

Takeoff 185903 UTC Sept 14, ETA FLL 014956 UTC Sept 15

Platform scientist Liz Ritchie. Main objective was to do a pattern centered on the expected center location of tropical depression 13 (soon to be TS Karl) in order to continue investigating tropical cyclogenesis processes (Fig. 1). This mission was a follow-up on the previous day's mission in order to maintain time-continuous observations. Subsequent to the previous day's mission, observations taken during a PREDICT flight that morning had indicated that there was a complete surface circulation. The overriding scientific issue with this system was to document the physical processes that were causing the system to evolve from a region of disturbed weather into a tropical cyclone.

In terms of operations, the flight concept was slightly more complicated than the previous day. An attempt to coordinate one figure 4 pattern half way through the flight with the NOAA P3 that was returning to Tampa from St. Croix meant that some adjustment to the flight track would need to be made. In practice, the NOAA P3 did not make the rendezvous and the DC-8 completed the pattern alone. The DC-8 flight pattern was a butterfly pattern centered on 18.8°N, 84.7°W with an extra rectangular section extending east to allow coordination with the NOAA P3 (Fig. 2). The center of the pattern was updated early during the flight to 18.1°N, 83.6°W (ESE of the original center) at the request of the Mission Scientists at FLL. In addition, an experimental APR2 module was flown during the last pass through the center of TS Karl. The module consisted of flying a loop to the west of the track (Fig. 2). The NASA WB-57 was also present in the storm for the latter part of the DC-8 mission, and one overflight of the two aircraft occurred after the DC8 completed the APR2 module.

There was relatively little deep, organized convection in the system and almost no lightning was present. By the end of the mission, the target had evolved into a tropical storm (Fig. 3) and showed some continued development. The minimum surface pressure measured by eye dropsondes was 975 hPa, with calm surface winds. A well-defined circulation from the surface to 700 hPa and above was documented in dropsondes plots during the flight.

All instruments worked well. Twenty-one dropsondes were released and all but two worked well. Skew-Ts of the dropsondes were again created in-flight and were used by the platform scientists to better understand the kinematic structure of the disturbance while they were flying it. In addition, APR2 quick-look plots were made in real-time revealing valuable information regarding the center location of the TS and other interesting structural information. A MMS calibration maneuver was planned for the return to FLL, but was aborted partway through.

