

**Mission Summary**  
**Danielle**  
980830H Aircraft 42RF

Scientific Crew (42RF)

Lead Project Scientist \_\_\_\_\_ Hugh Willoughby  
Radar Scientist \_\_\_\_\_ Chris Landsea  
Dropwindsonde Scientist \_\_\_\_\_ Sim Aberson  
Dropwindsonde Scientist \_\_\_\_\_ Sharan Majumdar (PSU)  
Workstation Scientist \_\_\_\_\_ Peter Dodge  
Stable Isotope \_\_\_\_\_ Jim Lawrence (UHouston)

*Mission Briefing:*

Flight 980830H was an eXtended Cyclone Dynamics eXperiment (XCDX) flown in Hurricane Danielle. It originated and terminated at Opa Locka. HRD participants were: Hugh Willoughby, Peter Dodge, Sim Aberson, Steve Feuer, Jim Lawrence (Univ. of Houston) and Sharan Majumdar (Penn. State). The objective was to fly a six-sided pattern just below the melting level, deploying 3 dropsondes, along with AXBTs, on each 300 nmi radial leg. These data combined with flight-level data from TEAL 984, which was scheduled to leave the storm at 1730 UT, TEAL 977, which was scheduled to arrive at 2300 UT, and NASA 917 (the DC8), which was flying a similar pattern at 35-37 Kft simultaneously and also deploying dropsondes, was intended to document the storm's structure and dynamics as a less comprehensive follow-on to the Vortex Motion and Evolution Experiment conducted on the previous day. The mission was also designed to provide lower tropospheric validation for remote sensors aboard the DC8.

*Mission Synopsis:*

N42RF took off from Opa Locka at 1837 UT on 30AUG98, arrived at the initial point of the pattern at 1955 UT, and flew toward the center at 5890 m from the SSW on a nominal 030 track. We attempted 3 drops at point 1, all of which failed because of a blown fuse on the preamplifier for the dropsonde receiver's antenna. The second sounding, 100 nmi farther along the track after we found and repaired the fuse, was good. It was very dry above a strong dewpoint inversion in the lower troposphere. As we approached the center, the eye appeared on radar to be irregular with an eyewall composed of bands wrapping around it. We reached the center (32-08N, 71-08W) at 2102, where we deployed two sondes, one at the flight level center and the other at our best estimate of the surface center. The observed profiles differed significantly. The splash pressures were 986 and 989 mb. We continued on the 030 track to point 3, 300 nmi NNE of the eye, where we turned westward. SST measured at the turn point was 28.3, compared with 26.3 100 nmi outward from the eye. The circulation was so small that we had only about 10 kt of tail wind on the westward leg. At this point we became concerned about fuel and decided to shorten the southeast legs.

We reached point 4, 300 nmi NNW of the eye, and turned toward the center on a nominal 150 track. Earlier, during the initial approach to the eye, we had discovered that the time on HAPS was incorrect. After numerous attempts to reset it, we received CARCAH's concurrence to send TEMP DROP messages with erroneous date-time groups. On the second approach to the eye we again observed 26C SST 100 nmi NW of the center. N42RF reached the center (27-56N, 74-15W) at 0031 UT on the 31AUG98, passed through without dropping sondes, and continued on the 150 track to relocated point 5, 250 nmi SSE of the center. Then we turned to a nominal 030 track to relocated point 6, 250 nmi E of the center. We had only 10 kt of tail wind on this leg as well. SSTs were 27.6 and 28.5C 250 nmi SSE and E of the center respectively.

The final pass across the center was from East to West. On radar, the eye appeared to be much more circular and regular. We deployed two GPS sondes in rapid succession at the flight level center (28-15N, 72-30W) at 0319 UT. Stan Czyzyk, the flight director, was in superb form. Both sondes fell at the axis of

rotation. The soundings and splash pressures were essentially identical. If one accepts 986 mb as the correct surface pressure on the initial pass, the pressure had fallen 6 mb to 980 in 6.25 h. A hundred nmi west of the center, an AXBT reported 29.2C SST (perhaps unreliable). The final point and last dropsonde was moved 275 nm west of the center to avoid dropping over land at 0422 on 31AUG98. N42RF recovered at Opa Locka at 0503 UT on 31AUG98, 10h 06m duration.

*Evaluation:*

This mission provides an invaluable follow on to the full Vortex Motion and Evolution mission on the previous day. It captures the end of Danielle's weakening trend and the beginning of the intensification that continued on the next day. A possible cause of this change is motion over warmer SSTs.

*Problems:*

There were three principal equipment problems: 1) The blown fuse in the dropsonde receiver preamp, which probably should have been diagnosed before we expended three dropsondes. 2) Inability to reset the HAPS time without the root password, now corrected. 3) Mistimed launch detects combined with large pressure offsets on more than half of the drops. Of the 24 sondes deployed only the first 3 failed outright and the last had no winds.

Hugh Willoughby  
4 September 1998

980830H

XCDX

