19990914I1_LPS

E.2 Lead Project Scientist

E.2.1 Preflight

1 1. Participate in general mission briefing.

1 2. Determine specific mission and flight requirements for assigned aircraft.

1 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.

1 4. Contact HRD members of crew to:

a. Assure availability for mission.
b. Arrange ground transportation schedule when deployed.
c. Determine equipment status.

1 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.

1 6. Report status of aircraft, systems, necessary on-board supplies and crews to appropriate HRD operations center (MGOC in Miami).

E.2.2 In-Flight

JM 1. Confirm from AOC flight director that satellite data link is operative (information).

JM 2. Confirm camera mode of operation.

JM 3. Confirm data recording rate.

JM 4. Complete Form E-2.

E.2.3 Post flight

____ 1. Debrief scientific crew.

____ 2. Report landing time, aircraft, crew, and mission status along with supplies (tapes, *etc.*) remaining aboard the aircraft to MGOC.

____ 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 MGOC as to where you can be contacted and arrange for any further coordination required.

____ 7. Prepare written mission summary using form E-2 p.3 (due to Field Program Director1 week after the flight).

Form E-2
Page 1 of 5

Floyd

Lead Project Scientist Check List

Date 14 Sept. 1999 Aircraft 43RF Flight ID 990914I

A. —Participants:

HRD		AOC	
Function	**Participant**	**Function**	**Participant**
Lead Project Scientist	Marks	Flight Director	Damiano
Cloud Physics		Pilots	Philipsborn, Kowal
Radar	Reasor	Navigator	Rathbun
Workstation	M. Black	Systems Engineer	Moore, Wade
Photographer/Observer		Data Technician	Delgado, McNamara
Dropwindsonde	Landsea	Electronics Technician	Carpenter
AXBT/AXCP/Guest	Walsh	Other	San Souci

Take-Off: 181453 Location: MacDill 27°51' 82°29.6" Landing: 032226 Location: Tampa International 2 NPR folks 27°59.1 82°31.7"

Number of Eye Penetrations: 2

B. —Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP	Maximum Wind

C. —Mission Briefing:

Synoptic Surveillance (see attached sheet) with 1 Fig-4 early just after take off. Try to put drops on C-MAN and buoys where possible.

D. —Equipment Status (Up ↑, Down ↓, Not Available —, Not Used O)

Equipment	Pre-Flight	In-Flight	Post-Flight	# of DATs or Expendables
Aircraft	↑ *	↑	↑	
Radar/LF	↑	↑ (*)	↑	(3)
Radar/TA (Doppler)	↑	↑	↑	
Cloud Physics				
Data System	↑	(**)		needs to be repaired before we fly again
Dropwindsondes	↑	↑	↑	26 / # bad
AXBT/AXCP	↑ 10 ~~**~~			8 / 3 bad
Workstation	↑	↑	↑	
Videography	↑	↑	↑	4 tapes

REMARKS:

* — APU failed ~~before~~ takeoff

~~**~~ main data system failed repeatedly swapped CPU's a number of times with mixed success ending up with no tape recording of FL data recorded BTs on 5 5 history CPU ~~tape~~ drive not communicating well

Considering all of the data system and radar system problems AOC crew did a fantastic job to get the sondes out for WHC and get us some really good data at the end.

* — Radar system was working poorly at beginning of mission. Didn't get it up for much of the Fig 4. Had data for only last part of E-W leg (came on in 9). Worked real well after that with a few failures. LF & TA dBZ low. Got nice data near KMCB at end

~~**~~ of the 7 bad drops all were in the ~~Fig~~ E-W leg of the 5 4. The only loss was

Mission Summary
Storm name
YYMMDDA# Aircraft 4_RF

Scientific Crew (4 RF)

Lead Project Scientist	_____
Radar Scientist	_____
Cloud Physics Scientist	_____
Dropwindsonde Scientist	_____
Boundary-Layer Scientist	_____
Workstation Scientist	_____
Observers	_____

Mission Briefing: (include sketch of proposed flight track or page #)

Mission Synopsis: (include plot of actual flight track)

Evaluation: (did the experiment meet the proposed objectives?)

Problems:(list all problems)

Form E-2
Page 5 of 5

Hurricane Floyd (1)

Lead Project Scientist Event Log

Date 14 Sept 1999 Flight 990914I LPS Marks

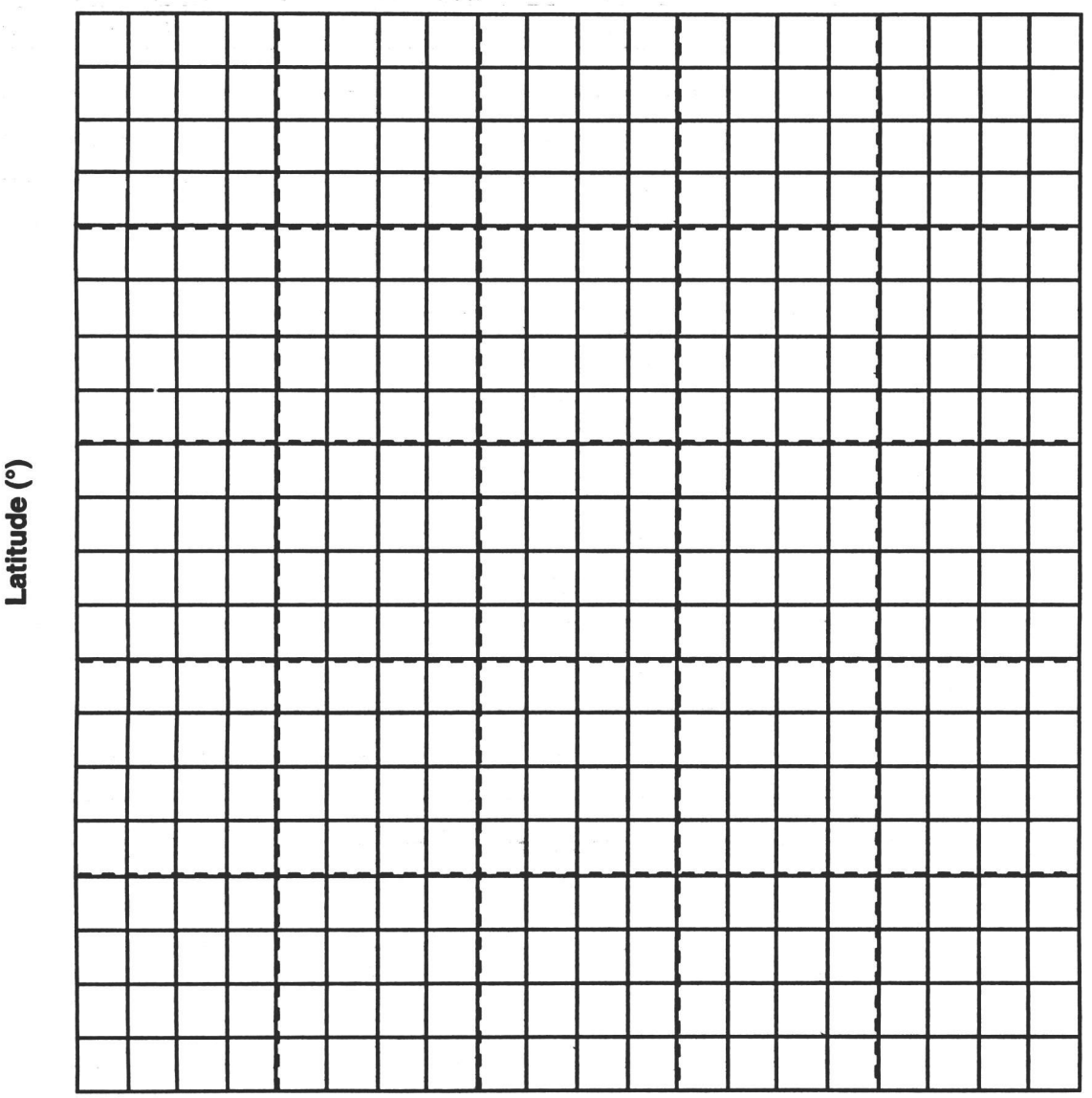
Time	Event	Position	Comments
18:45:5	TO	27°51" 82°29.6"	ramp location (ftc)
			Dave Rathbun thinks
			we can fly over SFMR on
1858			storm farther N than
			predicted
			TA R/T looks terrible
			LF seems low as well
			Mike will add 5dBZ to
			LF composites
191010			Radar system down
		Tcal fix	26°13' 77.85" 1859 9524
			192545 rewind radar tape
			1930 Radar up TA useless
			+10 dB to LF
193105	(1) turn 50NG	77.06"	eyewall replacement nearly
193450	2 eye wall drop		complete
1942 33	9 Drop	26°24.7" 77°06.3"	TK 160 down
		9	drop no winds
			landed on Island
1949	2 Eyewall drop	25°54" 77°6.8"	2 eyewall drops
195520	(2) 50 SG	26°28" 77°06.2"	TK 045 → (3)
2011	(3) 50 EG	26°26" 75°54"	

