Mission Summary

Genesis TD7/GERT
IFEX Research Mission Summary
050724I Aircraft: N43RF

Scientific Crew:

Lead Project Scientist	Michael Black
Radar Scientist	Michael Black
Workstation Scientist	Krystal Valde
Cloud Physics	Aaron Bansamer
AXBT/SFMR Scientist	Aaron Bansamer

Aircraft Crew:

Pilots	Phil Kennedy, Barry Choy, Mark Nelson
Flight Engineers	Dewie Floyd
Navigators	Devin Brakob
Flight Director	Marty Mayeaux, Tom Shepherd
Engineers	Terry Lynch, Damon San Souci, Bill Olney

Mission Brief:

What a difference 24 hours makes! The tropical wave N43 had flown near the Yucatan early on 22 July had moved into the southern Gulf of Mexico and was flown later during the day on 23 July. Visible satellite imagery and dropsonde observations from N42 showed that a broad circulation was now evident and NHC upgraded the system to TD& during 42's flight. A weak low-level circulation in the extreme southern portion of the Bay of Campeechee was observed both in satellite imagery and from data from N42. The main lobe of convection, however, was centered further to the north, away from land.

Since the system was now a depression, a rotating figure-4 pattern was planned (see Fig. 1) in coordination with the NASA ER2, which was operating out of San Jose. We had also planned to cut some of the legs short to leave time for a coordinated convective burst module if an opportunity presented itself. Takeoff from MacDill was planned for 0000 UTC with a duration of about 9 hours and a flight altitude of 12,000 ft. We planned on dropping about 20 evenly-spaced GPS sondes and 8 AXBTS within the pattern. We had planned for the ER2 to be coordinated with the P3 on all legs and would operate the radar in F/A scanning except for about 20 miles within the closest approach of the ER2 which we would run the radar in continuous mode.

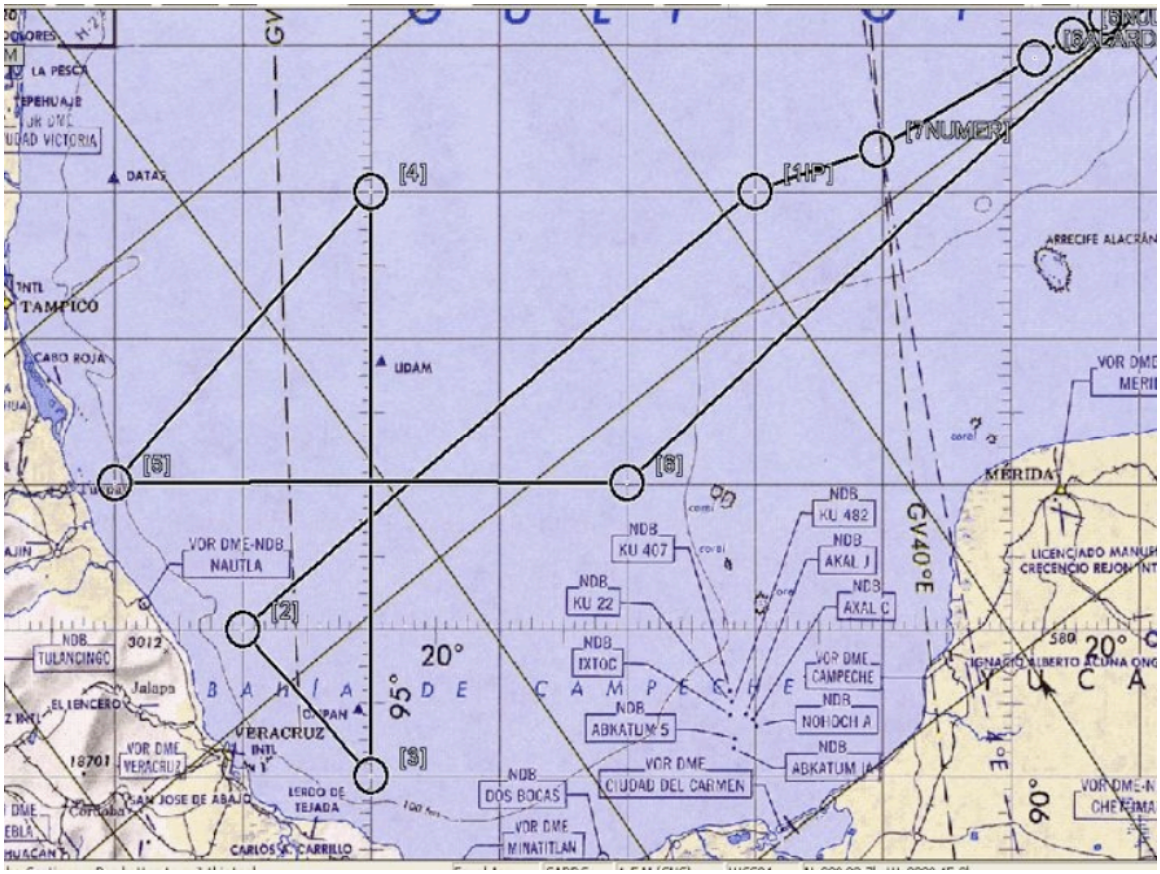

Fig. 1: Planned flight track of NOAA43 in the southern Gulf of Mexico.

