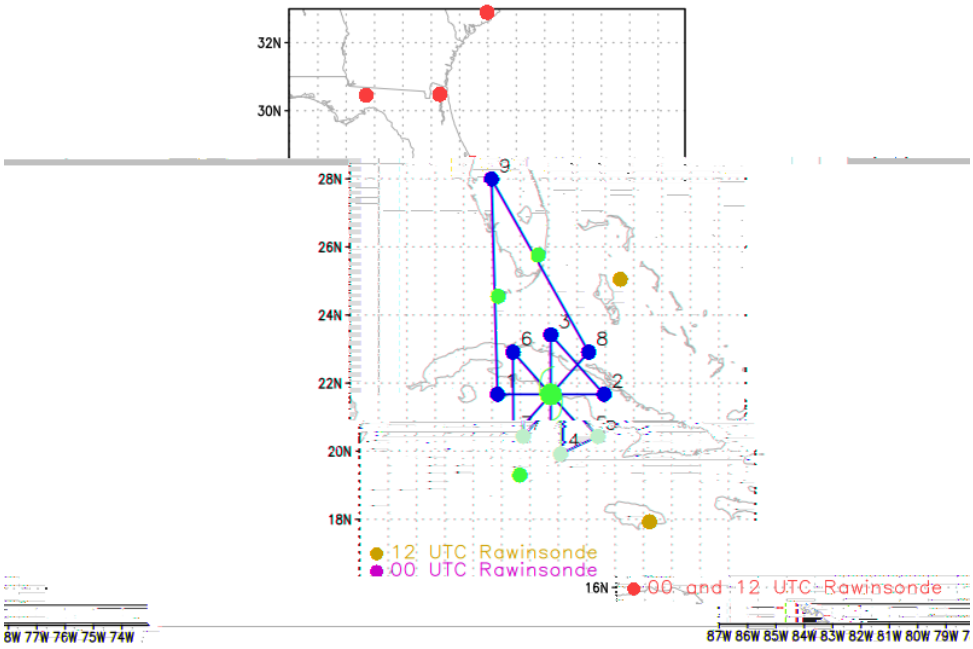
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

MISSION PLAN			
FLIGHT ID	20210705H1	**STORM**	AL05/ELSA
MISSION ID	1105A	**TAIL NUMBER**	NOAA42
TASKING	NHC/EMC	**PLANNED PATTERN**	Rotated Fig. 4
MISSION SUMMARY			
TAKEOFF [UTC]	0853	**LANDING [UTC]**	1545
TAKEOFF LOCATION	Lakeland, FL	**LANDING LOCATION**	Lakeland, FL
FLIGHT TIME	6.9	**BLOCK TIME**	7.1
TOTAL REAL-TIME RADAR ANALYSES (Transmitted)	4 (4)	**TOTAL DROPSONDES (Good/Transmitted)**	11 (11/11)
OCEAN EXPENDABLES (Type)	None	**sUAS (Type)**	None
APHEX EXPERIMENTS / MODULES	None planned		
HRD CREW MANIFEST			
LPS ONBOARD	NA	**LPS GROUND**	Dunion
TDR ONBOARD	NA	**TDR GROUND**	Reasor/Gamache
ASPEN ONBOARD	NA	**ASPEN GROUND**	Sellwood/Hazelton
NESDIS SCIENTISTS	NA		
GUESTS (Affiliation)	NA		
AOC CREW MANIFEST			
PILOTS	Didier, Legidakes, Rannenberg, Copare		
NAVIGATOR	Utama		
FLIGHT ENGINEERS	Sanchez		
FLIGHT DIRECTOR	Carpenter		
DATA TECHNICIAN	Richards		
AVAPS	Lynch		

