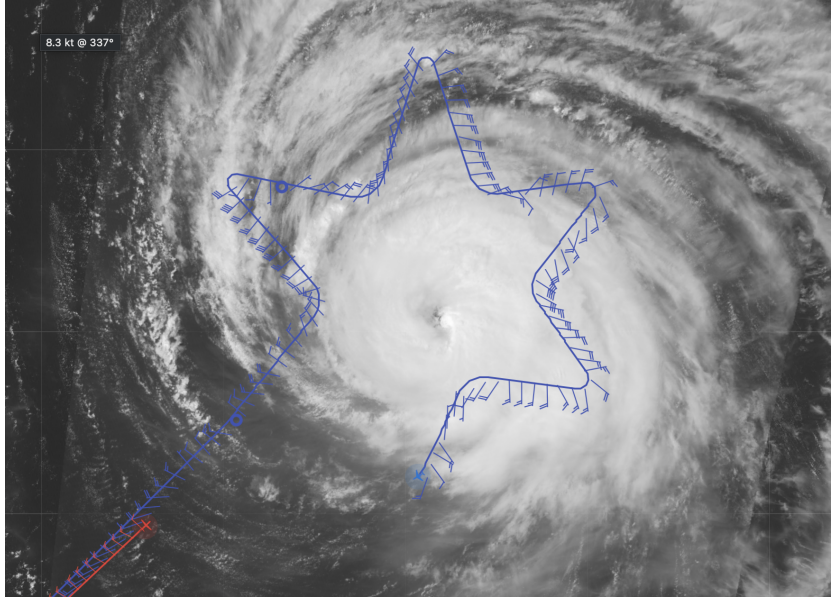
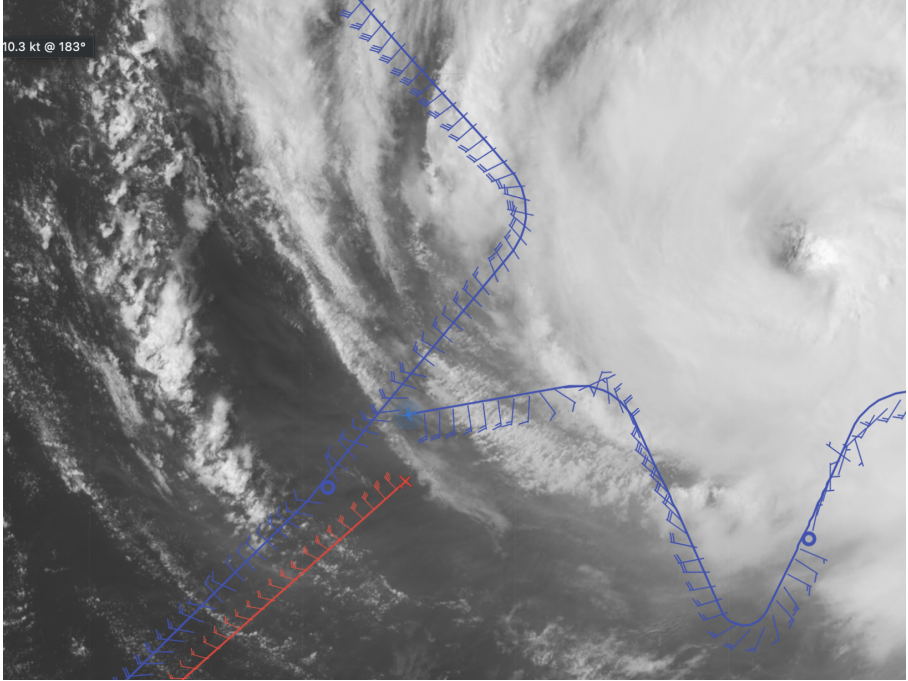
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	 <p>07 Sep 2021 03:00Z NOAA/NESDIS/STAR GOES-East Band 13 HU Larry</p>  <p>07 Sep 2021 03:10Z NOAA/NESDIS/STAR GOES-East Band 02 HU Larry</p>
1817	The G-IV has been flying the Star portion of the pattern and has nicely gone back and forth through the gradients in the environment all around the storm. Much of the flight has spent time in the outflow, which is interesting as a follow up to the TC Diurnal Cycle flights the past 2 days.



