19990913I1_LPS

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

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

____ 2. Confirm camera mode of operation.

____ 3. Confirm data recording rate.

____ 4. Complete Form E-2.

E.2.3 Postflight

____ 1. 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 13 SEP 99 **Aircraft** N43RF **Flight ID** 990913I

A. Participants:

HRD		AOC	
Function	**Participant**	**Function**	**Participant**
Lead Project Scientist	WILLOUGHBY	Flight Director	DAMIANO
Cloud Physics		Pilots	KENUL/McCIM
Radar	DOIRST	Navigator	BATHBURN
Workstation	LEIGHTON	Systems Engineer	McNAMAR
Photographer		Data Technician	
GPS Omegasonde	DOIRST	Electronics Technician	
~~AXBT/AXCP~~ OTHER	KATSAROS/RITCHIE	Other- Sonde	CARPENTER

Take-Off: 13/1738 z **Location:** MIA **Landing:** 14/0153 z **Location:** MIA

B. Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP	Maximum Wind
13/20	24.3	73.5	916	LOTS

C. Mission Briefing:

FLY XCDX, DROP NUMEROUS SONDES

D. Equipment Status

Equipment	Pre-Flight	In-Flight	Post-Flight
Aircraft	↑	↑	
Radar/LF	↑	↑ (1)	
Radar/TA (Doppler)	↑	↑	
Cloud Physics			
Data System	↑	↑ (2)	
GDS Omegasondes	↑	↑ (3)	
AXBT/AXCP	↑	↑	
Workstation	↑	↑	
Photography	↑	↑	

REMARKS:

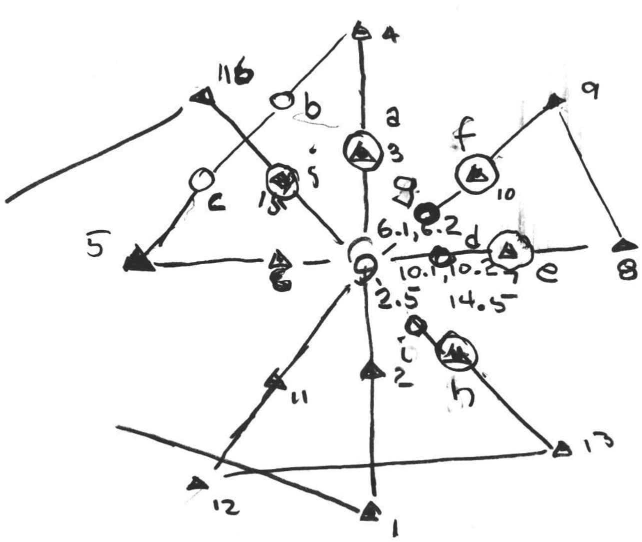
(1) JUST B4 IP SWAPPED LF R/T. NO BETTER SWITCHED BACK TO ORIG. Reflectivities low 28-32 dBZ max

(2) Data system frozen 1959-2009

(3) HAD TO RESTART AVAPS DIFFICULT TO GET DROP DATA TO WORKSTATION. LOST COMM BETWEEN AVAPS & HRD'S TRANSMITTED ONLY THE FIRST DROPS.