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

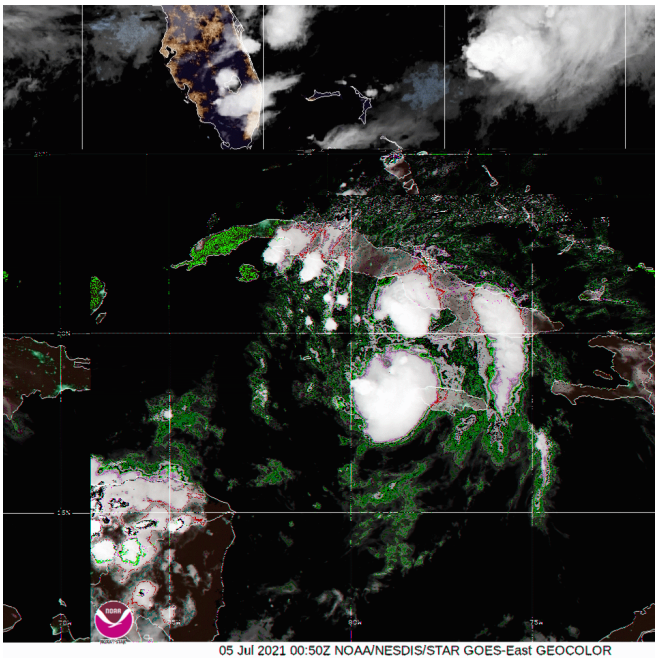
FLIGHT LOG -- 20210704H1

PRE-FLIGHT	
Flight Plan	
Expendable Distribution	Dropsondes released at the endpoint and midpoint of each leg, as well as at the center of each pass.
Preflight Weather Briefing	Elsa's intensity is 55 kt and it's still fairly disorganized. NHC's 03z advisory did note overnight convective bursts and the occasional appearance of an eye-like feature on the Cuban radars. The storm is moving 310/13 kt and should continue a NW motion with a gradual shift to the N as it rounds the western periphery of a deep layer ridge. WNW vertical wind shear (17 kt in SHIPS) continues to affect the system, though CIMSS shear analyses does indicate that there is a marked E-W gradient in the shear pattern with lower shear on the W side and higher shear on the E side. AOC did get clearance to overfly Cuba, so we will adjust the IP to be NW of the center and will adjust the rest of the pattern on the fly early in the mission. A 105 nm IP is over Cuba, so we'll plan to drop the 1st sonde a bit early N of the Cuban coast..
Instrument	The Compact Raman Lidar is not operational, and the WSRA and cloud

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

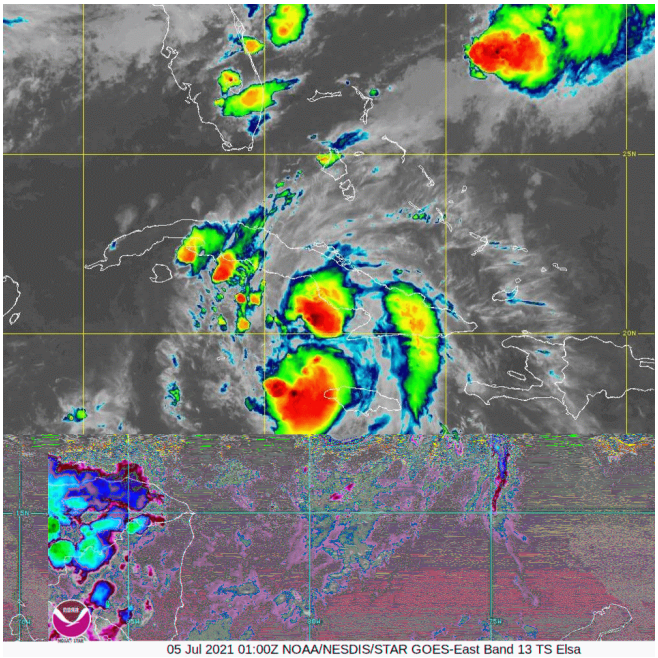
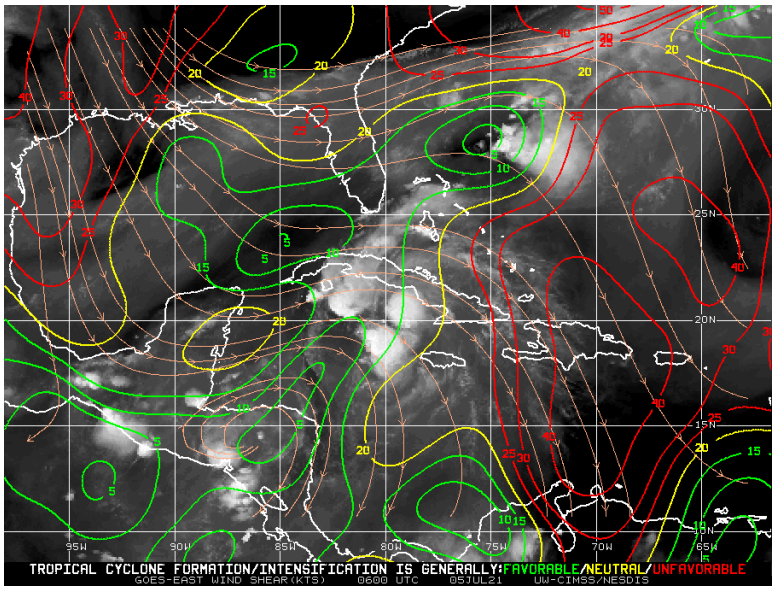
FLIGHT LOG -- 20210704H1