Mission Synopsis:

Takeoff from MacDill was at 0024 UTC and NOAA43 headed southwestward for the Initial Point (IP) at 23° N, 93° W. We reached the IP at 0237 UTC where we descended to our operational altitude of 12,000 ft and released our first dropsonde at 0258 UTC. The main rain shield associated with TD7 was visible ahead on the LF radar at about 100 nmi range. Winds here were out of the east at about 25 kt. We continued heading SW toward the anticipated center location near 21°N, 95° W, which we reached at about 0310 UTC. As we headed SW toward the Mexican coast in the far western Gulf, we encountered areas of moderate to weak, disorganized convection and the flight-level winds and dropsondes showed no clear evidence of a distinct circulation center, although a broad N-S oriented axis of circulation may be centered around 94° W. This is the longitude that we chose to focus the rest of the pattern on.

From 0330 to 0355 UTC we encountered north winds of about 10-15 kt between 19.5° N and 20.5° N. The winds eventually backed to the west near 18.5° N and 94° W but were only about 5 kt. A wind shift, with winds out of the south was observed further along the south periphery of our track in this same area. We had flown the same low-level center that 42 had flown through 10 hours earlier yet there was still almost no convection associated with it.

At 0410 UTC as we headed back to the north along 94° W, we noticed that a large area of convection had blossomed and was centered near 20.5° N, 94° W, nearer where we expected the center of TD7 to be. We decided that we would fly, in conjunction with the ER2, a convective burst module around this developing MCS, collecting radar data as we flew on the periphery of the convective system as well as releasing sondes along its edges.
We made the necessary coordination with the ER2 and began a box pattern around the most prominent portion of the MCS at 0440 UTC. We encountered a combination of strong convective cells nearby as well as large areas of stratiform rain during our box pattern around the MCS. We finished the box pattern at 0535 UTC.

After the convective burst module, we still had some time to investigate nearby convective rainbands with the ER2. From 0536 to about 0545 UTC we flew through a large region of stratiform precipitation then headed toward a large rainband with numerous embedded convective cores to coordinate a rainband module with the ER2. At 0553 UTC, we flew along the inside edge of this rainband while the ER2 flew directly over top of it. We ended up crossing the band to the east as we headed southward along the band and proceeded to repeat the pattern, this time on the outside of the band as we headed northward. There were occasional bursts of lightning as we flew along the band which became frequent near 0610 UTC.

We finished our work with the MC and rainband complex at 0638 UTC where we headed back toward MacDill. Along the way we dropped our remaining 2 AXBTs at 10 and 200 nmi to the NE of the MCS to provide some ground truth for any remotely sensed SST measurements. We landed back at the AFB at 0928 UTC.

We released 21 GPS dropsondes and 8 AXBTs, which measured SST from 28°-29°C during our mission.

Problems:
Two of the sondes did not have launch detects (no data). The radars and flight-level systems worked flawlessly. We had one failure of an AXBT.

Michael Black
8/14/05

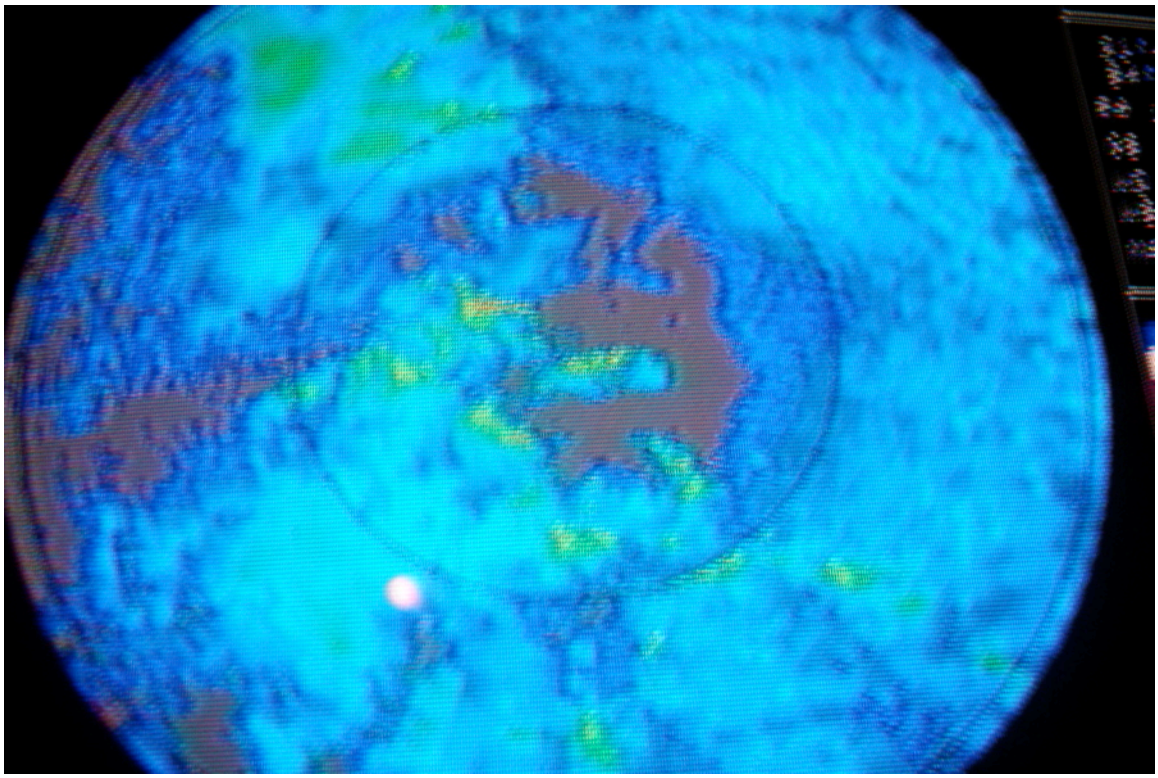

Fig. 2: LF radar image (screen photo) at 0500 UTC showing the scattered convection south of the main MCS. Range rings are 50 nmi.