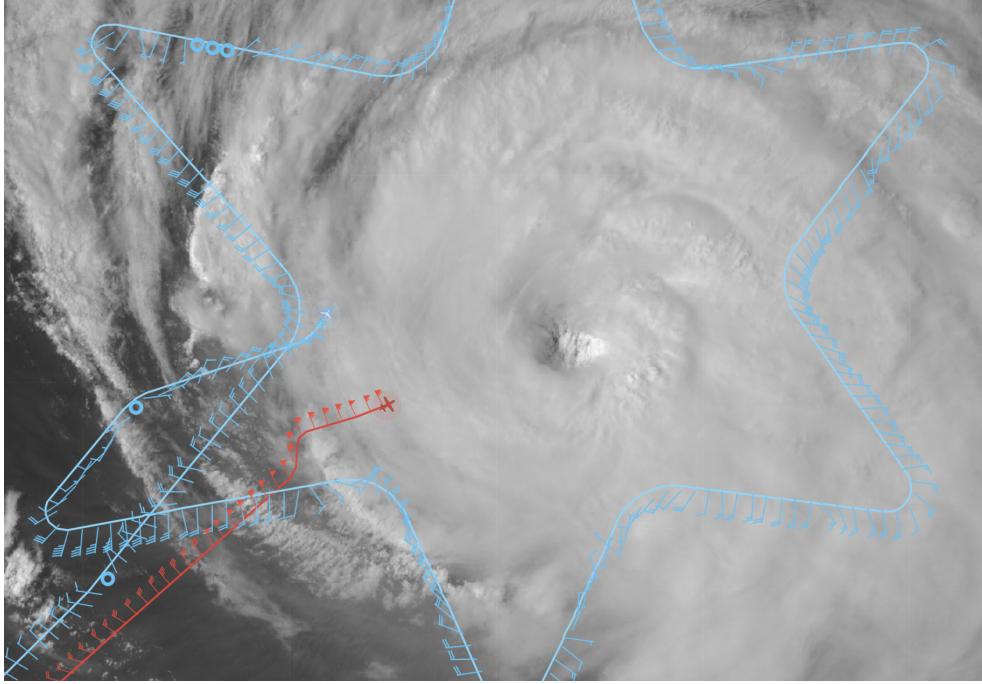
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<p>1844</p>	<p>The P-3 and the G-IV are now passing in close proximity to each other.</p> 
<p>1849</p>	<p>LPS has shifted the inner core circumnavigation to be better centered on the storm center; shifted southeast by 40-45 n mi. The Star portion of the</p>

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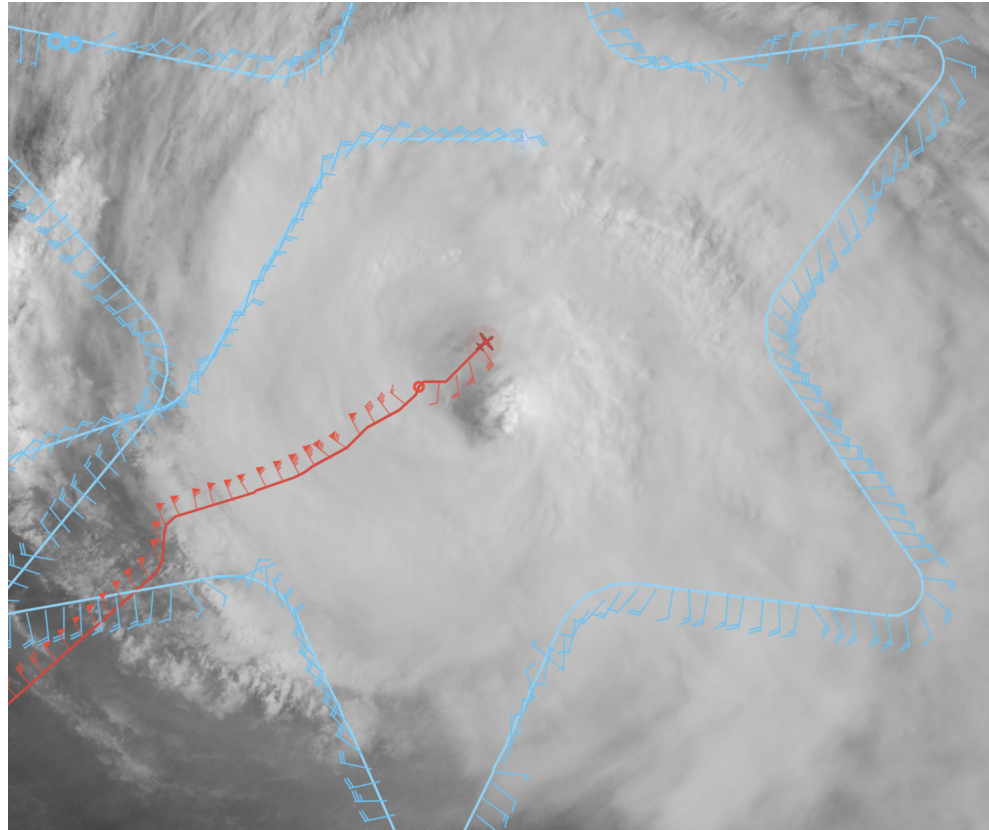
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	pattern is now complete.
1904	<p>The airplane is headed towards its first circumnavigation point to the west of the storm, while the P-3 is now inbound.</p>  <p>The image shows a satellite view of a hurricane with a well-defined eye and spiral cloud bands. Overlaid on the image are two flight paths. A blue path starts from the top left, moves westward, then curves south and east, eventually looping back to the top left, forming a large circle around the storm. A red path starts from the bottom left and moves northeast towards the storm's outer edge. Small icons of an airplane and a P-3 Orion are placed along these paths to indicate their positions and directions of travel.</p>