Notes	Physics probes are not yet installed. THOR is installed but not operational due to a failure of one of the components on the instrument.

IN-FLIGHT	
Time [UTC]	**Event**
0900z	NHC keeping Elsa steady state at 55 kt.
0910z	 05 Jul 2021 00:50Z NOAA/NESDIS/STAR GOES-East GEOCOLOR

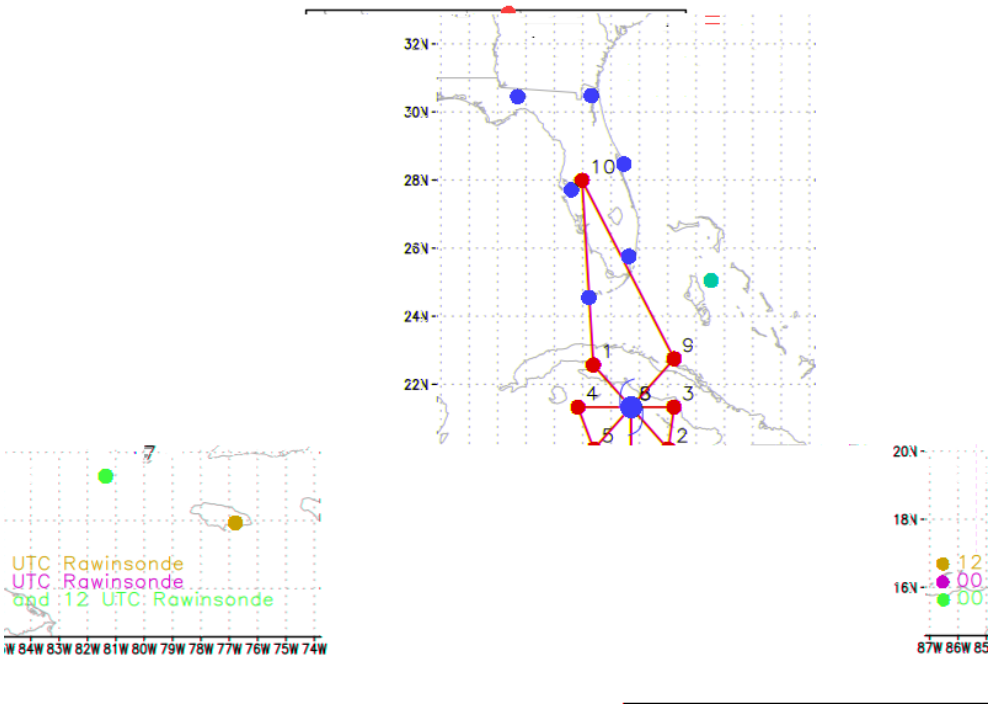
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

0910z	 05 Jul 2021 01:00Z NOAA/NESDIS/STAR GOES-East Band 13 TS Elsa
	
0930z	Worked up revised pattern and provided to the 42 FD (~6 h 20 m):