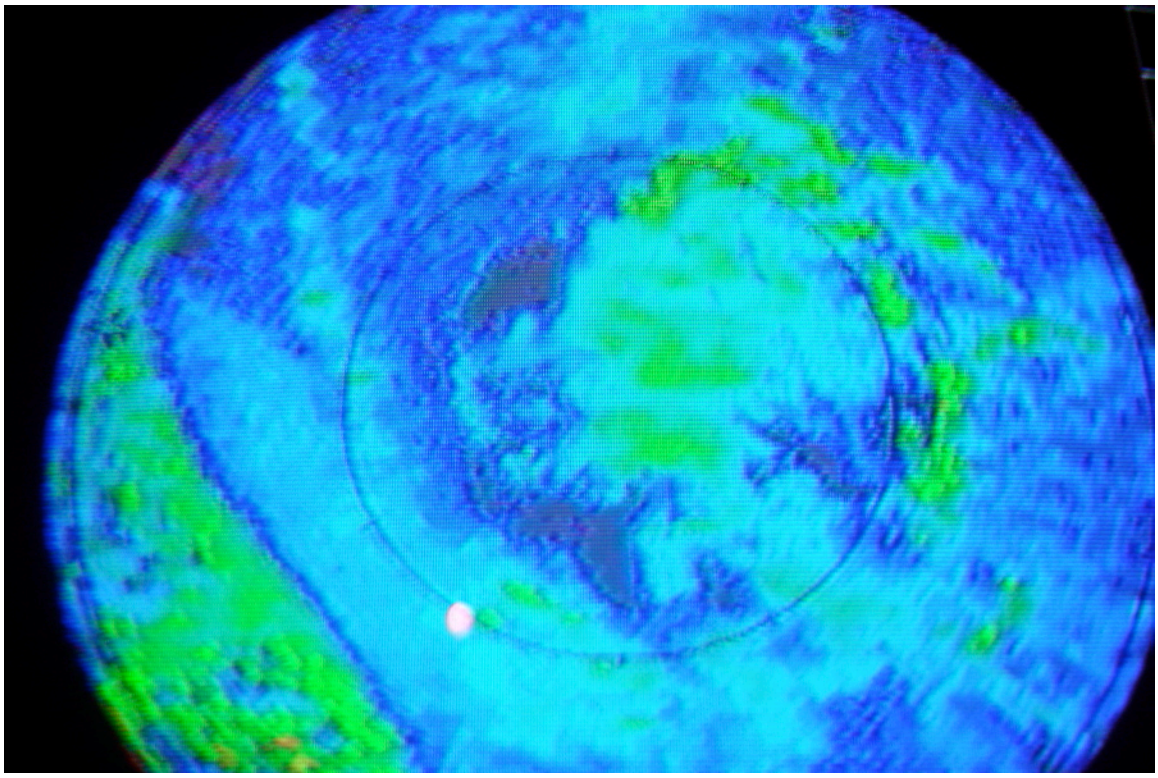

Fig. 3: LF radar image (screen photo) at 0539 UTC showing the main portion of the MCS. Range rings are 50 nmi

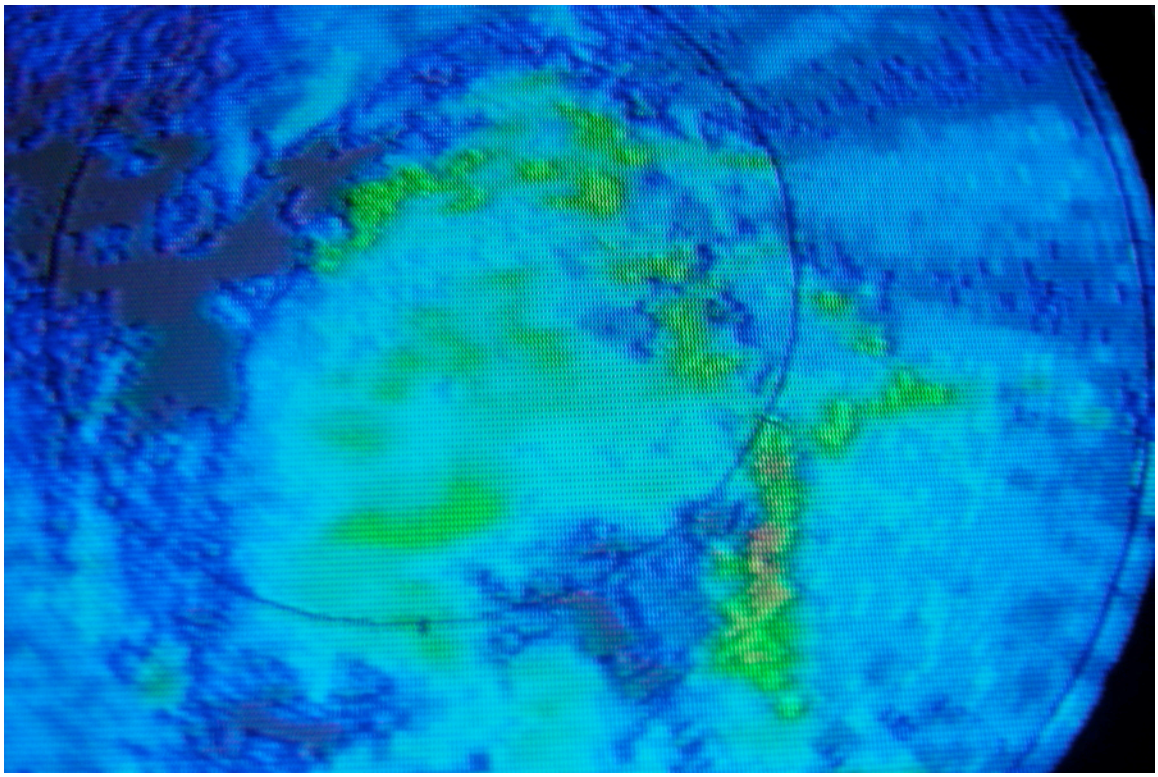

Fig. 4: Zoomed LF radar image (screen photo) at 0553 UTC of the centroid of the MCS.