Abaco Island
SFMR not good over land

IP sorry to

Observer's Flight Track Worksheet

Date 14 Sept. 1999 Flight 990914T Observer Mark



(2)

Lead Project Scientist Event Log

Date 14 Sept. 1999 Flight 990914I LPS Marks

eyewall replacement nearly complete

Time	Event	Position	Comments
2021	2 eyewall drops (3)		no winds either drop
202915	5	26°34" 77°15.4"	no winds on sonde
			TA up and running
203430	2 eyewall drops (4)		dBZ ~10dB low
			AF 932mb 2027z
204025	(4)	26°33.8" 78°9.7"	cl. mb to 18kFt 26°34" 77°15"
			Tk 200 to drop point
			TA - F/AST
210448	drop 5	26°40" 79°00"	NW Andros
212001	drop 6	23°30 79°30'	Turn Tk E
214350	drop 7	23°26' 77°08"	27°20' 77°37' radar fix 0012 Tk 340/13kts
220925	drop 8	23°16" 74°49"	
223240	drop 9	23°06" 72°29"	
225043	drop 10	24°20" 71°30"	SE of 6 ~300nm
-23 230820	drop 11	25°30" 73°30"	Tk W
-22 233230	drop 12	25°30" 72°45"	2355-0000 great lightning convection
			2355 - 0009 data system down
2359	drop 13	——	data system down
0009			data system back ok!!!
002457	drop 14	27°54.3" 74°27.8"	turn E

2355 major data system failure switched to CPU B failed immediately (0002) trying one more thing maybe able to get data but no records

(3)

Lead Project Scientist Event Log

Date 14 Sept. 1999 **Flight** 990914 **LPS** Marks

Time	Event	Position	Comments
005846	drop 15	28° 06' 71 30"	0030
			010330 data system ↓
012633	drop 16	30°27" 72°30"	TKW datasys.
014906	drop 17/BT1	30°27" 75°00"	combo BT CH12
	SST 27.1		
015814	BT2 (ch 16)	30°10" 75°47"	
	SST 27.3		data system not recording
020816	BT3 (ch 12)	29°50" 76°39.4"	Tape drive not
	bad		talking to CPU
021737	drop 18 / BT4	29°28.2" 77°30.8"	start descent
	SST 27.9		slowly to 8 kft
022820	combo 41010	28°55" 79°27"	in band < ~~[illegible]~~
	BT5 bad		~~[illegible]~~
023425	~~BT6~~	28°37" 79°00"	
	SST 26.?		0236 start F/AST run at KMLB
023953	BT7	28°35" 79°33"	at 8 kft
	SST 28.2		60m MLD
024607	combo 41009	28°32" 80°74"	
	BT8 bad		Good Doppler for KMLB comparison
			hit beach at 8 kft
0252	cross beach		Ed Walsh ecstatic
	working inland with KMLB comparisons		
0306	28°06" 81°47"	stopped radar run with KMLB	
	landing		

Left margin notes: 0209 radar fix 27 42 78 02

Right margin notes: data sys 013131; 014521; set printer to 5s rate to record BTs; in Doppler range