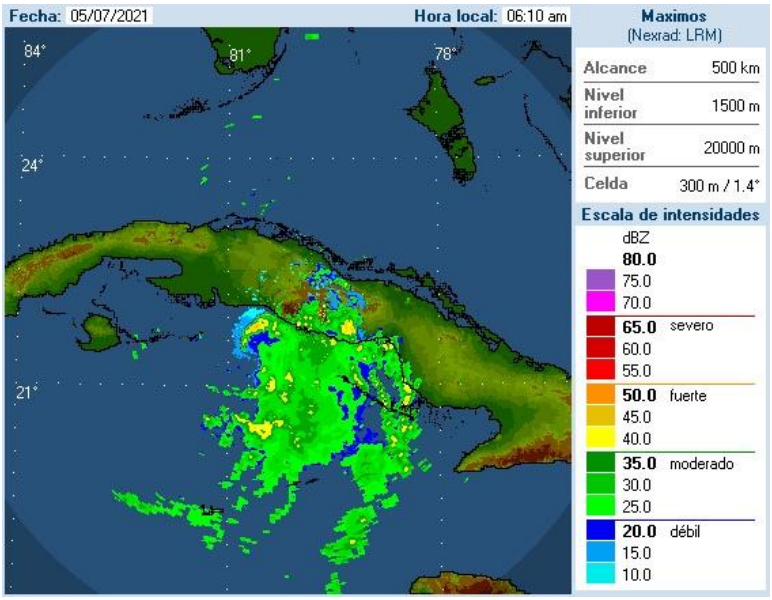
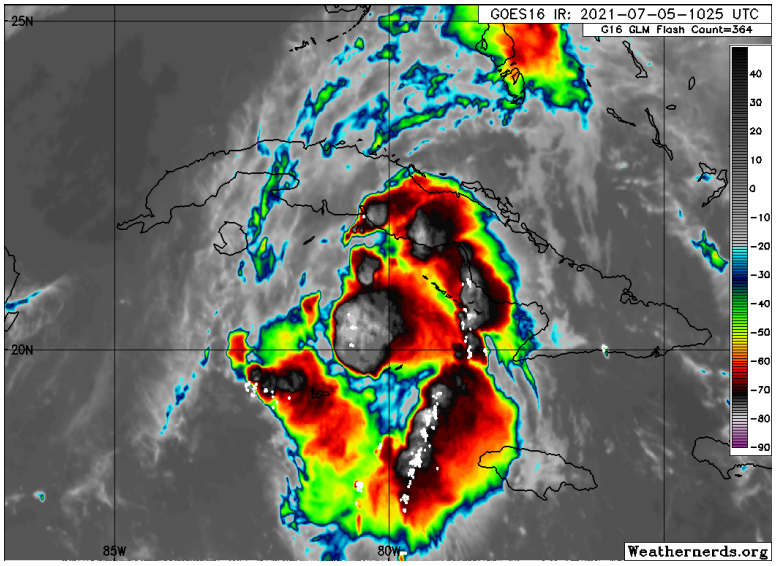
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

	
0958z	IP, sonde #1: NW inbound
1000z	No mid-point sonde on this 1st leg since we're over Cuba
1025z	Cuba ATC is requiring 42 to avoid certain "prohibited areas" over land and water- this could complicate some of the fixes, but that's TBD.