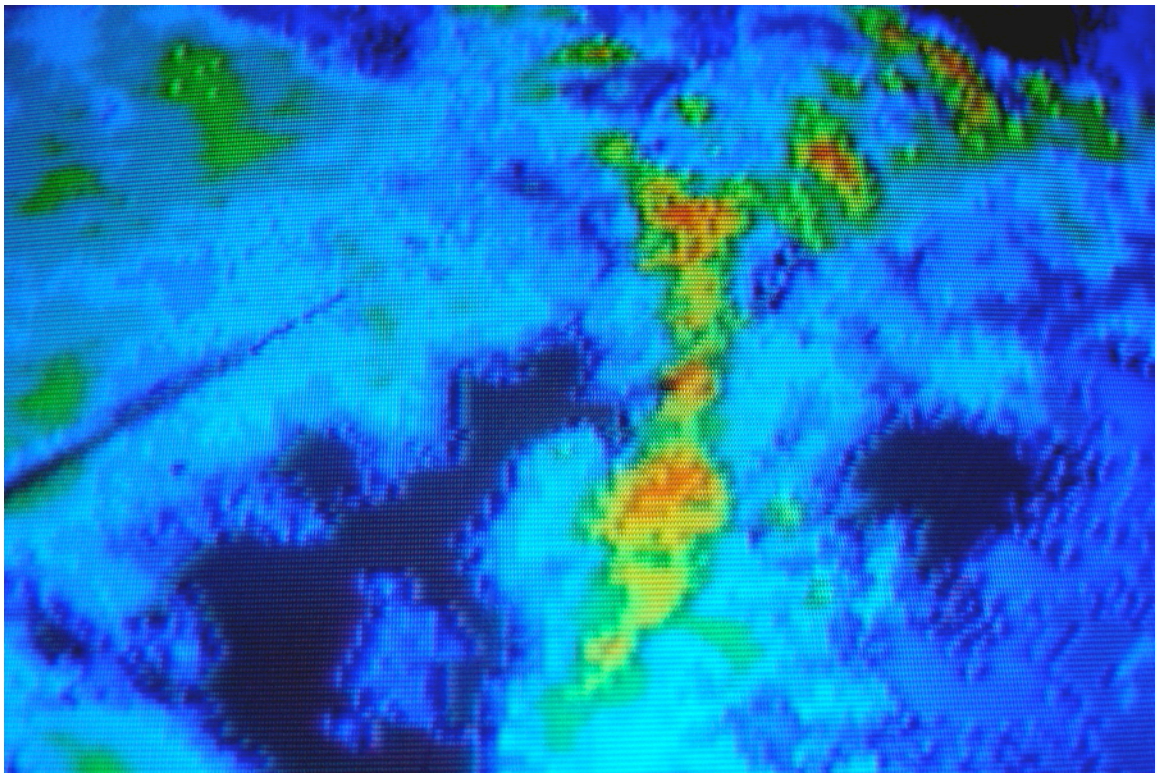

Fig. 5: Zoomed LF radar image (screen photo) at 0606 UTC showing some of the convective cells in the band east of the MCS that N43 flew concurrently with the NASA ER2.