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

E. (II) **Actual Flight Pattern**

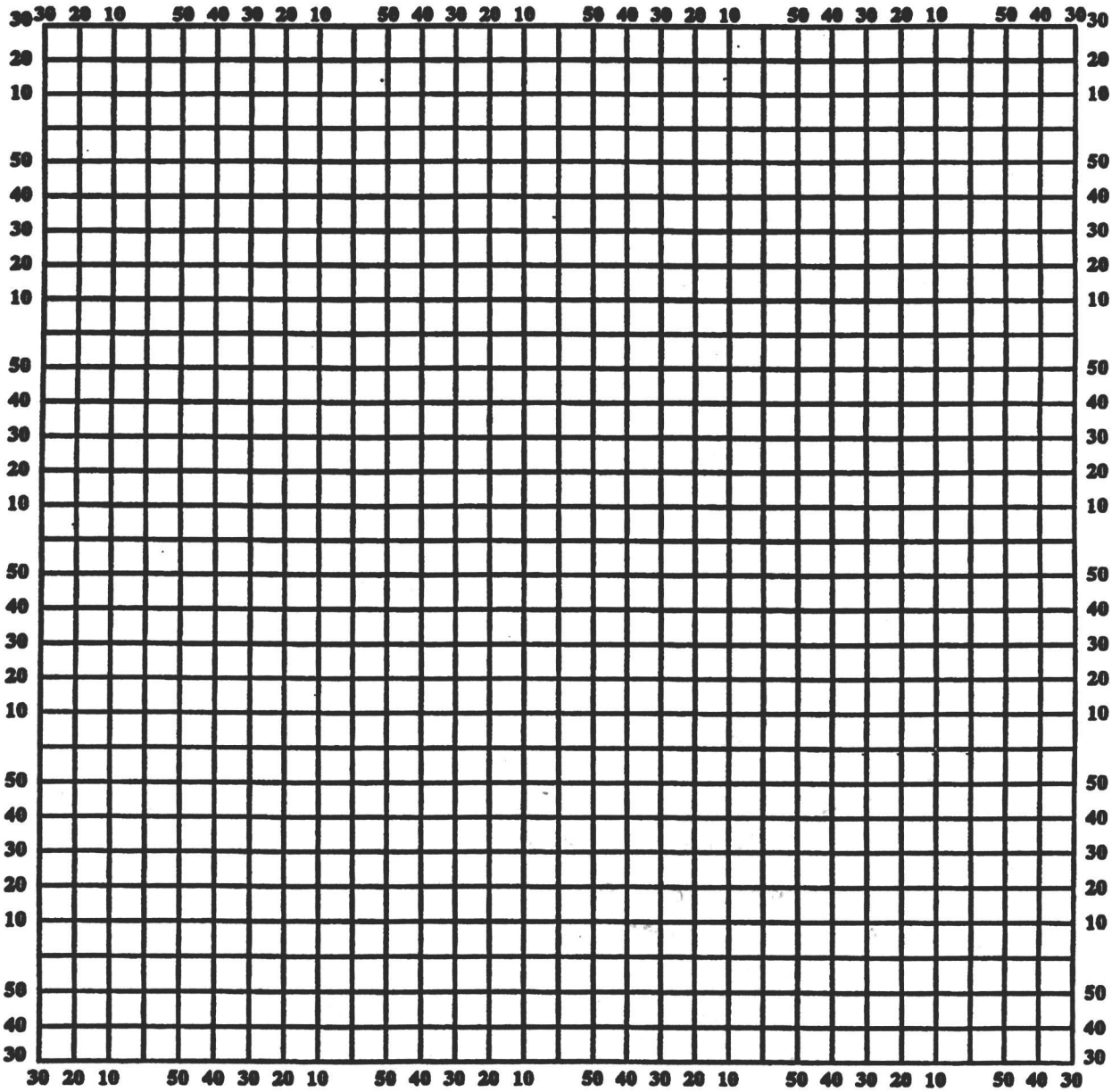


Nominal 24.3, 73.5 @ 13/2200Z

Hurricane Recco Plotting Chart

True at 25° Latitude, In Degrees and Minutes

Date _____ Aircraft _____ Observer _____



Note: Label full degrees according to location of flight area.