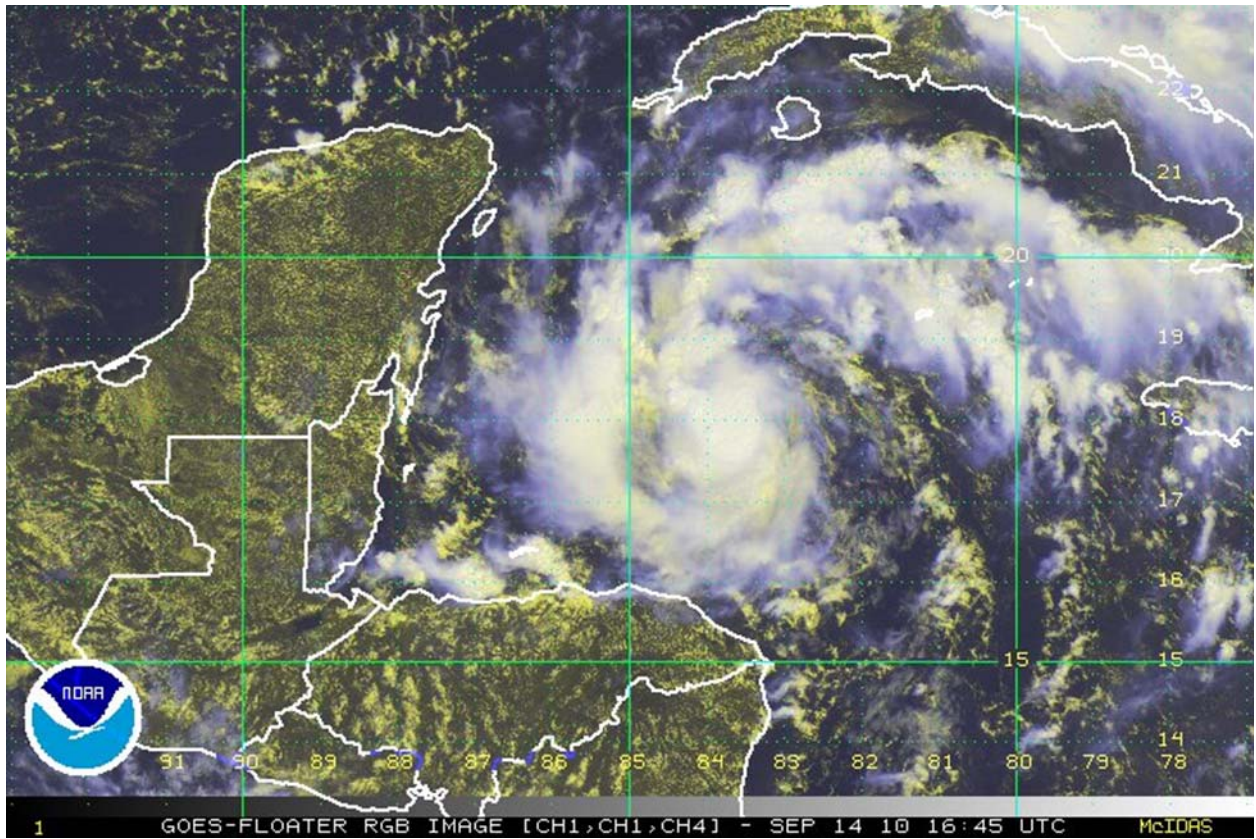


Figure 1: three-channel image at 1645 UTC of TS Karl prior to the DC-8 mission on September 14 2010.

