19960912H1-LPS

Mission Summary 960912H 42RF Hortense

Scientific Crew (43RF)

Lead Scientist Doppler Scientist Observers Willoughby Landsea J. Lawrence (U. Houston) S. Jones (U. Munich)

Planning: Flight 960912H was a tasked reconnaissance mission into Hurricane Hortense, originating and terminating at McDill AFB. HRD participants were: Hugh Willoughby, Chris Landsea, Sarah Jones (Univ. of Munich) J. Lawrence (Univ. of Houston) and J. Donnelly (UMASS). The tasking required N42RF to obtain the 06Z and 12Z fixes and to fly ALFA patterns between fixes. Because the hurricane was more than 600 nmi from Tampa, the ability to remain on station for the required time between fixes was a concern. The ALFA patterns were oriented at 45 degrees to the cardinal directions (314-135, 045-225) with 110 nmi legs. Chosen mission altitude was 5000 ft.

Operations: N42RF took off from McDill at 0331 UT on 12SEP96, arrived within radar range of the storm at 0546, and approached the eye at 5000 ft on a nominal track of 135. Initially the eye was 15 nmi in diameter, open to the S, defined by several wispy bands of convection with maximum reflectivities ~40 dB(Z). We reached the center 0609 UT, extrapolated a MSLP of 963 hPa, and encountered 110 kt winds on exit to the SE. We continued beyond the eye on the same track to a point SE of the center and turned north to a point NE of the center. The nominal track on the second penetration was 225, perpendicular to the first penetration's. We measured 115 kt winds on penetration and reached the center at 0734 UT when the MSLP was 962 hPa. We continued beyond the eye to a point 110 nmi the SW of the center and turned downwind to the west. After the second penetration, the character of the eyewall changed. It became a continuous arc of reflectivity occupying the northern semicircle. Maximum reflectivities increased to nearly 50 dB(Z). Before this time we had flown through only light turbulence in the eyewall and essentially no turbulence elsewhere. We entered the eye from the SE through a broad ~3 m/s updraft in the low reflectivities of the southern semicircle. By 0859 the MSLP had fallen to 958 hPa. On exit from the eye toward the NW we flew through alternating up and downdrafts with peak vertical velocities > 10 m/s. During one transition from down to updraft we encountered severe turbulence that imposed +3g and -1 g accelerations on the airplane. After the third penetration the eyewall expanded to 25 nmi diameter and extended through 270 degrees of arc, but remained open to the south. We flew downwind around the storm to a point east of the center and made the final penetration from east to west. When we reached the center at 1103 UT, the pressure remained unchanged from the third fix. A line of relatively low reflectivity extended diametrically across the eye from SW to NE, and the boundaries of an extensive anvil extending 200 nmi from eye showed clearly on the PPI radar. By this time, the sun had risen. The aircraft was in stratocumulus cloud at the 5000 ft flight level in the eye with blue sky visible above through breaks in the clouds. We exited on a 300 deg track, remaining at 5000 ft until we were 110 nmi from the center and then climbed to ferry altitude. H42Rf recovered at McDill at 1335 UT.

Equipment: Airplane, and instrumentation worked well. The g-loading imposed by severe turbulence led to a required inspection for structural damage, but none was found. J. Donnelly made some progress on interference between the scatterometer and radiometer prototypes for ultimate installation on the AFRES aircraft.

Critique: Clearly, some influence weakened Hortense during the early part of the flight. Then the hurricane accumulated energy that erupted in the surpercell and produced a 3-4 hPa fall in MSLP as well as reformation of the eyewall at larger radius. This transformation was the start of a deepening trend that lasted throughout the day on 13SEP96.