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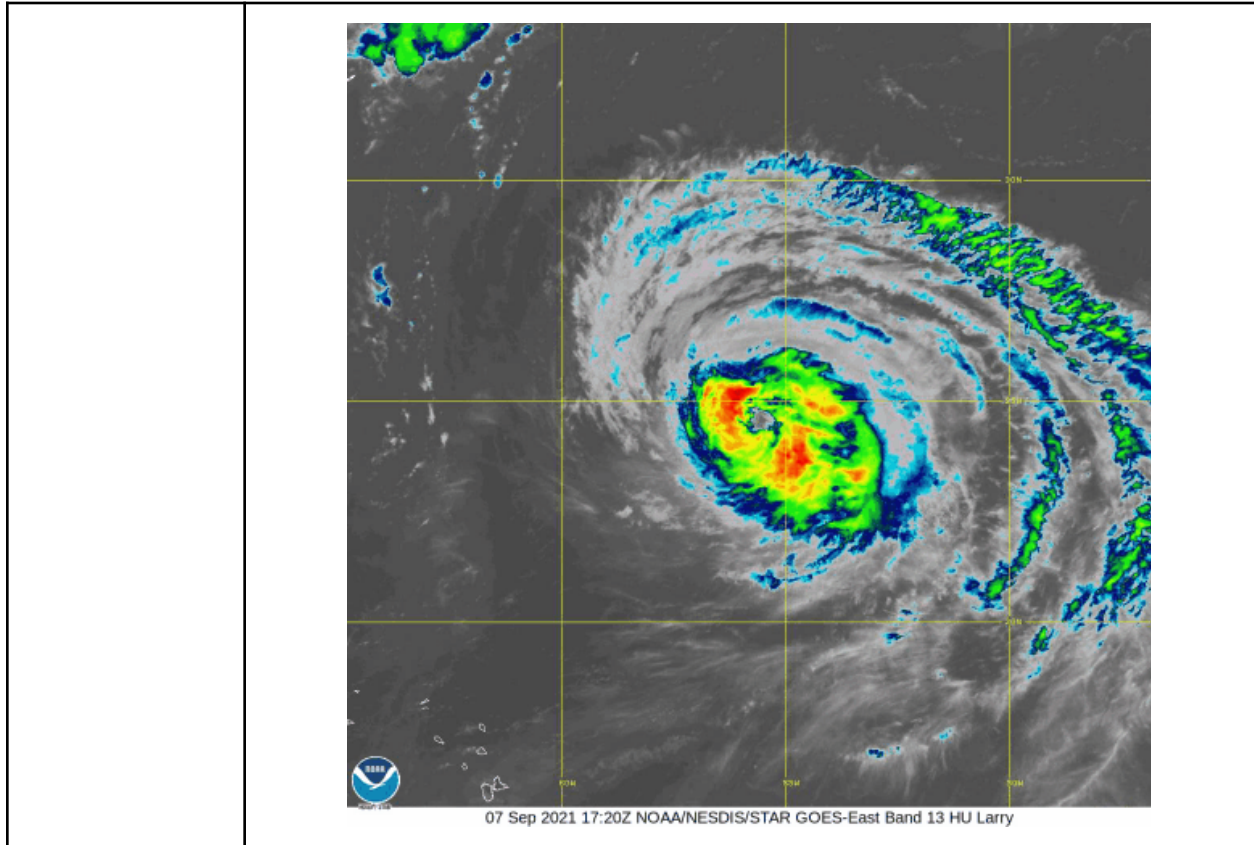
1928



While the P-3 completes its first eyewall penetration and fix, the G-IV is now on the northern portion of its inner circumnavigation pattern, likely picking up some nice precipitation to help get some decent coverage for the TDR analyses:

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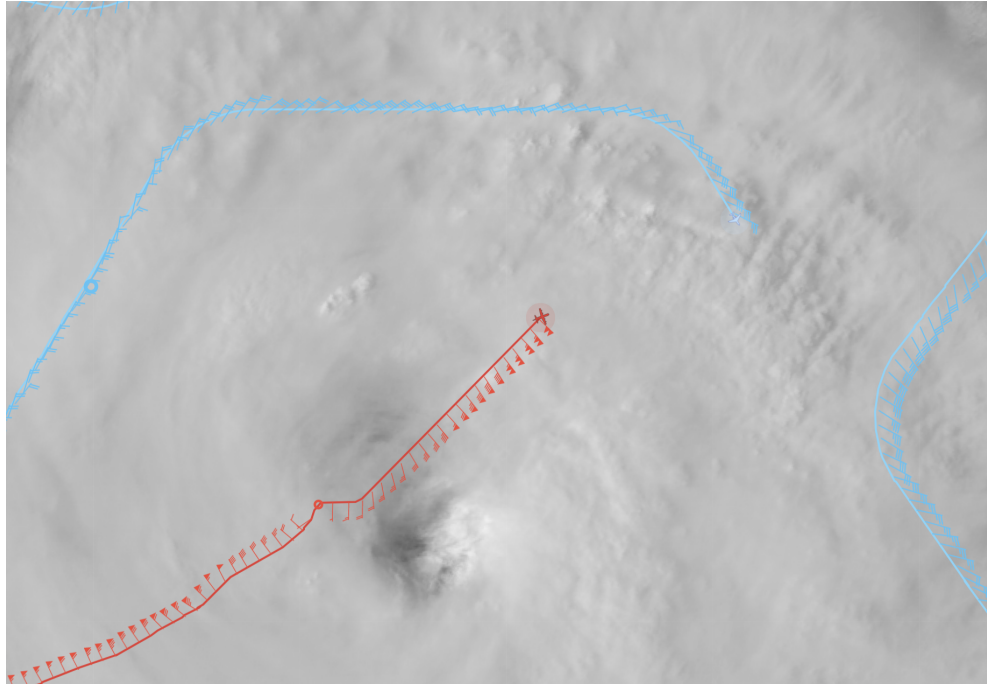
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1936