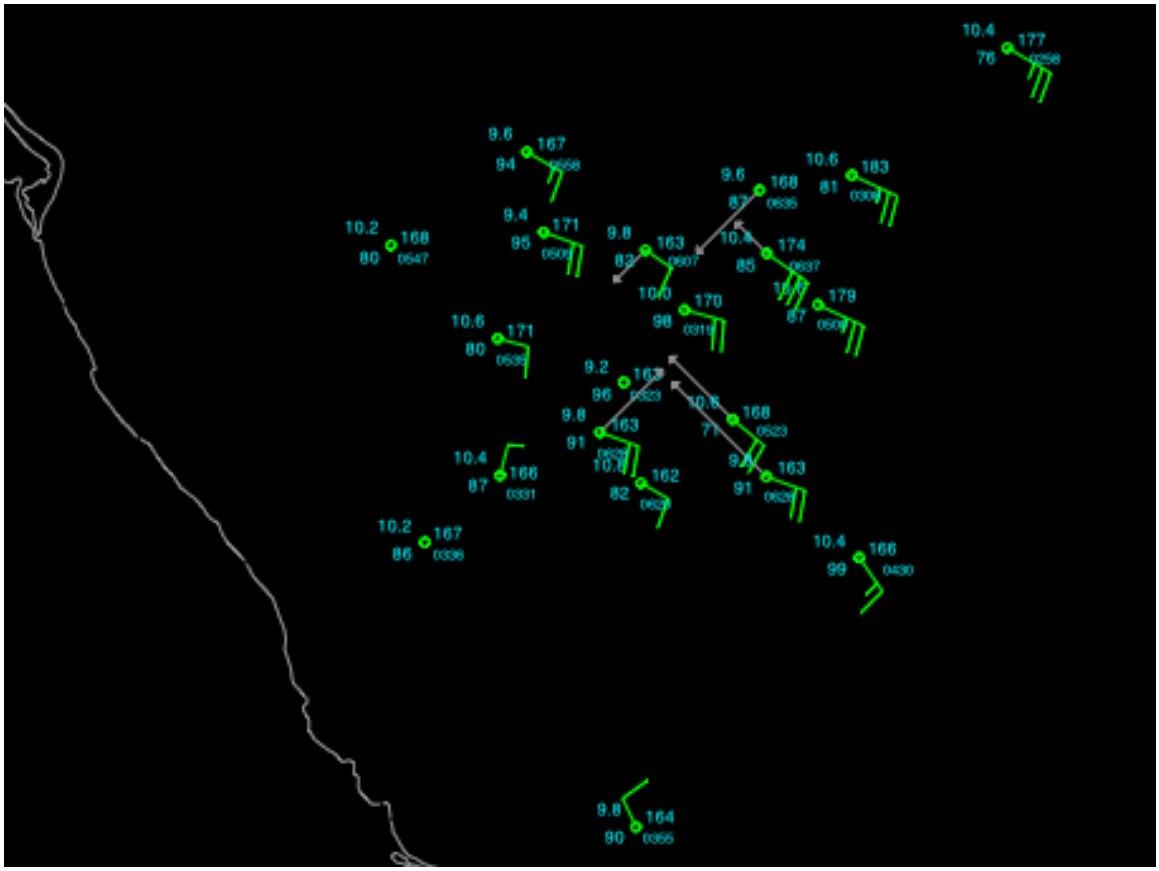

Fig. 6: 700 mb dropsonde observations.

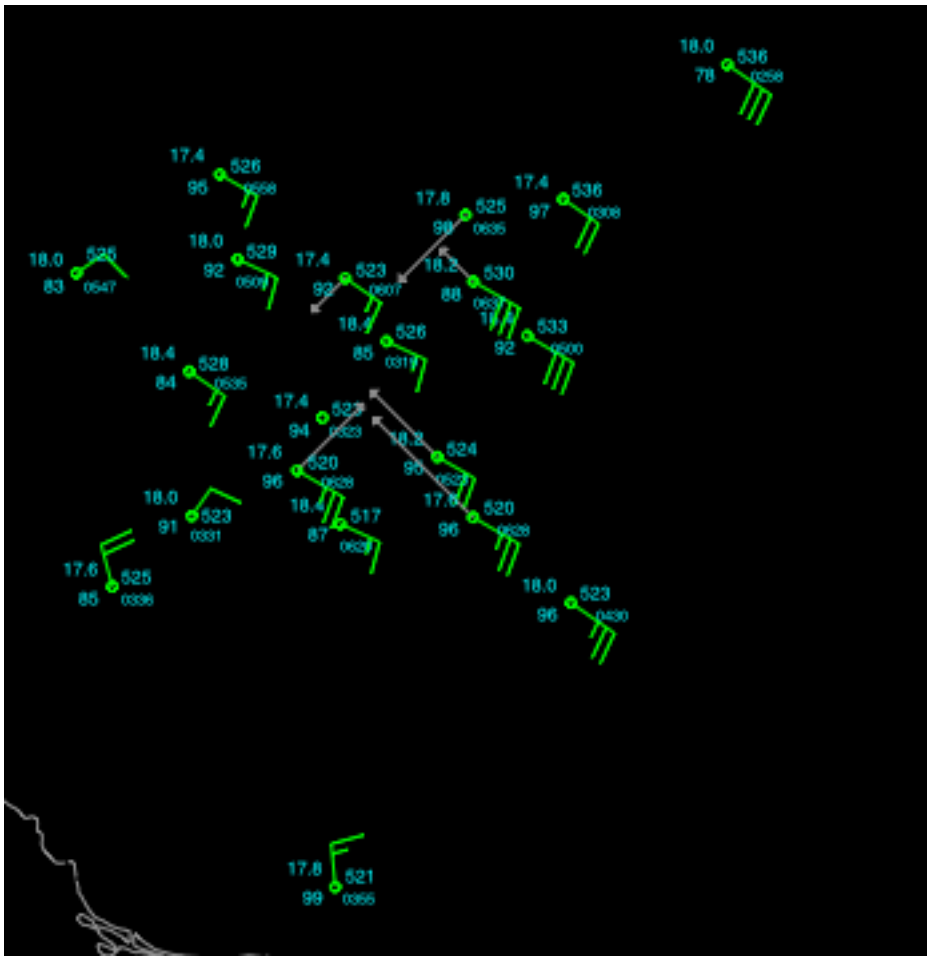

Fig. 7: 850 mb dropsonde observations.