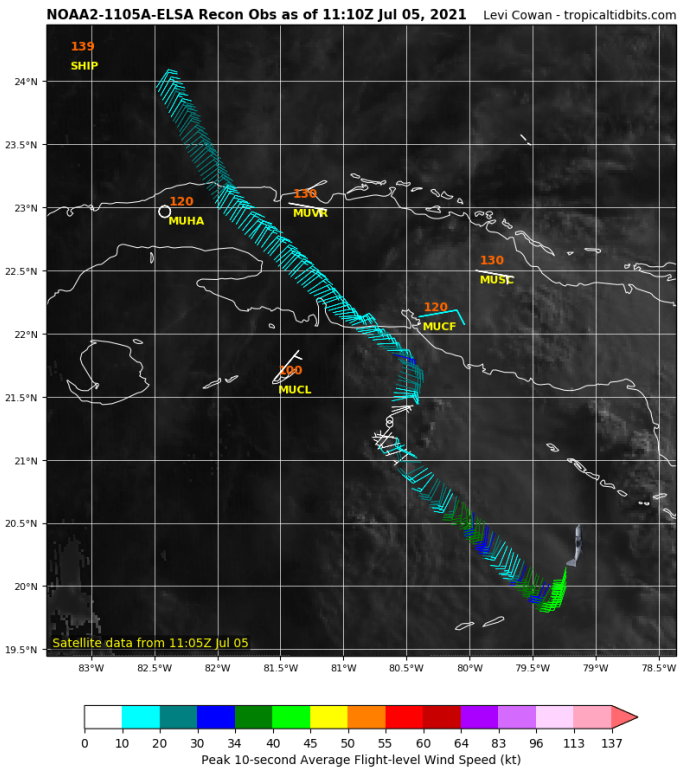
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

1010z	
1025z	GOES-16 GLM showing a SSW-NNE oriented band of lightning east of Elsa (very similar to yesterday). The band looks like it will be outside of our SE and E WPs, so we should get a full 105 nm leg SE and a “full” leg E (~85 nm due to land restrictions). 
1040z	Sonde #2: ctr (surface winds 205/19 kt, 1008.2 mb)
1055z	FD reports that the Cuban prohibited area may affect our ctr-W leg...looking at alternatives.

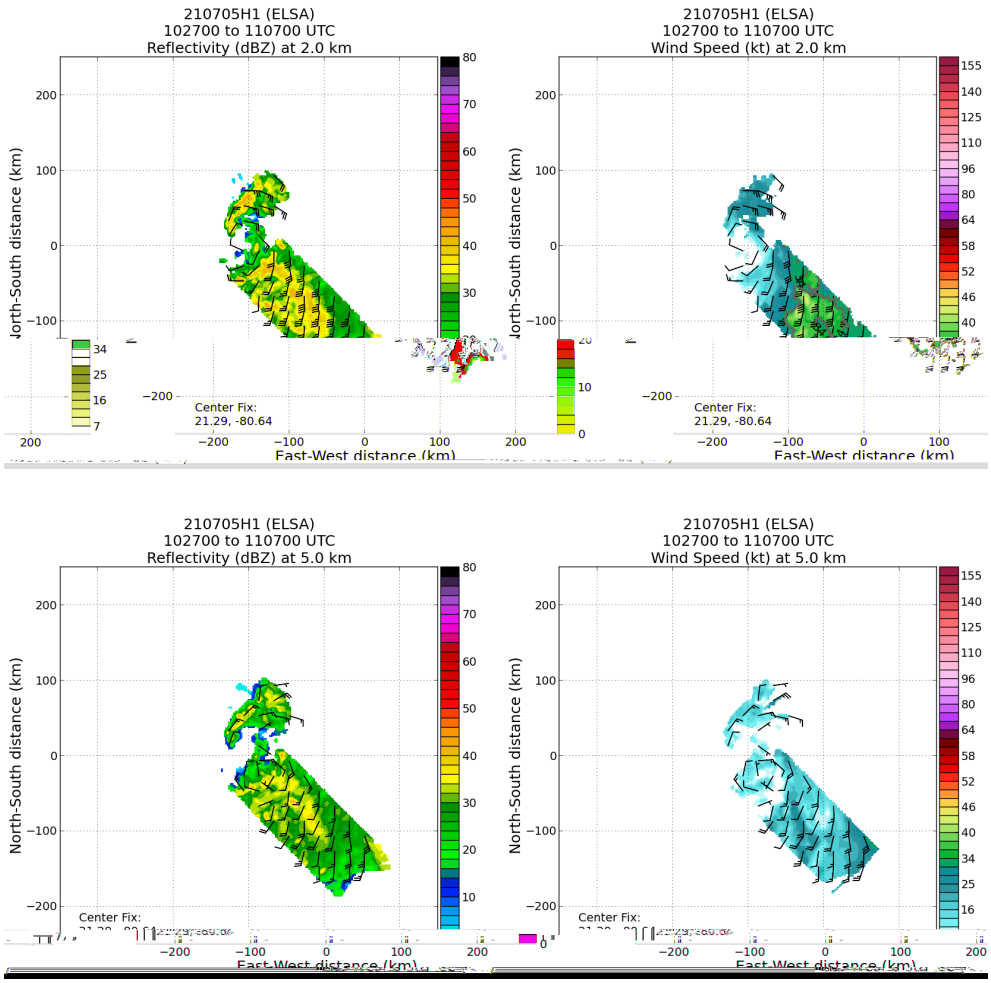
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