4

Lead Project Scientist Event Log

Date 14 Sept. 1999 **Flight** 990914I **LPS** Malks

Time	Event	Position	Comments

Form E-2

932

921

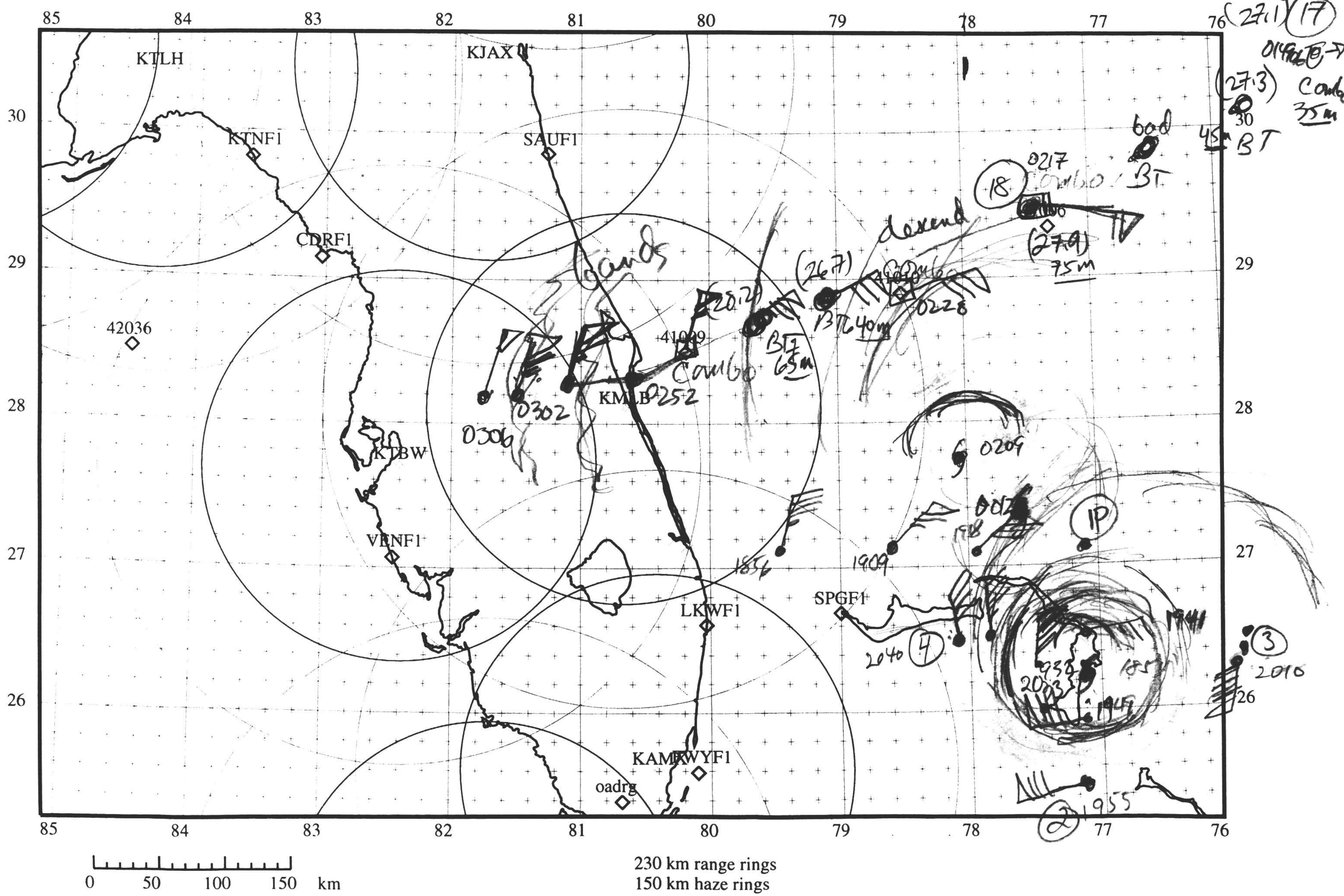
5

Lead Project Scientist Event Log

Date 14 Sept. 1999 Flight 990914J LPS Marles

Time	Event	Position	Comments

mlb_map.ps Center Lat: 28.00 Lon: -80.60

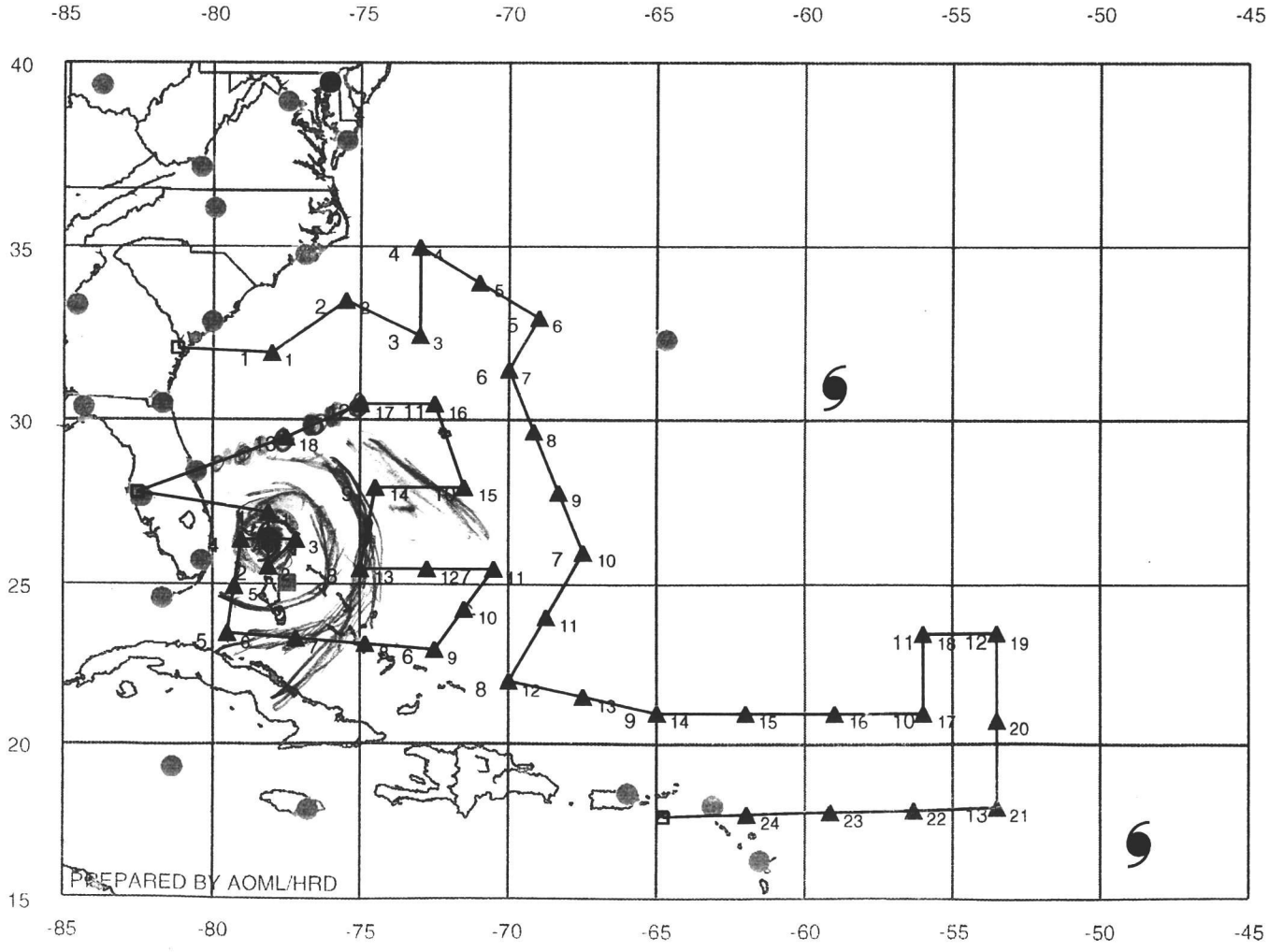


HRD Crew:
Marks
Landsea
Reasor
M. Black
Walsh

0012
27 ~~20~~ 7737

50 nm N of 50 N
of 1830Z 26.0 77.4

14 kft Sat of penetrations
as high as possible afterward



FLIGHT TRACKS
FLOYD/SYNOPTIC

990914np.ftk
990914ip.ftk

RAWINSONDES 9908

- Regular
- 12Z only
- 00Z only
- Infrequent
- Infrequent - 00Z
- Infrequent - 12Z

DROP LOCATIONS

==========

HURRICANE SYNOPTIC SURVEILLANCE MISSION PLAN: FLOYD/SYNOPTIC

Prepared by the Hurricane Research Division at 11:45:22 AM on 09/13/99.
File: 990914ip.ftk

Aircraft: N43RF Altitude: FL180-250 Proposed takeoff: 14/1730Z

==========

DROP LOCATIONS

#	LAT (d m)	LON (d m)	RAD/AZM (nm/dg)	TIME (h:mm)
1S	27 14	78 06	50/000	0:59
2S	25 34	78 06	50/180	1:20
3S X	26 24	77 10	50/090	1:35
4S X	26 24	79 02	50/270	1:55
5	24 57	79 16		2:14
6	23 30	79 30		2:32
7	23 20	77 10		2:59
8	23 10	74 50		3:25
9	23 00	72 30		3:52
10	24 15	71 30		4:11
11	25 30	70 30		~~4:31~~
12	25 30	72 45		~~4:56~~
13	25 30	75 00		5:21
14	28 00	74 30		5:53
15	28 00	71 30		6:26
16	30 30	72 30		6:59
17	30 30	75 00		7:25 combo
18	29 30	77 30		7:55 combo

1814
456
2370

431
1814
2245

combo — { 2 AXBT evenly spaced

+ 2 eye drop

2 AXBTs near buoys
1-2 near axis of Gulf stream
8 total AXBT

HURRICANE SYNOPTIC SURVEILLANCE MISSION PLAN: FLOYD/SYNOPTIC

Prepared by the Hurricane Research Division at 11:45:22 AM on 09/13/99.
File: 990914ip.ftk

Aircraft: N43RF Altitude: FL180-250 Proposed takeoff: 14/1730Z

TRACK DISTANCE TABLE

#	LAT (d m)	LON (d/m)	RAD/AZM (nm/dg)	LEG (nm)	TOTAL (nm)	TIME (h:mm)
0	MACDILL			0.	0.	0:00
1S	27 14	78 06	50/000	238.	238.	0:59
2S	25 34	78 06	50/180	100.	338.	1:20
3S	26 24	77 10	50/090	71.	409.	1:35
4S	26 24	79 02	50/270	100.	509.	1:55 2:26
5	23 30	79 30		176.	685.	2:32
6	23 00	72 30		388.	1073.	3:52
7	25 30	70 30		186.	1259.	4:31
8	25 30	75 00		244.	1503.	5:21
9	28 00	74 30		153.	1656.	5:53
10	28 00	71 30		159.	1815.	6:26
11	30 30	72 30		159.	1974.	6:58
12	30 30	75 00		129.	2104.	7:25
13	29 30	77 30		143.	2247.	7:55
14	MACDILL			283.	2530.	9:03