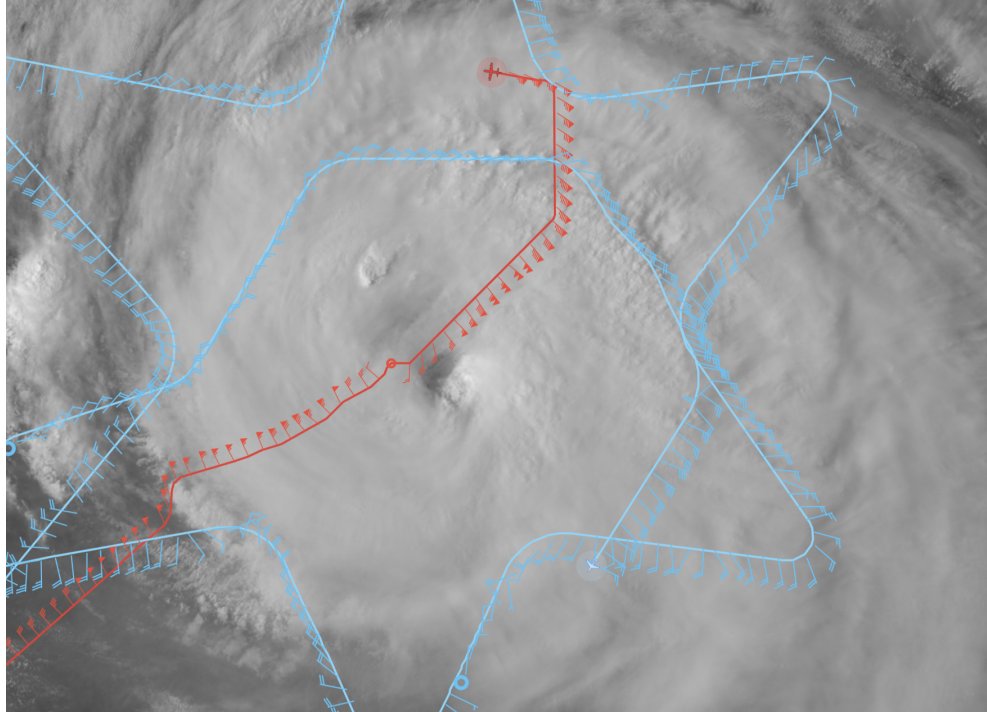
P-3 is now picking up 100+ kt flight level winds, and is approaching the point in the pattern in which the G-IV is on the NE portion of its inner circumnavigation of the inner core.



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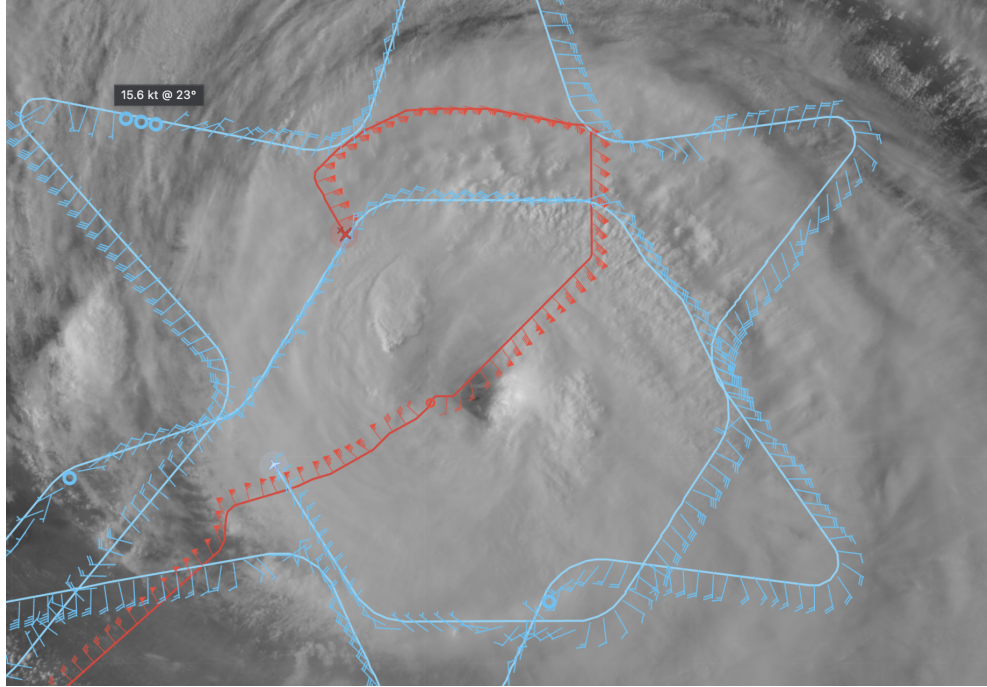


The P-3 is now downwind to the next cross from the NW to SE. The G-IV is completing the SE portion of the inner circumnavigation -- it looks like the G-IV has been flying through plenty of precipitation on the circumnav, although the cirrus is thinning out on the south side.