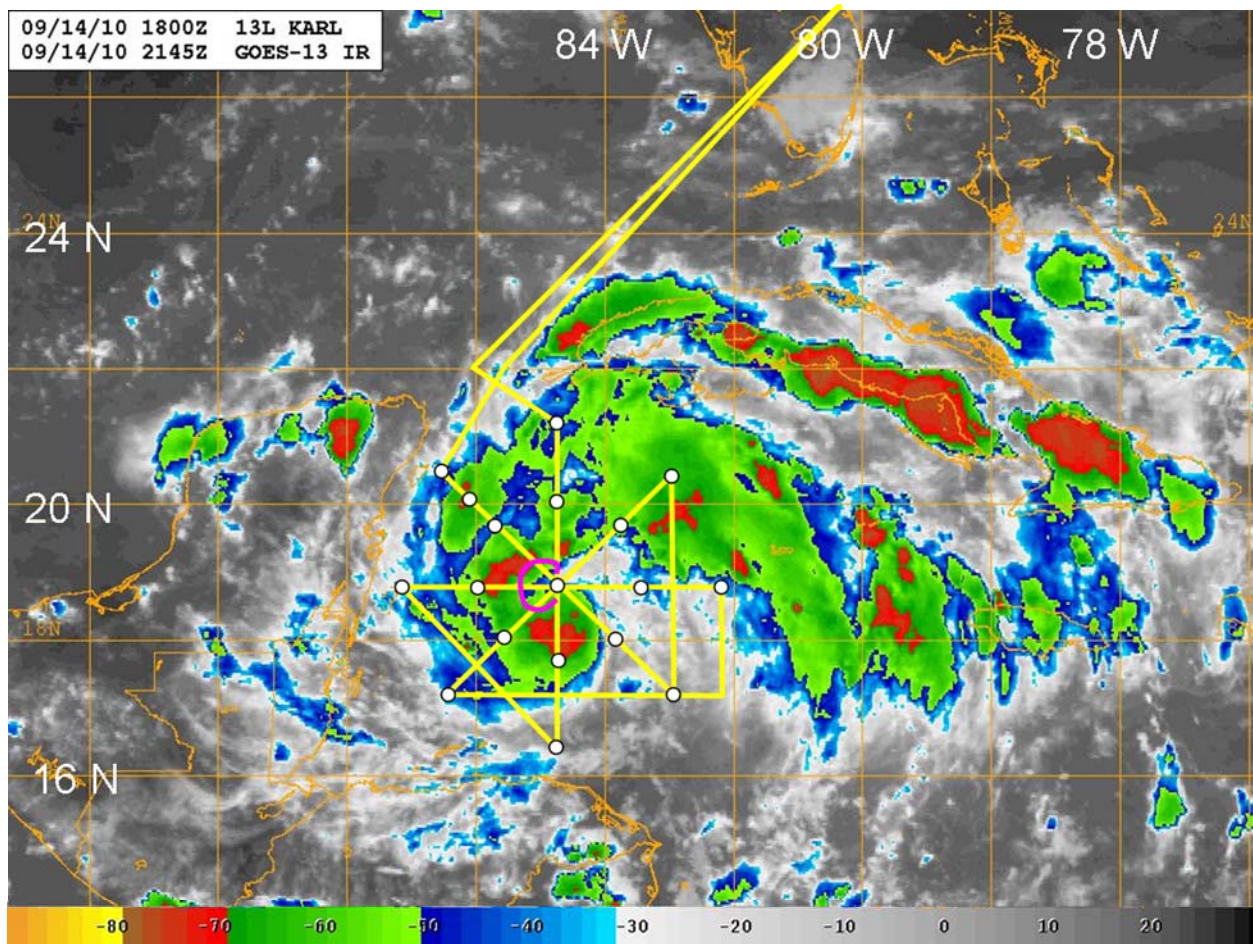


Figure 2: Enhanced satellite infrared imagery of TS Karl valid 2145 UTC during the DC-8 mission on September 14 2010 showing the initial flight plan in yellow and added APR2 module in magenta.

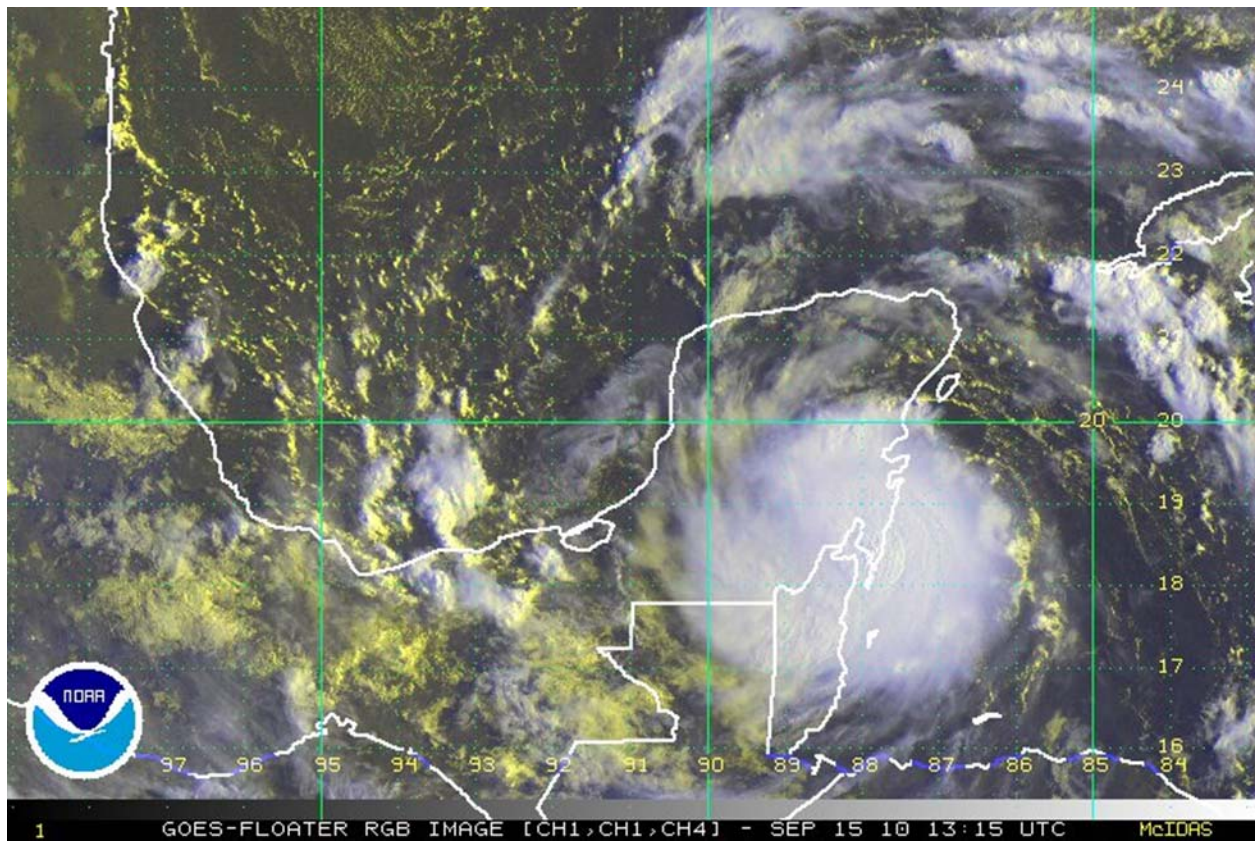


Figure 3: three-channel image at 1315 UTC September 15 2010 of TS Karl after the DC-8 mission just as Karl was making landfall on the Yucatan Peninsula.