@ 1830Z 26.0 77.4
aim for 50nm N of @

buoys
41009 28° 30' 01" 80° 10' 03"
41010 28° 53' 23" 78° 32' 23"

Drop AXBT combo
" " "

C-MAN
SPGF1 26.70° 78.99°

WSR-88D
KMLB 28° 06' 48" 80° 39' 15"

Mission Summary
990914I Aircraft 43RF
Floyd
Synoptic Surveillance

Scientific Crew (43RF)

Lead Scientist/Radar	F. Marks
AXBT	P. Reasor (CSU)
Dropsonde	C Landsea
Workstation	M. Black
Air-sea interaction Scientist	E. Walsh (NASA/GSFC)
Observers	J. Palca, S. Bear (NPR)

Mission Briefing:

On Tuesday 14 September N43RF was tasked to do a two-plane synoptic surveillance mission with N49RF into Hurricane Floyd as it passed Nassau, Bahamas with a takeoff from MacDill AFB at 1730 UTC and landing at Tampa International Airport around 0230 UTC. The plan called for figure-4 at 14,000 ft with 50 nm legs with GPS drops on the ends of the legs and in the eyewall on the four cardinal directions. One drop was also planned in the eye on the first pass through the center with a backup on the second and last pass through the center. Following the figure-4 pattern N43RF would climb to as high as possible and execute the surveillance pattern covering the area surrounding the S, E, and N sides of the storm while N49RF would sample the far environment N and E of the storm at 41,000 ft. Our final leg would pass just N of the storm over the buoys E of Cape Canaveral, FL and the WSR-88D at Melbourne, FL (KMLB) (Table 1). We planned to drop a string of AXBTs along that final E-W track to sample the sea-surface temperature (SST) and mixed layer depth (MLD) in front of the storm in a region where Dennis had just passed. We also planned some GPS-sonde drops near any buoys and C-MAN sites in Table 1 if possible.

Mission Synopsis

N43RF took off from MacDill AFB at 1815 UTC and headed toward an IP 50 nm N of the storm. As we approached the storm it became apparent that it was farther E and N than the forecast track suggesting the storm had started its anticipated northward turn sparing southern Florida. At about the same time we received the AFRES latest fix confirming our radar presentation (Table 2). We adjusted our IP to reflect the change in position at 1858 UTC (Fig.1).

The LF and TA radars were acting up (the TA wouldn't hold frequency) and the engineers swapped the TA transmitter. The LF showed that the storm had changed considerably from the previous night (Fig. 2), with the near completion of an eyewall replacement cycle. There was only a large outer eyewall (60 nm diameter) encompassing a small inner hub cloud (the remains of the inner eyewall). At 1910 UTC the radar system crashed and the engineers started to diagnose the problem, starting a process that became commonplace on this mission.

We reached our IP (50 nm N of the storm) at 1931 UTC, dropped a GPS sonde and AXBT and tracked S to the center at 14,000 ft. The sonde worked (no winds below 800 mb) and the AXBT gave a SST of 27.5°C (Table 3). With such a large eyewall we attempted 2 eyewall drops on the N side 3 min later, one of which gave no winds. We hit the center at 1943 UTC right over Abaco Island, Bahamas and dropped a sonde that landed on the island with a 932 mb central pressure. We received no winds from this sonde either. We proceeded to track S down the island to a point 50 nm S of the center dropping one more eyewall sondes which had no winds. At 1955 UTC we reached the point 50 nm S of the center, dropped a sonde (which had winds), and turned NE. We produced one radar composite, but no EVTD as the TA radar was still giving problems.

At 2011 UTC we reached the point 50 nm E of the center, dropped a sonde (no winds) and turned W to the center. We attempted a drop in the E eyewall which also had no winds. Dale Carpenter suspected the either a bad batch of sondes or the ribbon used to pull out the launch pin was too tight. He tried loosening the ribbon. We passed through the center at 2029 UTC, two minutes after the AFRES fixed the center, and dropped a sonde which still had no winds. Passing through the eye the radar started working well and we started recording TA data in F/AST mode through the W eyewall. We also attempted dropsondes in the W eyewall and at the point 50 nm W of the center which both failed (one with no winds, one with no launch detect). We reached the end of the figure-4 at 2040 UTC and turned SW to our first surveillance drop. At this time Dale started using a new box of sondes and we never had a problem with the sondes the rest of the flight. Mike Black transmitted two more LF composites and then settled down for some dropsonde processing.

The first surveillance drop was just NW of Andros Island. We then proceeded to a point just off the NE coast of Cuba (23.5N, 79.5W) where we turned to the E to a point .300 nm SE of the center. We then zig-zagging N along the E side of the storm. We encountered an intense rainband with lightning ~200 nm E of the center at 2355 UTC. Unfortunately, the main data system failures started getting worse at this time, crashing from 2355-0009 UTC, causing us to have problems with drop 19 (Table 3). Chris Landsea manually input the flight level data from the 10 s listing to get the sonde out. Richard McNamara and Jorge Delgado swapped the CPUs on the main data system and we were up again for a while. We limped along with data system problems heading N along the NE side of the pattern. At 0103 and 0130UTC the data system crashed again and was revived within a few minutes, but Barry Damiano noted that the tape drive might not be recording data. We discussed the data recording problems and agreed to try to finish out the surveillance pattern transmitting the drops back to NHC even if the data system was not recording data provided the onboard data display was still working. We reached the far NE portion of our pattern at 0126 UTC and turned WSW to track toward Cape Canaveral N of the storm laying down a string of AXBTs along with our dropsondes.

As we tracked WSW N of the center it became apparent that the storm was farther N than we had expected and would pass only about 80 nm S of our track. We decided to alter our plan slightly to add an 8000 ft leg near the shore toward KMLB to acquire some storm surge and wave spectra data, as well as provide some intercomparison with the KMLB WSR-88D radar. We planned the decent to correspond with a GPS sonde drop over buoy 41009 just E of Cape Canaveral (Table 1). Along this leg the data system crashed one more time at 0159 UTC and Richard couldn't bring it up and record the data as well. Ed Walsh said he had his own source of the necessary flight level data (as did the radar data system) so we proceeded with the planned low-level beach run. Unfortunately, the only record of the AXBTs was from the 5-s onboard listing. We completed our last surveillance drop at 0218 UTC and descended to 8000 ft by our

combo drop near buoy 41010 at 0229 UTC. At 0236 UTC, in rainbands 80 nm NW of the center the TA was set to FAST and we started the 8000 ft run at the beach within Doppler range of KMLB. We crossed the beach at 0252 UTC passing directly over Patrick AFB. Ed Walsh was ecstatic with the surge and wave data. We turned W heading for Tampa recording radar data inland until we passed S of Orlando. We landed at Tampa International at 0319 UTC.

Accomplishments

This mission was a very draining experience with radar and main data system problems. Considering all of the data system problems the AOC and HRD crew did a fantastic job to get all of the surveillance drops out for NHC and to get some really good landfall research data (wave, surge, and Doppler radar data) along the coast of FL at the end of the mission. The AOC crew, particularly Barry Damiano, Richard McNamara, Jorge Delgado, and Dale Carpenter, deserve special credit for accomplishing the tasked operation surveillance mission despite all of the equipment problems. The mission was successfully completed thanks to their hard work and dedication.