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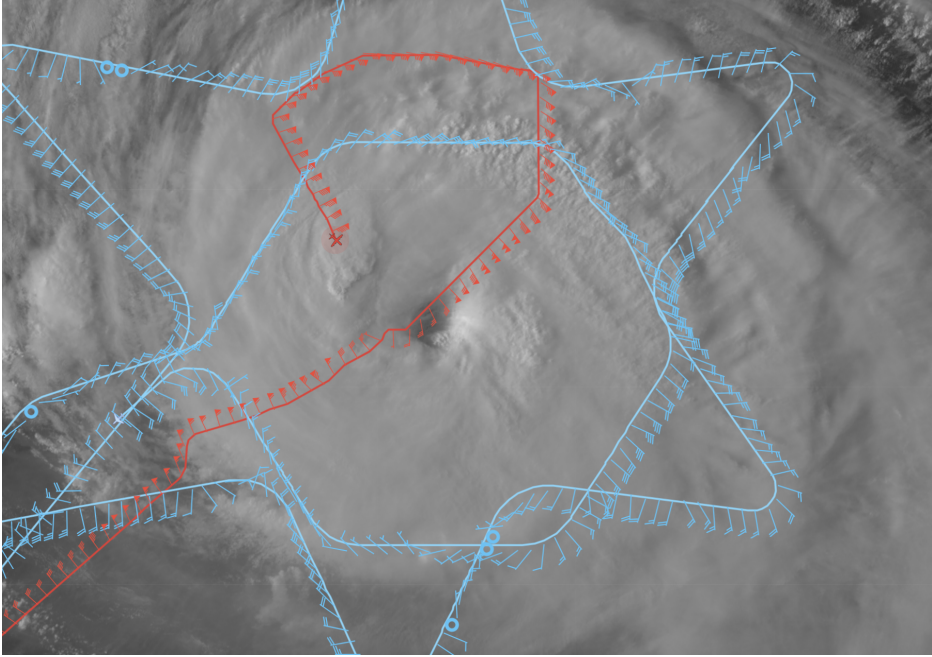
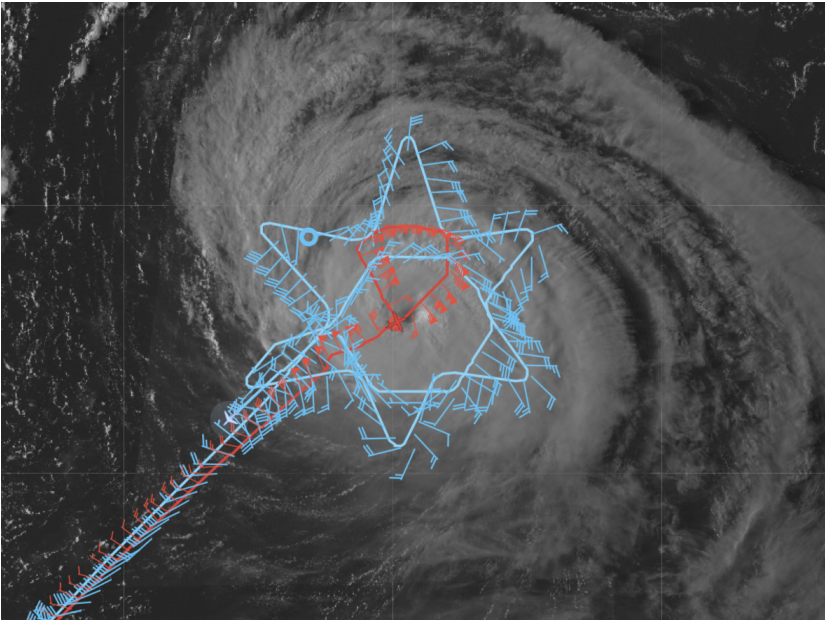
2020



The P-3 now inbound from the NNW. In front of them on the inbound is a new convective burst in the eyewall. From this visible imagery it's become clearer that the eye is much bigger than we believed earlier as the cirrus was just camouflaging it on the western side. Meanwhile, the G-IV is just about complete with its inner circumnavigation of the inner core. The precipitation coverage from the TDR on the western side appears to be somewhat less than the other sides of the storm.