Hugh Willoughby

160913, H

E.2 Lead Project Scientist (On-Board)

E.2.1 Preflight

- 1. Participate in general mission briefing.
- 2. Determine specific mission and flight requirements for assigned aircraft.
- 3. Determine from CARCAH or field program director whether aircraft has operational fix responsibility and discuss with AOC flight director/meteorologist and CARCAH unless briefed otherwise by field program director.
- 4. Contact HRD members of crew to:
 - a. Assure availability for mission.
 - b. Arrange ground transportation schedule when deployed.
 - c. Determine equipment status.
- 5. Meet with AOC flight crew at least 90 minutes before takeoff, provide copies of flight requirements, and provide a formal briefing for the flight director, navigator, and pilots.
- 6. Report status of aircraft, systems, necessary on-board supplies and crews to appropriate HRD operations center (MGOC in Miami or FGOC at remote recovery location).
- E.2.2 In-Flight
- Confirm from AOC flight director that satellite data link is operative (information).
- Confirm camera mode of operation.
- _____ 3. Confirm data recording rate.
 - ____ 4. Complete Form E-2.

E.2.3 Postflight

- _____ I. Debrief scientific crew.
 - 2. Report landing time, aircraft, crew, and mission status along with supplies (tapes, etc.) remaining aboard the aircraft to the appropriate HRD operations center (MGOC or FGOC).
- 3. Gather completed forms for mission and turn in at the appropriate operations center. [Note: all data removed from the aircraft by HRD personnel should be cleared with the AOC flight director.]
- 4. Obtain a copy of the 10-s flight listing from the AOC flight director. Turn in with completed forms.
 - 5. Determine next mission status, if any, and brief crews as necessary.
- 6. Notify the appropriate operations center (FGOC or MGOC) as to where you can be contacted and arrange for any further coordination required.
 - _____ 7. Prepare written mission summary.

On-Board Lead Project Scientist Check List

Date 125EP96 Aircraft N 42RF Flight ID 960912H

A. Participants:

HRD		AOC		
Function	Participant	Function	Participant	
Lead Project Scientist	HILLAGHEN	Flight Director	DAMIANO	
Cloud Physics		Pilots		
Radar	LANDSEA	Navigator		
Workstation	and the second second second second	Systems Engineer	ROLLS	
Photographer		Data Technician		
Omegasonde	DONLOW	Electronics Technician		
AXBT/AXCP OBSERVER	5. JONES	Other		

Take-Off: 12/0331 Location: McDicc Landing: Location:

B. Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP	Maximum Wind
				5 K
		267.64		

C. Mission Briefing:

GET 06	515	FIXES.	FLY A	ALFA	PATTE	RNIS.	POLLECT
GOTOPE	DATA	, FIX	SURFA	KE I	SER UND	HSING EQUI	PMENT
)			X	1	

E. (I) Proposed Flight Pattern (sketch or designate by number)

GET 06, 122 FIXES, FLY ALPA PATTERNIS AT SKFT, CLIMISTO IOK IF IT GETS BUMPY ALFA'S ROTATED 45°, EXPECT CREATIVITY AT END ISECAUSE OF FUEL.



D. Equipment Status

Equipment	Pre-Flight	In-Flight	Post-Flight
Aircraft	\uparrow	ale - Large	
Radar/LF	1		
Radar/TA (Doppler)	1		
Cloud Physics	NOP		
Data System	1		
Omegasondes	- 1 · · · ·		
AXBT/AXCP	NO 13		
Workstation	MO 13		
Photography	MOB		

REMARKS:

Lead Project Scientist Event Log

Date 1356996

Flight 960912H

LPS WILLOUGHBY

Event	Position	Comments
10	McDILL	
IZADAIZ RECOZ	RIARS	
ETE 75 nmi ANEAD	23-50 72-31	ETE IS NOT DIAM
6	22-57	963 95 KT
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TUIZN SW	24-06	TTZAK 225 -> 5
6	~ 23-10 71-20	962
TURM E	21-57	
TUIZN (4)	22-15	TTZAIC 315->6)
3	23-22	958, N ETEWALL
		MARD BUMP LOT MIS UPDRAFT NW EYEAN
TURN S	24-35	TURN S
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(G)	23-40	958, INICUOUD AT
CUMB, FINAL	- 24-15 72-30	
REPORTS	ISMCF	10" Oth
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Hurricane Research Division

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16 September 1996

To: F. D. Marks

From: H. E. Willoughby

Subject: Flight 960912H

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