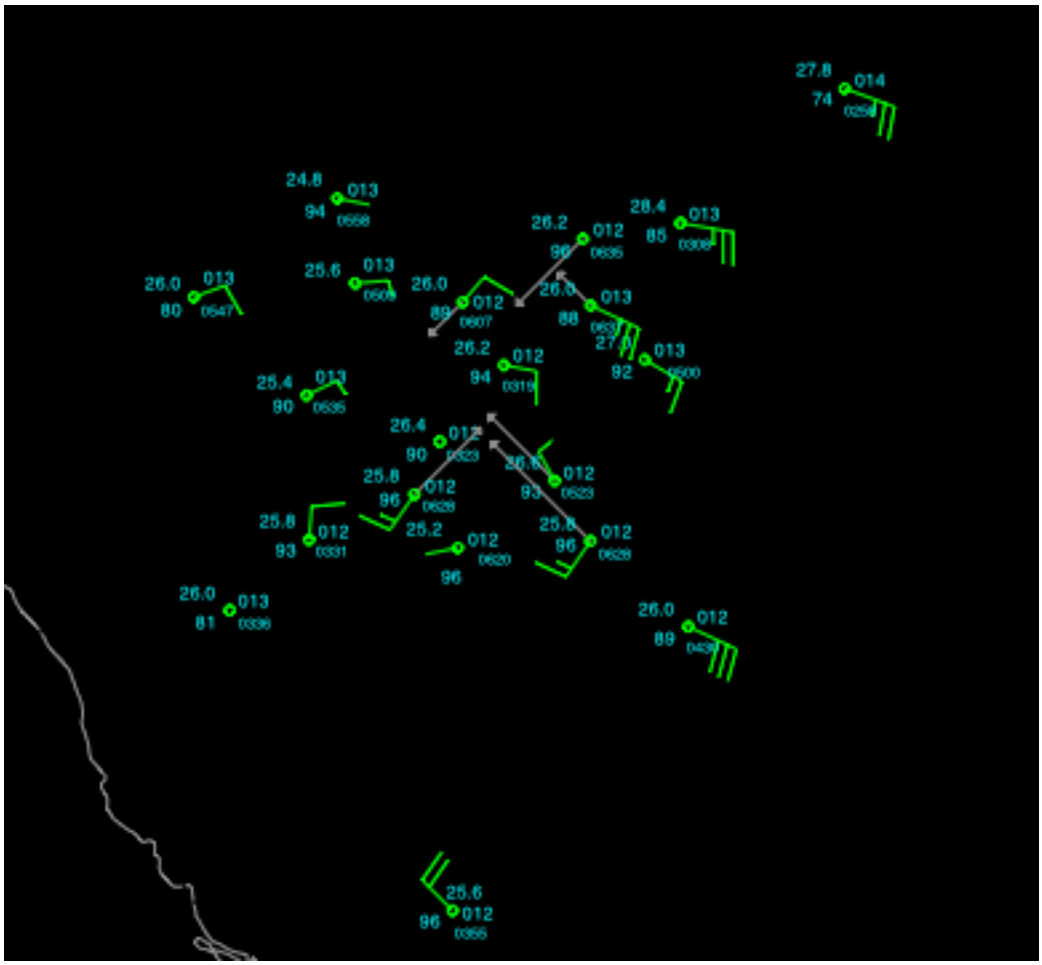

Fig. 8: Surface dropsonde observations.

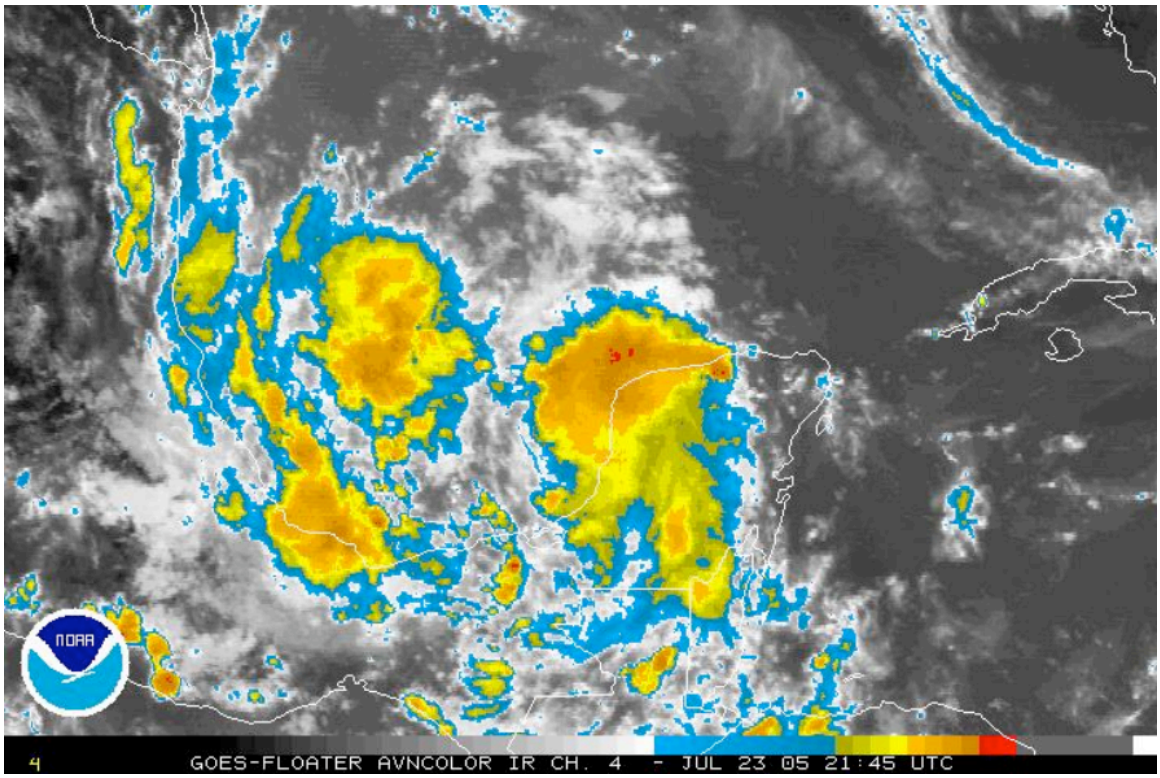

Fig. 9: IR satellite imagery 2145 UTC 23 July, a few hours before N43's flight.