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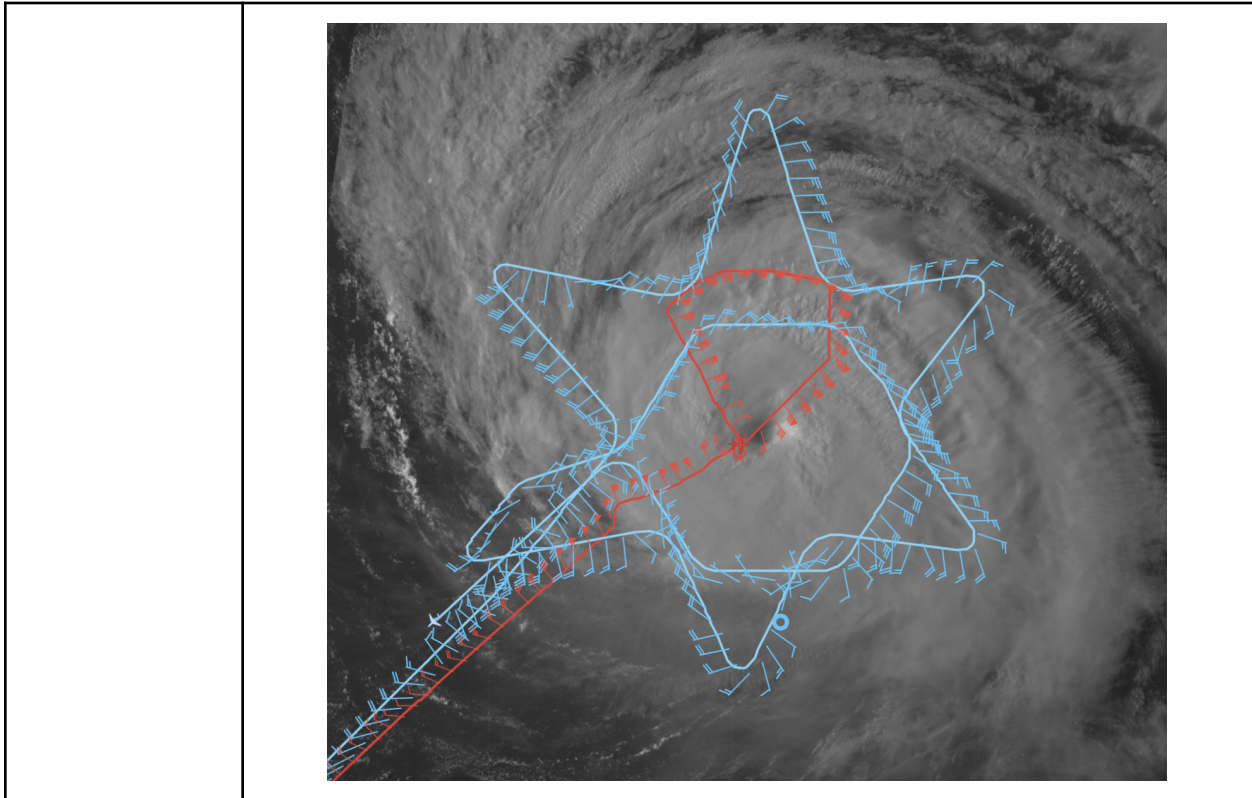
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2027	 <p>The G-IV has completed the inner core circumnavigation and is now on their way back to St. Croix. Meanwhile, the P-3 is approaching the eyewall, coming in on a 330 degree radial, from the NNW.</p>
2043	<p>The final pattern:</p> 



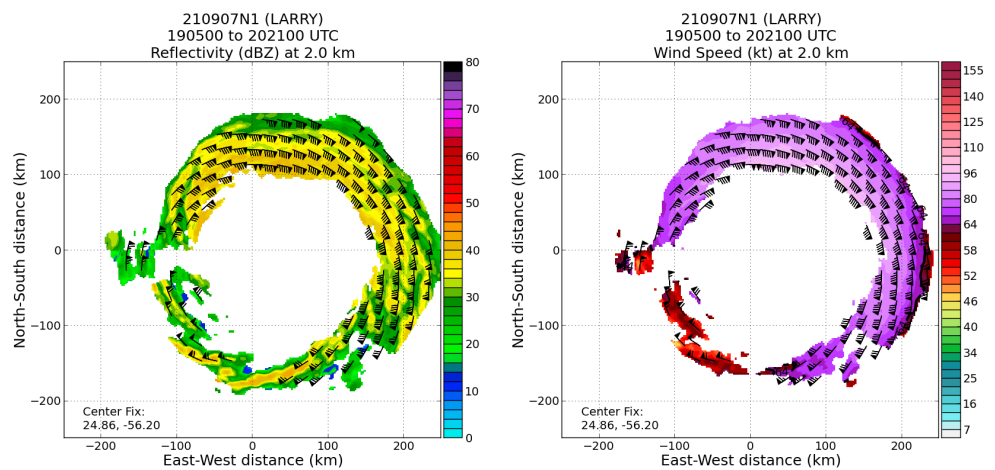
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2107

The final TDR analysis from the inner core circumnavigation is outstanding in coverage and shows well just how large of a wind field Larry has:

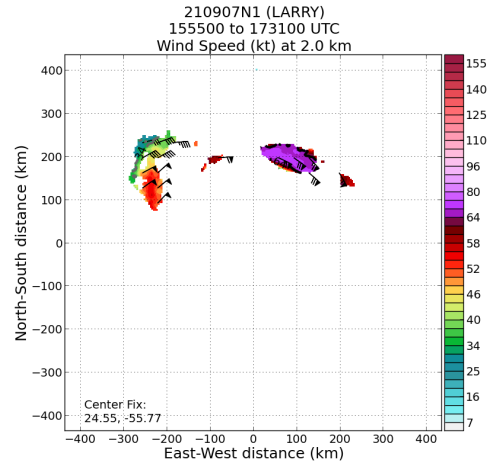
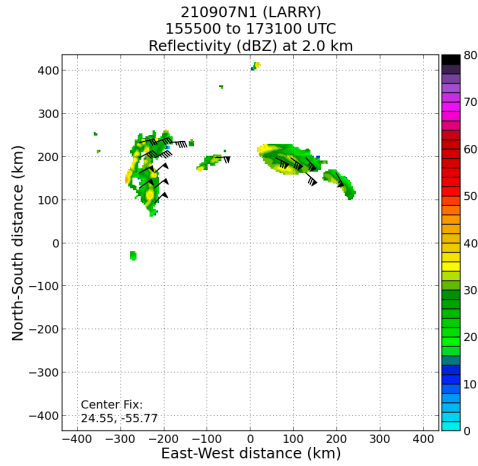


Here is a look at the TDR analyses from the Star pattern:

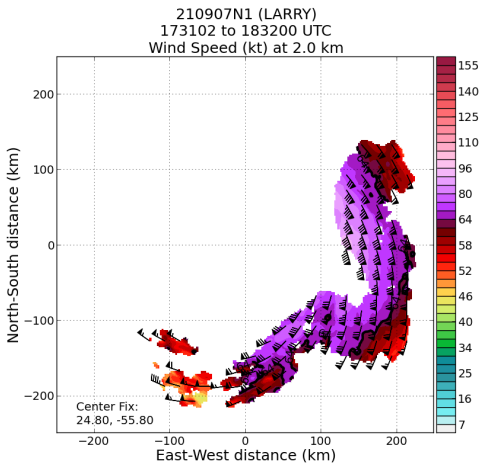
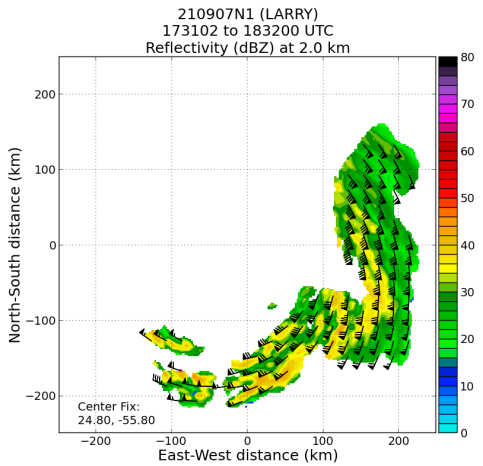
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...on the western and north side...



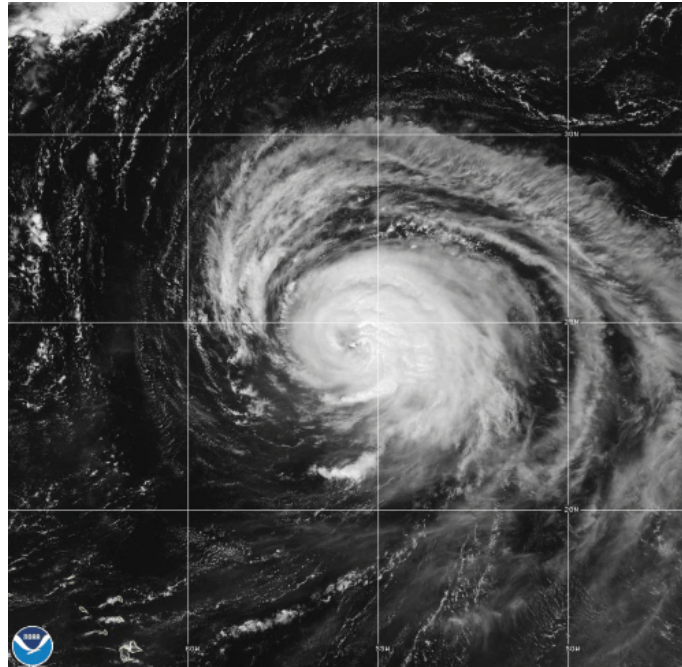
...on the eastern and south side...



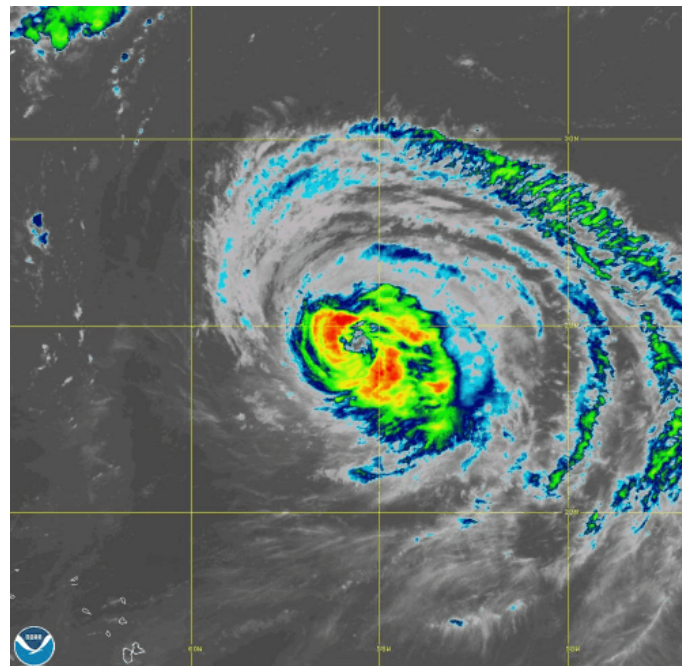
And finally, the final satellite loops encompassing the mission:

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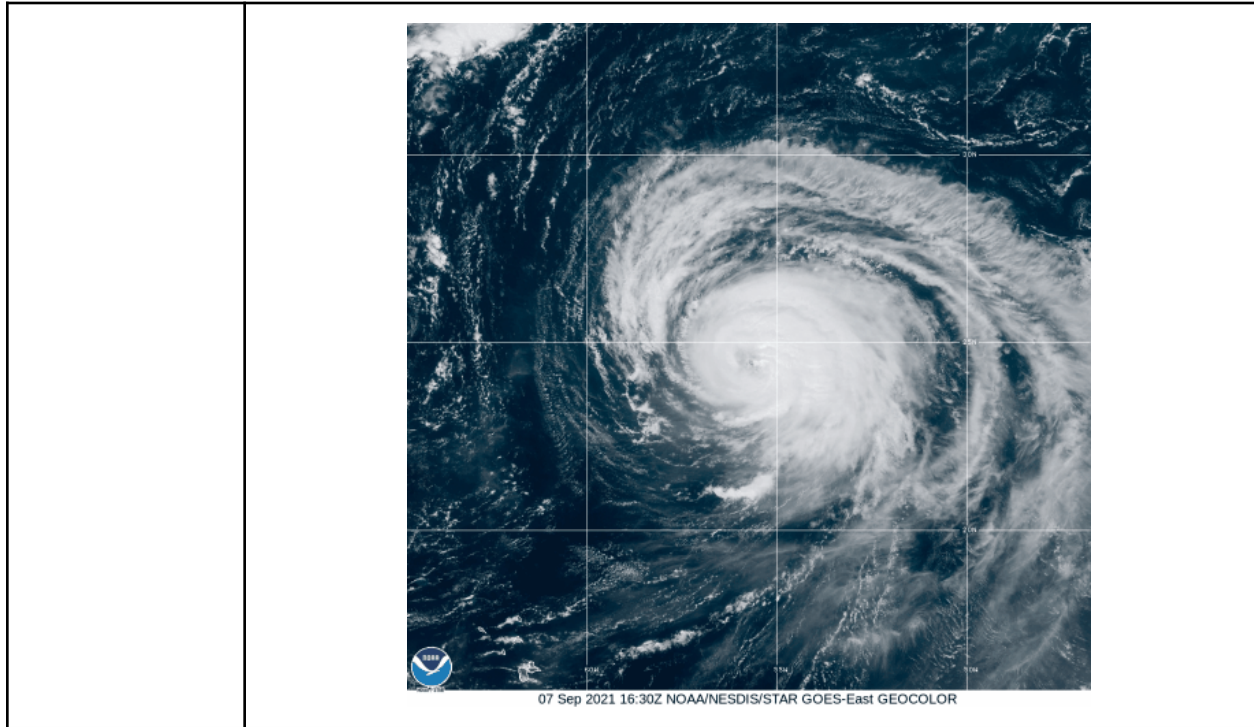
07 Sep 2021 16:40Z NOAA/NESDIS/STAR GOES-East Band 02 HU Larry



07 Sep 2021 17:00Z NOAA/NESDIS/STAR GOES-East Band 13 HU Larry

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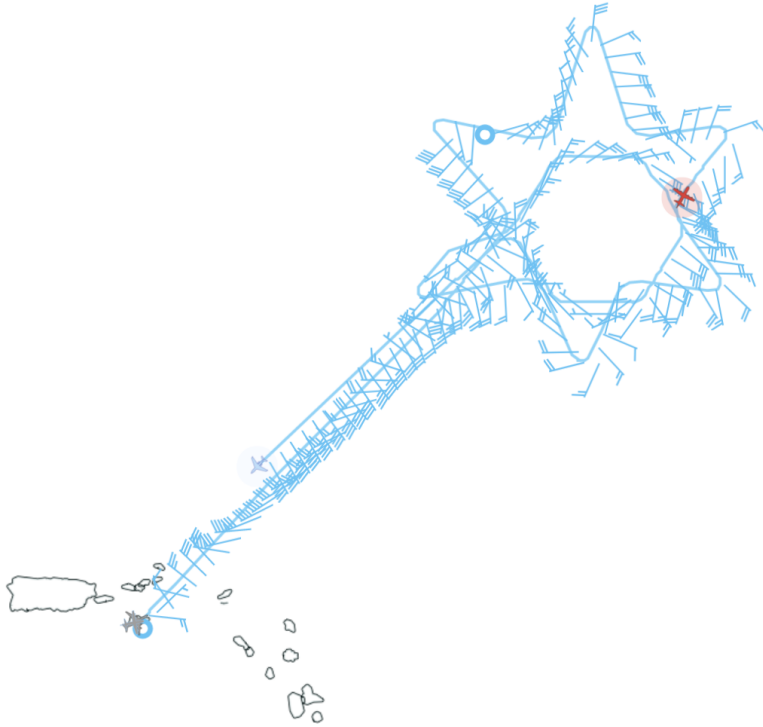
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POST-FLIGHT	
<b>Mission Summary</b>	<p>The goals of this flight were to get dropsonde observations in the environment to the near environment of Hurricane Larry (in the Star pattern) to validate against the NUCAPS temperature and moisture soundings applied to Aqua satellite sensor data, as well as (consistent with the previous G-IV missions into Larry) an inner core circumnavigation pattern to get measurements from the sondes and tail Doppler radar.</p> <p>35 total dropsondes were released for the validation, all for NESDIS JPSS, who is collaborating with APHEX on this mission.</p>
<b>Actual Standard Pattern Flown</b>	Star + Circumnavigation
<b>APHEX Experiments / Modules Flown</b>	Measurements were collected for the <i>Satellite Validation Experiment: NESDIS JPSS</i>

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<b>Plain Language Summary</b>	<ul style="list-style-type: none"><li>• This mission's dropsonde data will be used to validate satellite measurements of temperature and moisture in the near environment of Hurricane Larry to understand the capabilities of the satellite to sample the gradients of moisture and temperature that may affect the storm's evolution.</li><li>• A circumnavigation of the inner core of the storm provided good coverage of the large extent of the tropical- and hurricane-force wind field of Larry.</li></ul>
<b>Instrument Notes</b>	None
<b>Final Mission Track</b>	



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