Lead Project Scientist Event Log

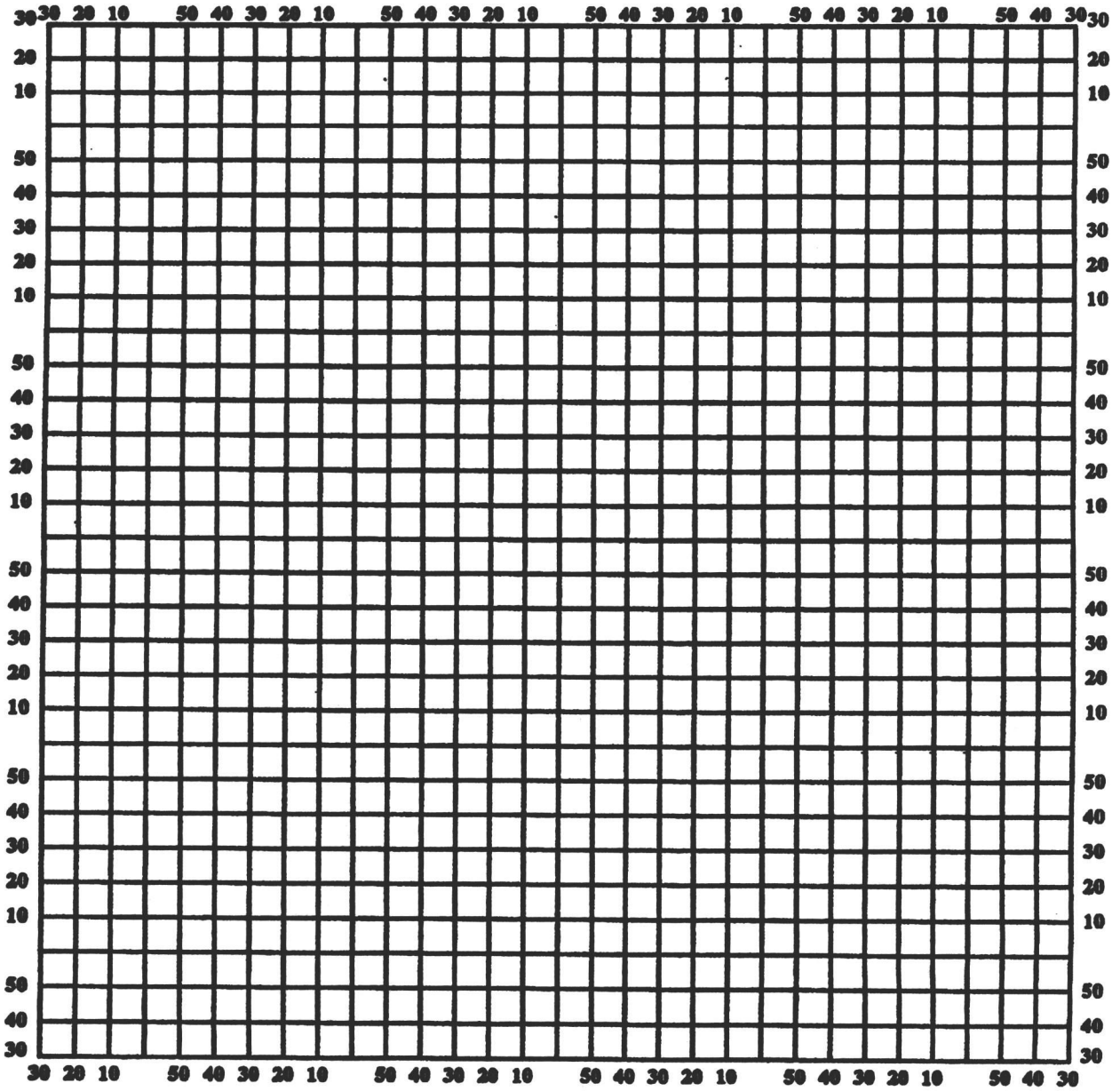
Date ____________________ Flight ____________________ LPS ____________________

Time	Event	Position	Comments

Hurricane Recco Plotting Chart

True at 25° Latitude, in Degrees and Minutes

Date _____ Aircraft _____ Observer _____



Note: Label full degrees according to location of flight area.

Lead Project Scientist Event Log

Date ____________________ Flight ____________________ LPS ____________________

Time	Event	Position	Comments

Lead Project Scientist Event Log

Date 13SEP99 Flight 990913I LPS WILLOUGHBY

Time	Event	Position	Comments
2226	BT 9	24°47 73°06	BT GOOD
2232	DROP 10.1	NE EYEWALL	
2236	G	24°25' 73°48'	
2239	DROP 10.2	SW EYEWALL	Winds 17 m/s 17 m/s updraft on exit
2252	DROP 11	23 46 74 51	winds
2300	DROP 12	23°07' 75°39'	winds TRAK E
2349	DROP 13	25°10 72°05	winds TRAK NW → G
0004	DROP 14 BT h	23 47 73 04	winds
0011	BT i	24°04' 73°30	
0021	G (1)	24-28 74 08 923 mb	
0037	DROP 15 BT k	25 13 74 58	winds
0048	DROP 16	25°47 75°34	LAST
0153	RECOVER	MIA	