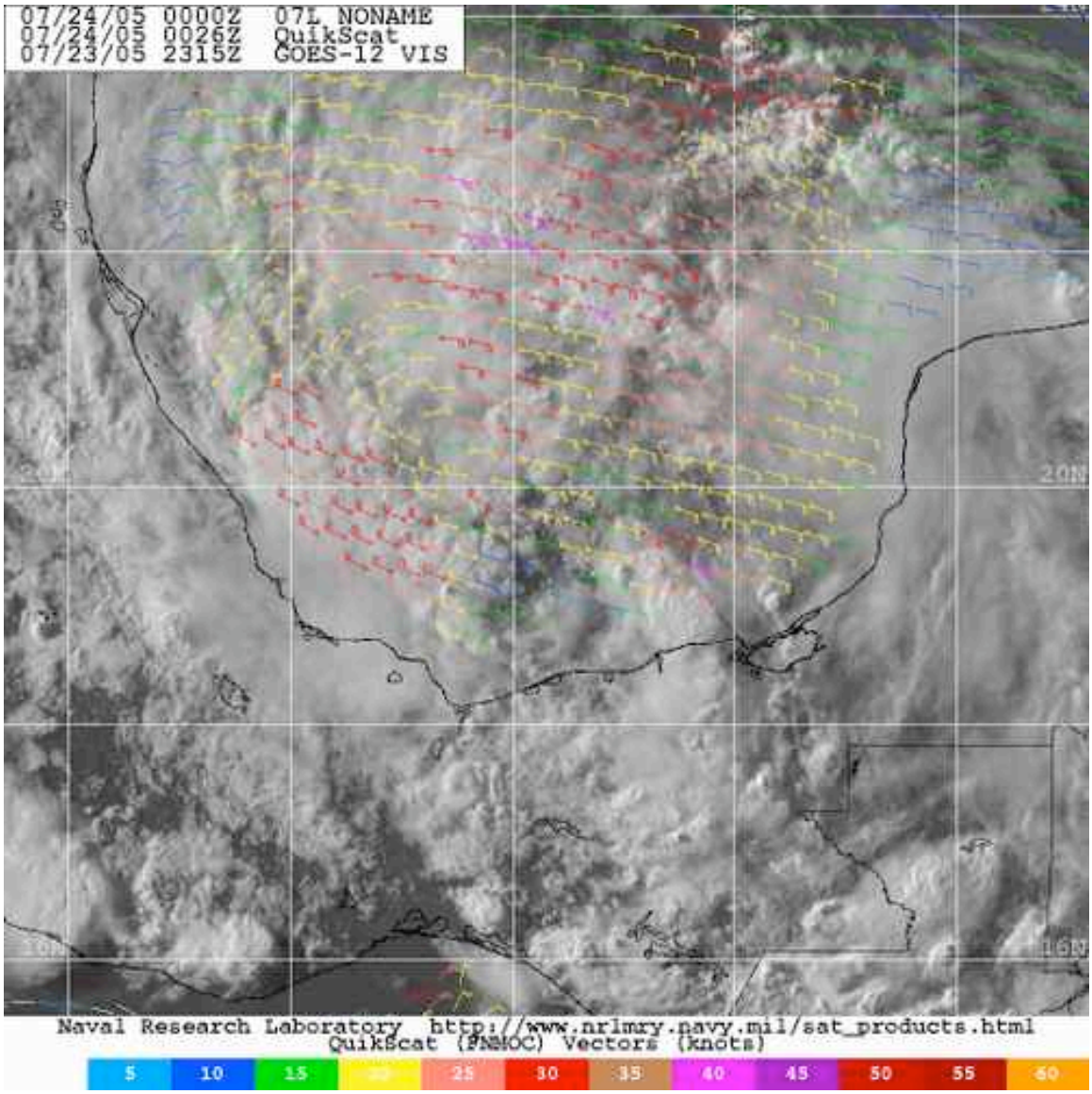

Fig. 10: GOES Visible satellite imagery at 2315 UTC 23 July and QUIKSAT winds at 0026 UTC 24 July, a few hours before N43's flight.