1101z	Sonde #3: ctr-SE midpoint (midpoint launch delayed a bit- since it was launched 20 nm from the SE endpoint, we're skipping the SE endpoint drop.)
1110z	
1126z	Sonde #4: NE WP
1135z	Deviating for weather and flying over Cuba- will rejoin the E-W inbound as soon as possible.
1140z	Havana ATC instructing 42 to stay on an E-W course for 50 nm before turning for our 290 outbound- this will keep us over land for a bit and unfortunately N of the ctr, so no center fix. We also have to do the 290 outbound to avoid the Cuban prohibited airspace This will keep us over land for a bit and unfortunately N of the ctr, so no center fix.

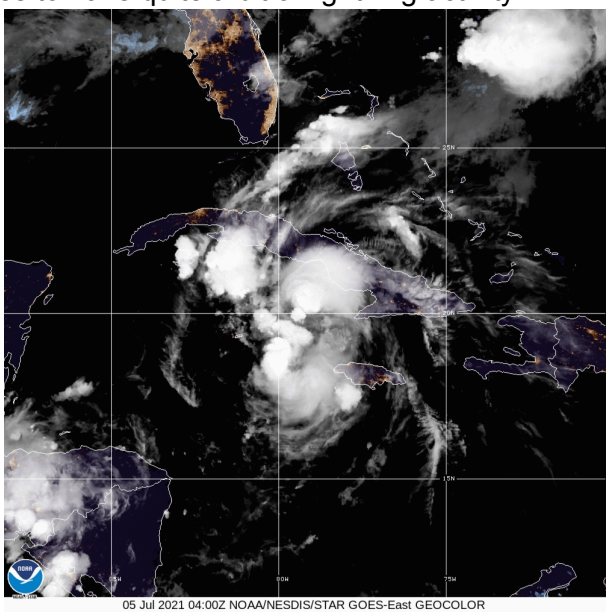
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

	 1st TDR analysis: mid-level (5 km) center displaced ~25 km SSE of the 2 km center
1205z	Sonde #5: WNW WP
1205z	“Finally” getting back to the planned pattern and starting our downwind to the SW- hoping for fewer ATC issues after this. Looks like good scatterers in the areas of our SW-ctr, ctr-S-ctr, and ctr-NE legs, so we should get some good TDR data coming up.
1225z	42 FD said that the Cuban prohibited airspace could stop us from making our ctr-S-ctr run. If that
1231z	Sonde #6: WSW WP
1240z	Hunting for the center- NHC’s best guess was to shoot for 21.6N 81.0W