Penetrations:	2
GPS sondes:	26, 7 failed
AXBTs:	8, 3 failed

Problems:

Although the primary operational surveillance mission was accomplished, there were several major glitches during this mission that compromise the research quality of the data.

1) Only 17 of 26 dropsondes released were transmitted. 7 were failures (all in the inner core figure-4) , and the last two over buoys were worked up but not transmitted since they were near the end of the mission. All scheduled drop points were covered except the east and west points of the figure-4 in the inner core of Floyd at the beginning of the flight.

2) The CPU for the main data system failed intermittently during the flight, crashing numerous times leaving data gaps as long as 10 min. The AOC engineers and technicians swapped the CPUs a number of times with limited success. Each time the system would come up for a while and then the problems would start again. It finally crashed near the end of the mission and was brought up only to initialize the final 5-6 GPS sondes and could not record the last 40 minutes of the mission on tape. (turned out the tape drives were dying and the heads were bad causing numerous parity errors which resulted in lost data and system problems)

3) The radar system worked poorly at the beginning of the mission. The AOC engineers had it working intermittently during the figure-4 segment, with consistent data only for the last half of the second leg in the figure-4. There was enough data to work up and transmit two composites but not VTDs. The radar system worked well after that with a few intermittent failures. The LF and TA reflectivities were low (7-8 dBZ). We did however get great Doppler data near KMLB WSR-88D at the end of the mission.

4) The first AXBT drop was recorded on tape, but the others were recorded only on the 5 s printed listing because of the data system limitations after the final crash.

5) The aircraft APU failed before take off forcing us to delay take off and restart many of the data systems possibly adding to our other problems.

Frank Marks
Frank.Marks@noaa.gov

Table 1. Buoy, C-MAN, and WSR-88D locations for the 19990914I Floyd flight.

Site ID	Latitude (°N)	Longitude (°W)	Location
41009	28.50	80.18	CANAVERAL
41010	28.89	78.55	CANAVERAL EAST
SPGF1	26.70	78.99	Settlement Point, GBI
KMLB	28.10	80.64	Melbourne, FL (ASOS)
KMLB	28.1133	80.6542	Melbourne, FL WSR-88D

Table 2: Center fixes for Floyd from N43RF and the Air Force (AFRES) on 14 September. Sea level pressures were provided in some eye drops.

Time (UTC)	Latitude (N) (deg min)	Longitude (W) (deg min)	Aircraft
1854	26 13	77 05	AFRES, 932 mb
1943	26. 25	77 07	N43RF, 932 mb
2027	26 34	77 16	AFRES, 932 mb
2029	26 34	77 16	N43RF, 932 mb
0209	27 42	78 02	N43RF radar fix

Table 3: Splash locations of sondes transmitted during the 19990914I Floyd mission. Here MBL = mean boundary layer wind (fffdd; fff = wind direction in deg and dd = wind speed in kt), LST WND = height of last wind (meters), and SST = sea surface temperature (tenths of °C).

#	Sonde ID	Time (UTC)	Lat (°N)	Lon (°W)	Comments
1	983720810	1934	26.95	77.36	EYEWALL 000=
2	983720778	1935	26.93	77.35	MBL WND 05107 EYEWALL 000=
3	983620731	1942	26.40	77.10	EYE (NO WINDS)=
4	983620760	1949	25.92	77.11	not transmitted (NO WINDS)
5	983720775	1949	25.95	76.97	MBL WND 24106 LST WND 011 EYEWALL 180=
6	983310189	2020	26.57	76.55	eyewall 090 not transmitted (NO WINDS)
7	983620743	2021	26.57	76.58	eyewall 090 not transmitted (NO WINDS)
8	983620661	2029	26.60	77.30	EYE (NO WINDS)=
9	983620678	2035	26.57	77.72	eyewall 270 not transmitted (NO WINDS)
10	983620691	2035	26.57	77.75	eyewall 270 not transmitted (NO WINDS)
11	984325501	2104	24.66	78.91	LST WND 010 MBL WND 29541=
12	985035055	2120	23.49	79.43	LST WND 012 MBL WND 27531=
13	984325474	2143	23.46	77.09	MBL WND 23534 LST WND 010=
14	985035114	2207	23.32	74.79	LST WND 010 MBL WND 18037=
15	985035105	2232	23.14	72.51	LST WND 011 MBL WND 15525=
16	985158013	2250	24.37	71.51	LST WND 010 MBL WND 15030=
17	983310106	2308	25.55	70.52	LST WND 010 MBL WND 13031=
18	984325182	2332	25.61	72.76	LST WND 010 MBL WND 14043=
19	985035112	2359	25.58	74.70	LST WND 050 MBL WND 18535=
20	985035309	0024	28.02	74.55	LST WND 006=
21	985035054	0058	28.15	71.54	LST WND 011 MBL WND 13035=
22	984325412	0126	30.55	72.65	LST WND 010 MBL WND 11533=
23	983310034	0149	30.53	75.06	LST WND 011 MBL WND 10044 SST 273=
24	983620593	0217	29.51	77.67	LST WND 010 SST 279 RAINBAND=
25	984325549	0228	28.90	78.45	at buoy 41010 not transmitted
26	983310162	0246	28.53	80.15	at buoy 41009 not transmitted

Note: Sondes 4, 6, 7, 9, 10 had no winds and were not transmitted. Sondes 25 and 26 were good but were not transmitted because of time constraints.