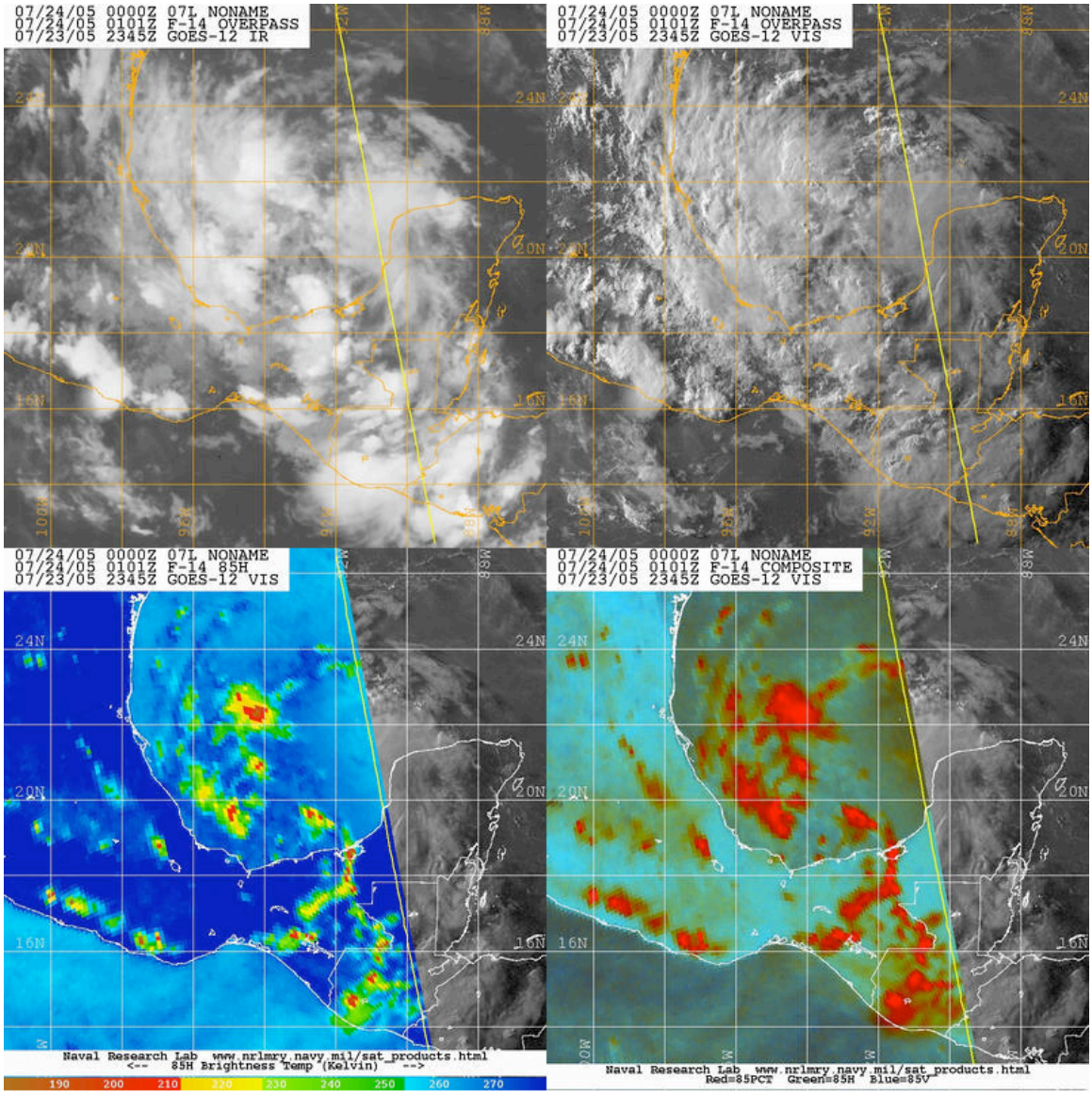

Fig. 11: IR satellite imagery at 2345 UTC 23 July and microwave imagery at 0101 UTC 24 July near the beginning of N43's flight.

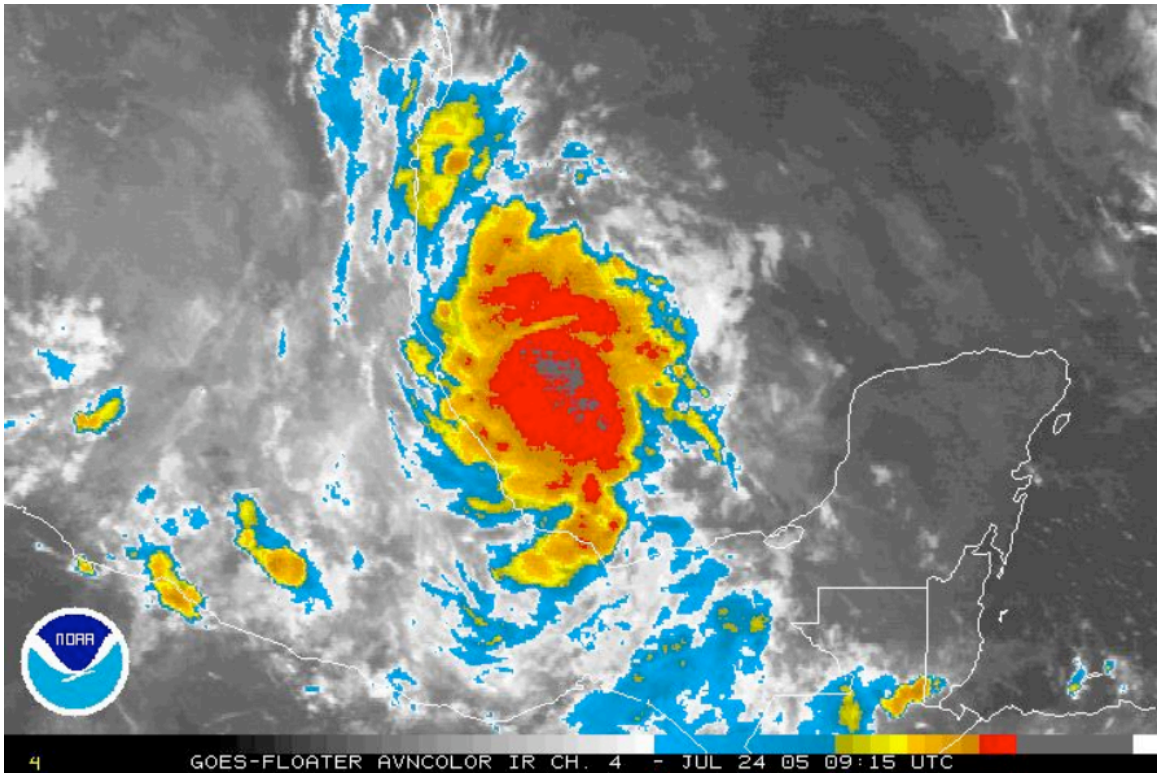

Fig. 12: IR satellite imagery at 0915 UTC 24 July right after N43's flight.