Mission Summary
990913I Aircraft 43RF
XCDX

Scientific Crew (43RF)

Lead Scientist	H. Willoughby
Dropsonde/Radar	N. Dorst
Workstation	P. Leighton
Observers	K. Katsaros
	L. Ritchie (Naval Postgraduate School)
	E. Campos (Costa Rican Met Service)

Mission Briefing:

Flight 990913I into Hurricane Floyd was an eXtended Cylone Dynamics eXperiment (XCDX) mission with added oceanographic observations. It originated and terminating at Miami International Airport. HRD participants were: Hugh Willoughby, Neal Dorst, Paul Leighton, Kristina Katsaros, and Liz Ritchie. Because the hurricane was about 400 nmi from Miami, the normal six–sided "butterfly" pattern was replaced with a rotating figure for with nominal 130 nmi legs. The plan was to deploy GPS dropsondes at the endpoints and midpoints of the radial legs with center drops on the first and last passes through the center and eyewall drops on the middle two passes. Some of the drops, predominantly on the right side of the track would be augmented by AXBTs. Chosen mission altitude was 12000ft.

Mission Synopsis:

N43RF took off from Miami at 1738 UT on 13SEP99, arrived at its initial point south of the center at 1916, and approached the eye at 12,000 ft on a nominal due-north track. Because the (malfunctioning) lower fuselage radar presentation showed low reflectivity and did not provide useful guidance, we used winds and the nose radar to find the center. Initially the eye was closed ~20 nmi in diameter. We reached the center at 1942 UT 70 nmi east of San Salvador Is. in the Bahamas, and observed a 923 mb MSLP of by dropsonde. The eye was well defined, clear overhead and undercast with broken stratocumulus. SMFR data showed an outer wind maximum at 60 nmi radius. Maximum surface winds were about 80 kt in the outer eyewall and 110 kt in the inner. We continued beyond the eye on the same track to a point north of the center and turned southwest to a point west of the center. The data system crashed during the outbound leg from 1959 to 2009. Two AXBT's on the downwind leg reported 28.8° and 28.7°C SST ahead of the storm. The nominal track on the second penetration was due east, perpendicular to the first penetration. We reached the center at 2113 and deployed eyewall drops on entrance and exit. We continued beyond the eye to a point 103 nmi the east of the center and turned downwind to the north-northwest in order to rotate the second figure 4 by 45°. An AXBT 60 nmi from the center on the outbound leg reported a 26.3°C SST. The third penetration was from northeast to southwest. AXBTs on this leg showed SSTs of 26.1° and 26.8°C behind and to the right of the storm's motion. We reached the center at 2236 and again deployed eyewall drops. On exit through the southwest eyewall, we encountered moderate turbulence in a 17 m s^{-1} updraft. At a point ~100 nmi out we turned downwind to the east to pass south of the center to the start of the final penetration from southeast to northwest. As we broke out of the eyewall into the eye we saw the new moon low over the western eyewall and bright stars overhead. We reached the center 30 nmi NW of San Salvador at 0021 UT on the 14th and observed a 923 mb MSLP by dropsonde. N43RF recovered at Miami International at 0153.

Evaluation:

Floyd was essentially in a steady state during an eyewall replacement after an episode of rapid deepening on the previous day. Average storm motion during the flight was 11 kt toward 290° This is a unique data set, compromised by equipment problems.

Problems

Airplane worked well, but instrumentation problems compromised the mission. The LF radar never observed realistic reflectivities, apparently due to AFC problems. Handshaking problems between AVAPS and the workstation prevented transmission of all but the first three dropsondes. Ten minutes downtime on the main data system cost us uniform spatial coverage. Eight of ten AXBTs worked, and all of the GPS sondes worked, at least partially.

H. E. Willoughby
Hugh.WIlloughby@noaa.gov

FLight 990913I, Floyd XCDX

Figure 1