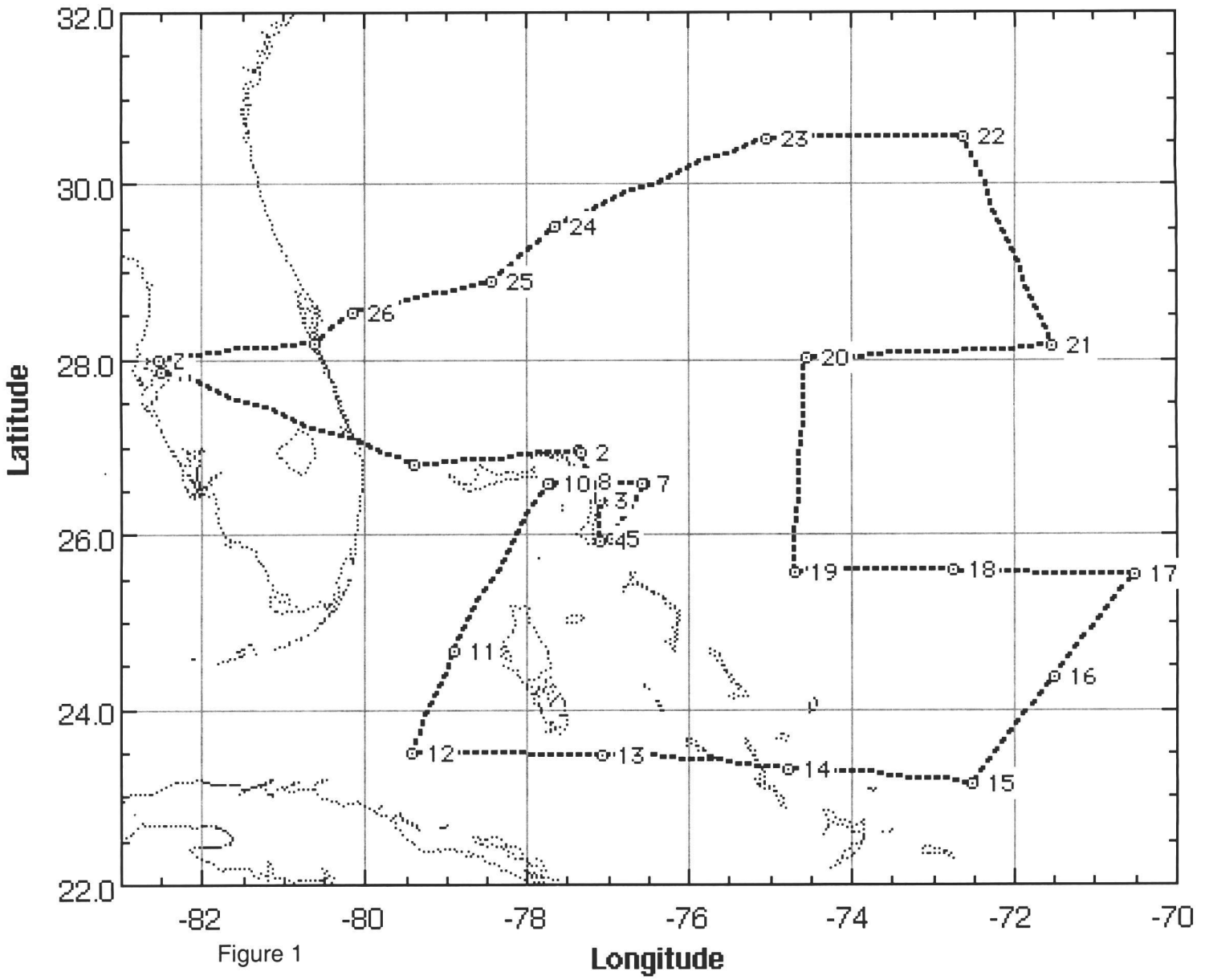

32.0
30.0
28.0
26.0
24.0
22.0
Latitude
-82
-80
-78
-76
-74
-72
-70
Longitude
1
2
3
4
5
6
7
8
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