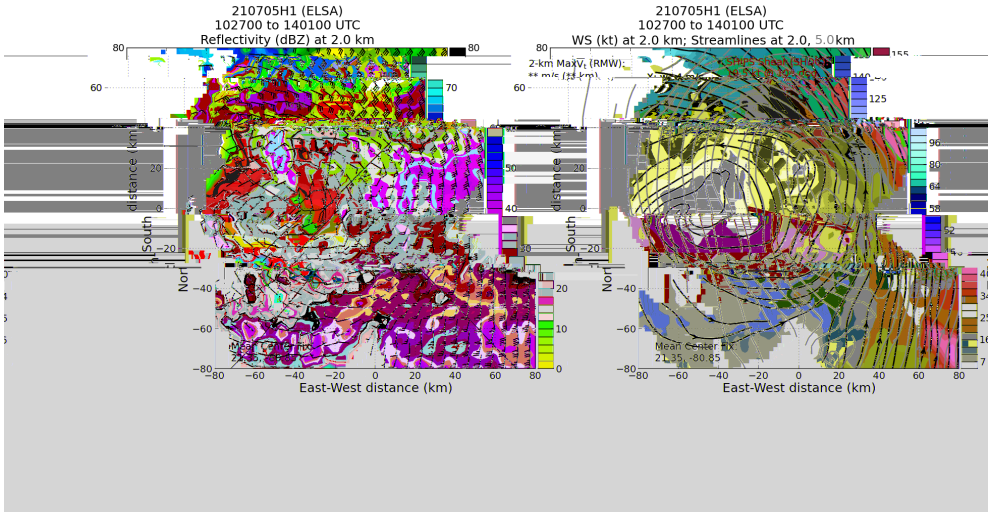
NOAA / AOML / Hurricane Research Division
2021 Hurricane Field Program
Advancing the Prediction of Hurricanes Experiment (APHEX)

FLIGHT LOG -- 20210704H1

1245z	Lots of convective burst activity in the storm and the band to the east of the center continues to have quite a bit of lightning activity.  05 Jul 2021 04:00Z NOAA/NESDIS/STAR GOES-East GEOCOLOR
1256z	Sonde #7: ctr (surface winds 150/40 kt, 1008.7 mb)
1257z:	42 FD reports that 42 is hemmed in by convection and doesn't have a lot of maneuverability- they need to head SW from the center instead of S. Requesting 42 to head to azimuth 225 105 nm form the center and then finish with a SW-ctr-NE pass.
1313z	Sonde #8: ctr-SW midpoint
1328z	Sonde #9: SW WP
1353z	Sonde #10: ctr (surface winds 145/25 kt, 1009.4 mb)
1419z	Sonde #11: NE WP (last sonde)
1401z	Final TDR dBZ planview at 2.0 and 5.0

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

FLIGHT LOG -- 20210704H1

	
1500z	NHC 1500z advisory mentions N42's observations from the NHC fix and EMC TDR requirements for today's mission: *"Based on SFMR-observed surface winds from the aircraft, the intensity is held at 55 kt for this advisory. A center dropsonde from the plane measured 1009 mb with 26 kt at the surface, so the minimum central pressure estimate is 1006 mb, indicating no significant change since yesterday. Tail Doppler wind data from the NOAA plane showed that there is an eastward tilt of the center with height, so the storm continues to have some vertical alignment issues."*

POST-FLIGHT	
Mission Summary	Successful NHC fix-EMC combination mission. NHC 1130z fix requirement was fulfilled, but the 1730z fix requirement could not be met due to crew rest requirements (NHC was aware of this pre-flight). 4 tail Doppler radar analyses were transmitted off the aircraft and 11 GPS dropsondes were transmitted to the GTS. Elsa maintained its 55 kt intensity during the mission and TDR data indicated that the vortex was tilted to the SSE with height. NHC mentioned use of NOAA 42's dropsonde, SFMR, and TDR data in their 15z advisory.

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

FLIGHT LOG -- 20210704H1

	Due to weather hazard avoidance and proximity to land, the planned pattern had to be modified significantly. 11 dropsondes were deployed and 11 were transmitted to the GTS (all sondes were charged to NWS).
Actual Standard Pattern Flown	Rotated Figure-4...heavily distorted due to Havana ATC airspace restrictions (what ATC called “prohibited airspace”) and weather hazard avoidance.
APHEX Experiments / Modules Flown	AIPEX
Plain Language Summary	● The NOAA P-3 flew this mission to determine Tropical Storm Elsa’s location and intensity for NOAA NHC and to collect radar data for NOAA/National Centers for Environmental Prediction/Environmental Modeling Center’s Hurricane Weather Research and Forecasting (HWRF) forecast model. ● Elsa’s circulation continues to be tilted with height, which may be contributing to its fairly ragged appearance and the steady state tropical storm intensity observed today.
Instrument Notes	The THOR instrument was not operational during this mission. All other aircraft instruments operated nominally.

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

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Final Mission Track