Figure 1

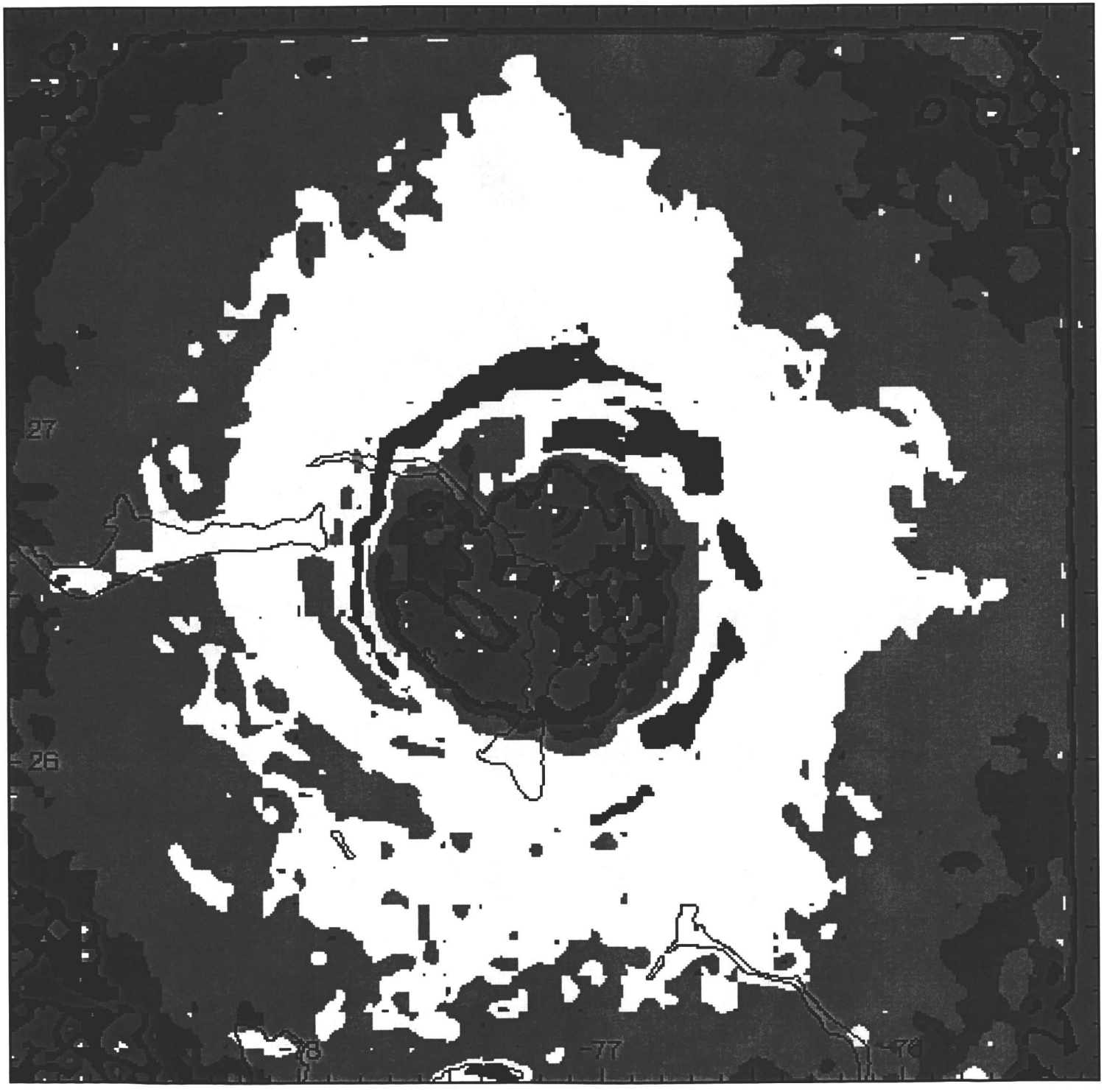


Figure 2

99091411

FLOYD

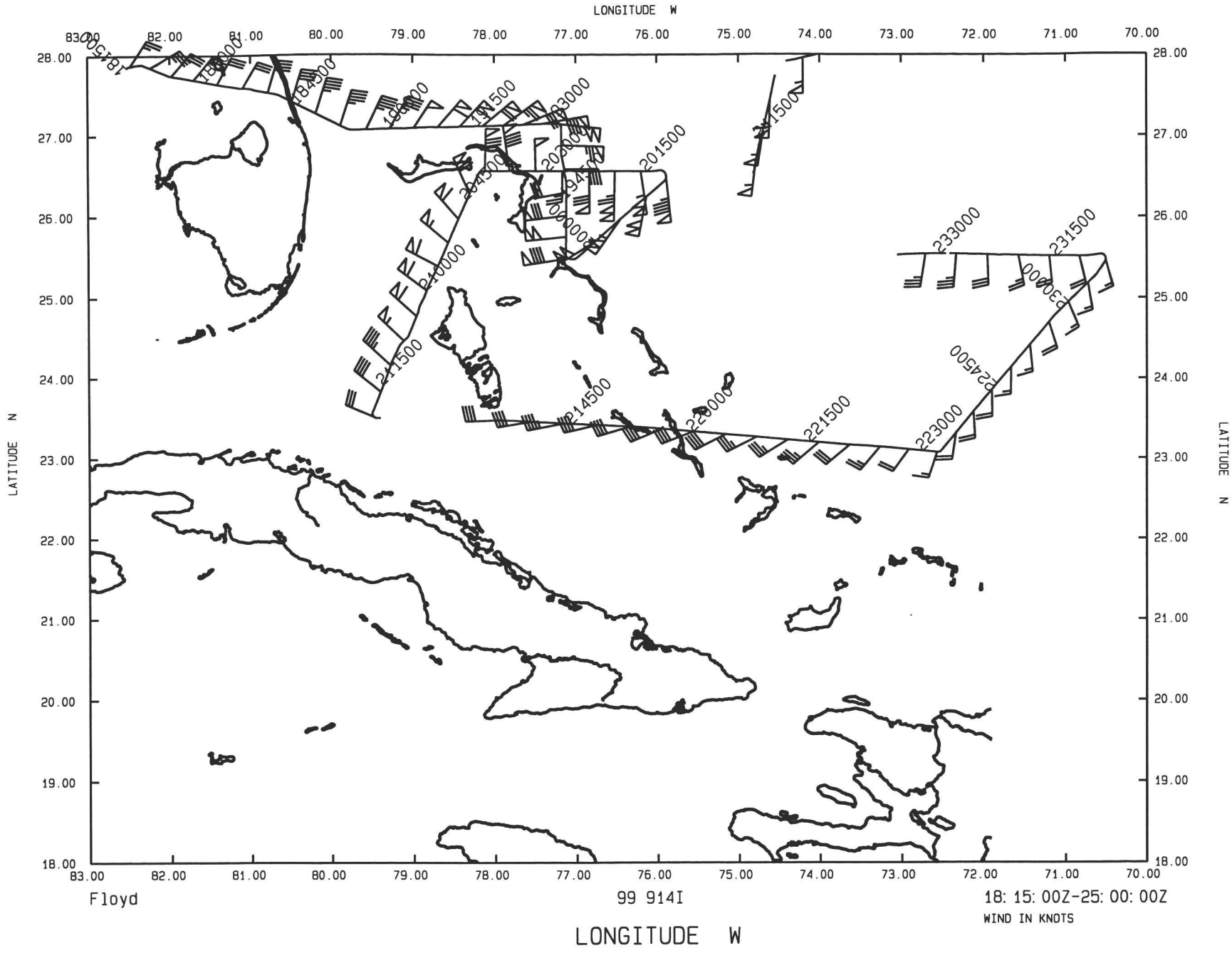
202931 Z to
202931 Z

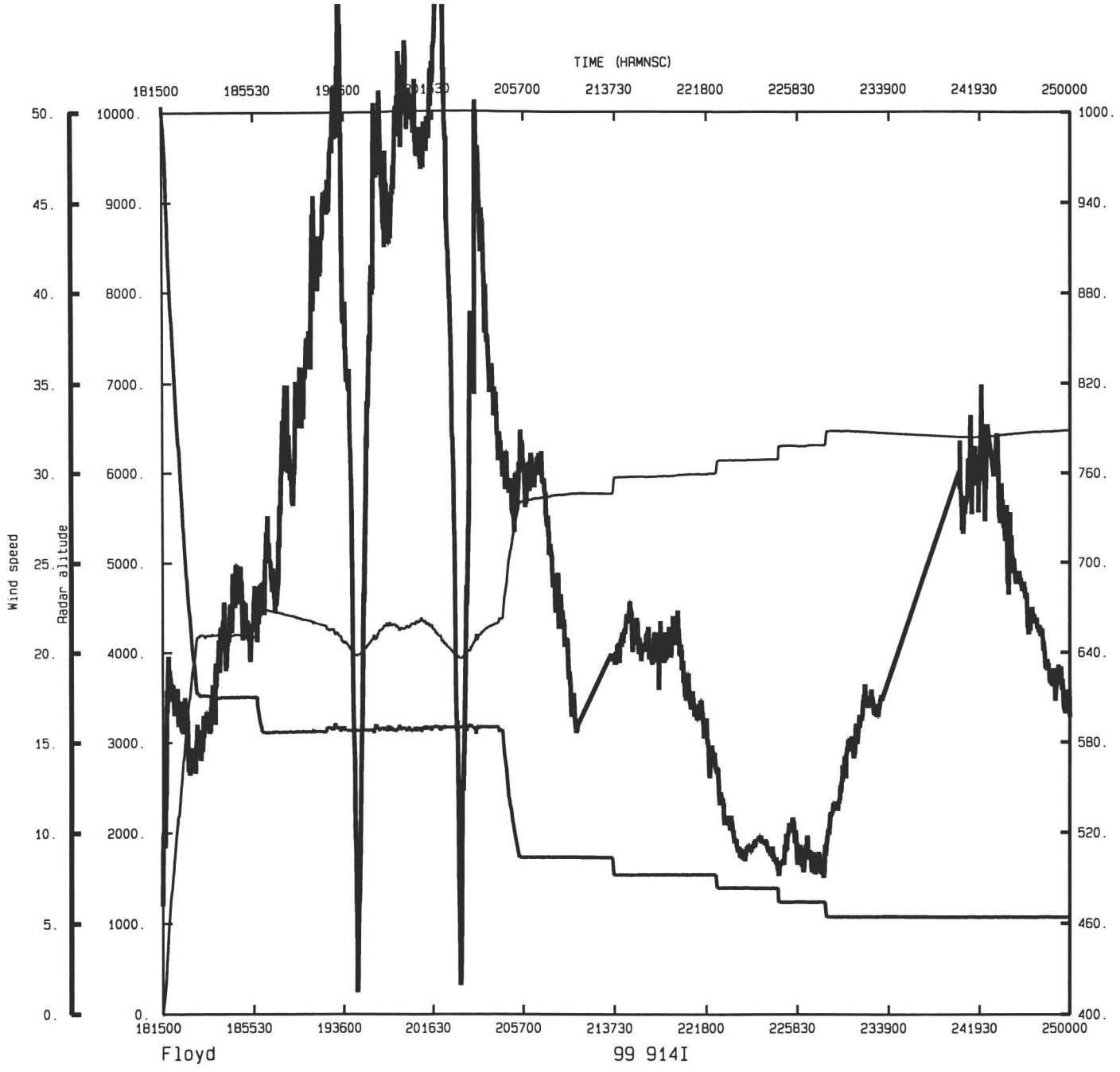
48
41
35
28
21
15 Alt 3934 m

dBZ Slat 26.66 N
Slon 77.15 W

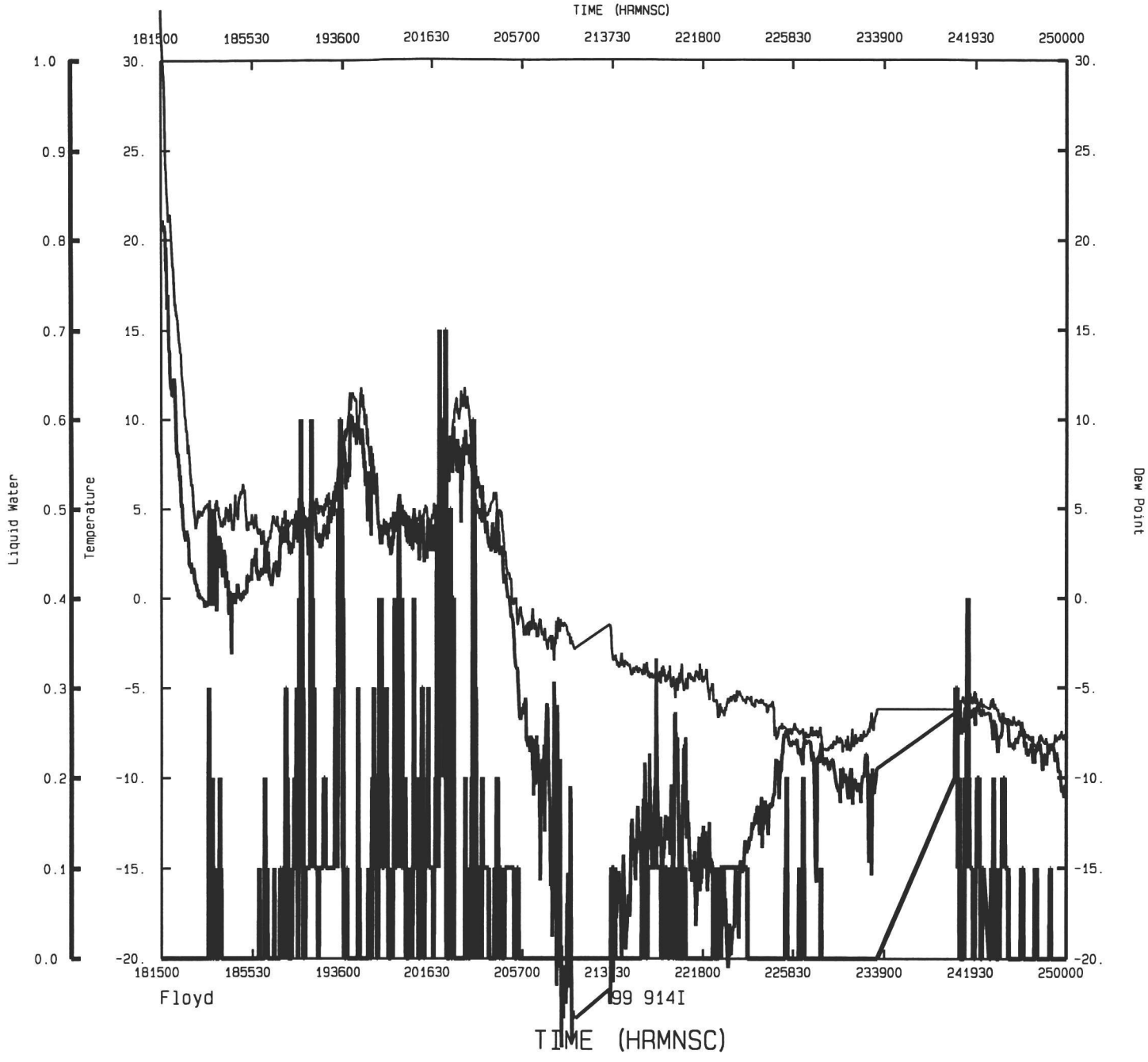
360 X 360 km

produced by
HRD / AOC

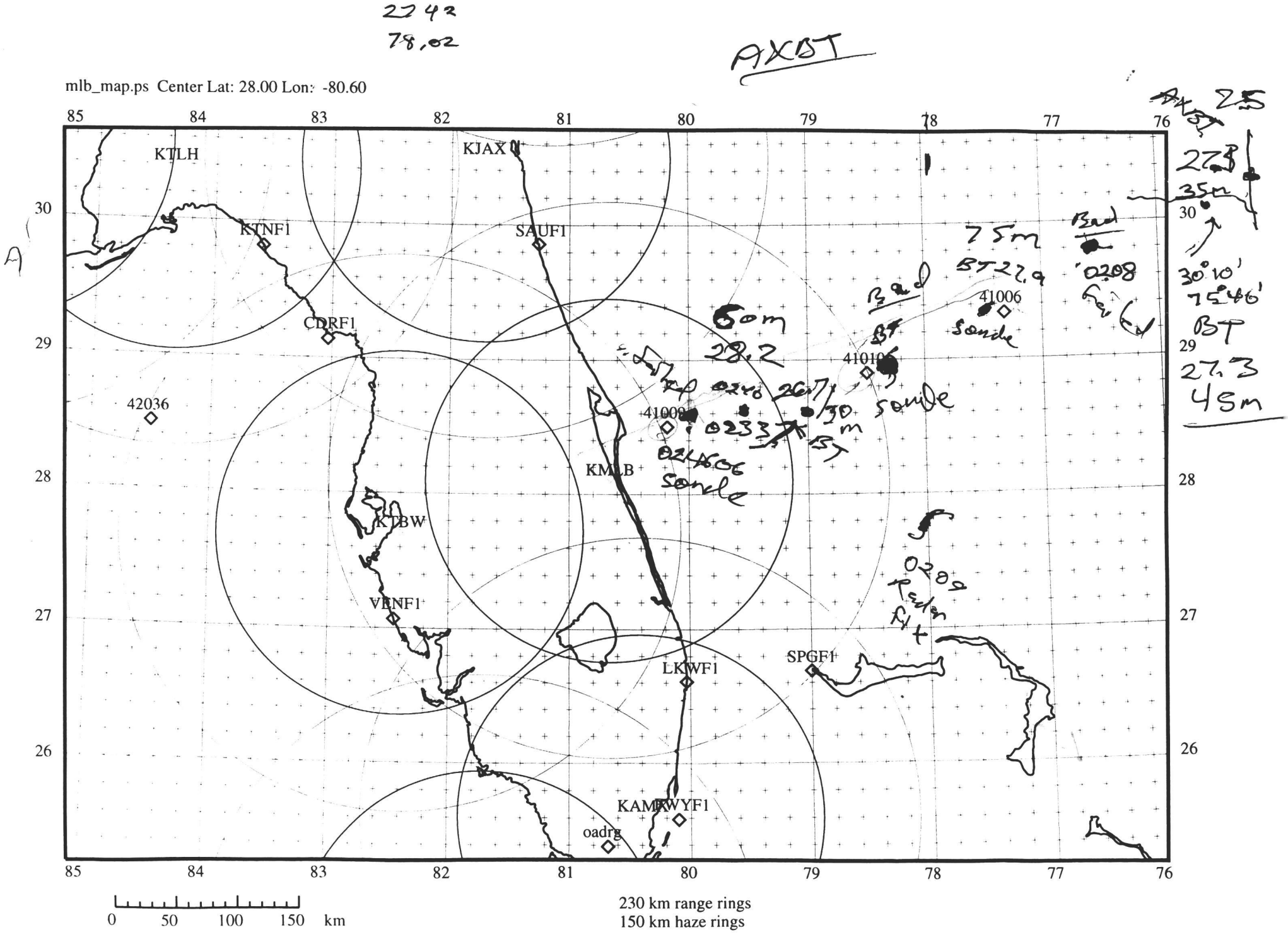

LONGITUDE W
83.00
82.00
81.00
80.00
79.00
78.00
77.00
76.00
75.00
74.00
73.00
72.00
71.00
70.00
28.00
27.00
26.00
25.00
24.00
23.00
22.00
21.00
20.00
19.00
18.00
LATITUDE N
184500
190000
191500
193000
194500
200000
201500
203000
204500
210000
211500
214500
220000
221500
223000
224500
230000
231500
233000
Floyd
99 914I
18: 15: 00Z-25: 00: 00Z
WIND IN KNOTS
LONGITUDE W


TIME (HRMNSC)
181500
185530
193600
201630
205700
213730
221800
225830
233900
241930
250000
Wind speed
Radar altitude
Pressure
50.
45.
40.
35.
30.
25.
20.
15.
10.
5.
0.
10000.
9000.
8000.
7000.
6000.
5000.
4000.
3000.
2000.
1000.
0.
1000.
940.
880.
820.
760.
700.
640.
580.
520.
460.
400.
Floyd
99 914I
TIME (HRMNSC)

NOAA/HRD


TIME (HRMNSC)
181500
185530
193600
201630
205700
213730
221800
225830
233900
241930
250000
Liquid Water
Temperature
Dew Point
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
30.
25.
20.
15.
10.
5.
0.
-5.
-10.
-15.
-20.
Floyd
99 914I
TIME (HRMNSC)

NOAA/HRD


mlb_map.ps Center Lat: 28.00 Lon: -80.60
KTLH
KJAX
KTNF1
SAUF1
CDRF1
42036
41009
41010
41006
KMLB
KTBW
VENF1
LKWF1
SPGF1
KAMKWYF1
oadrg
85
84
83
82
81
80
79
78
77
76
30
29
28
27
26
0
50
100
150
km
230 km range rings
150 km haze rings