(1) Inner eye 20 nmi, Outer 60
Bright stars & moon on exit

Lead Project Scientist Event Log

24-09 923
73-12 113

Date 13SEP99 **Flight** 990913I **LPS** WILLOUGHBY

Time	Event	Position	Comments
131738	T/O	MIA	
1901	AT 12 Kft	22°53', 74°59'	LF flakey
1916	IP DROP 1 GOOD	2230 7326 ~	LF sort of up with orig RIT
1930	DROP 2 GOOD	2320 7324	TRAK N → 9
1942	9 DROP 2.5	24-08 924mb 73-14	NOT TOO FAR NORTH TRAK N 9→
1957	DROP 3, BT ~~B~~	25-13 73-14	BT BAD
1959			DATA SYSTEM FROZEN
2009			DATA BACK
2012	DROP 4 PARTIAL	26°15', 73°18'	START DOWN WIND TO POINT 5
2023	BT "b" GOOD		Missed position
2034	BT "c" GOOD	24°51 7450	
2046	DROP 5	24°05', 75°33'	TRAK E → 9
2101	DROP 6	24°07', 74°26'	WINDS
2110	DROP 6.1	W eyewall	
2113	CENTER	24°18' 73°29	
2116	DROP 6.2		
2121	BT "d"	24°16', 72°52'	
2130	DROP 7 BT "e"	24°16', 72°18'	WINDS BT GOOD
2147	DROP 8 TURN DOWNWND	24°19', 71°46'	WINDS
2205	DROP 9 TRAK SE → 9	25°41 71° 52	WINDS
2219	DROP 10 BT f	25°00, 72°40'	BT GOOD

HRD GPS Dropwindsonde Scientist Log (Revised 6/1999)

Storm FLOYD
Flight Director BARRY DAMIANO
Page 1 of 2

Flight ID 990913 I
Dropwindsonde Scientists LEIGHTON / DORST
Takeoff 17:32 UTC

Mission ID WXWXA FLOYD
AVAPS Operators DALE CARPENTER
Landing 0200 UTC

Drop #	Sonde ID #	Time (UTC)	Lat (°N)	Lon (°W)	Surface Pressure (mb)	10m wind (kn)	MBL wind (kn)	BT SST (°C)	Location Comment	Comments	Ob #	
1	990415383	191635	22°25'	73°27'	993.2	—	—	—	S of G		✓ 17	GOOD
2	983410107	193007	23° 28'	73°24'	979.7	240/65	245/95	—	S of G		✓ 19	GOOD
3	983410038	194142	24°8'	73°14'	924.4	180/12	195/19	?	EYE		✓ 28	GOOD
4	990435437	195703	25°14'	73°14'					N of G			GOOD
5	990415379	201208	26°15'	73°18'					N of G			GOOD
6	990415275	204614	24°06'	75°33'					W of G			GOOD
7	990415382	210121	24°07'	74°25'					W of G			GOOD
8	990415086	211040	24°13'	73°42'					EYEWALL			GOOD
9	990415107	211625	24°17'	73°16'					EYEWALL			GOOD
10	990415376	213008	24°16'	72°16'					E of G			GOOD
11	990415381	214723	24°20'	71°4'					E of G			GOOD
12	990435438	220452	25°40'	71°52'					N of G			GOOD
13	983620684	221936	24°59'	72°40'					NE of G			GOOD
14	990845159	223238	24°34'	73°33'					EYEWALL			GOOD
15	990845157	223925	24°17'	73°59'					EYEWALL			GOOD
16	990415106	225248	23°46'	74°50'					WSW of G			GOOD
17	990415084	230832	23°57'	75°42'					SW of G			GOOD

HRD GPS Dropwindsonde Scientist Log (Revised 6/1999)

Storm FLOYD | Flight Director DAMIANO | Page 2 of 2

Flight ID 990913I | Dropwindsonde Scientists LEIGHTON / DORST | Takeoff 1732 UTC

Mission ID WXWXA FLOYD | AVAPS Operators CARPENTER | Landing 0200 UTC

Drop #	Sonde ID #	Time (UTC)	Lat (°N)	Lon (°W)	Surface Pressure (mb)	10m wind (kn)	MBL wind (kn)	BT SST (°C)	Location Comment	Comments	Ob #	
18	9849250 74	234937	23°10'	72°05'					SE of G			Good
19	990 41 5386	00 0438	23°47'	73°03'					SE of G			Good
20	9904153 85	00 2139	24°28'	74°08'			/10		EYE	923.5 mb SP		Good
21	9836206 85	003718	25°13'	74°58'					NW of G			Good
22	9836205 34	004830	25°46'	75°36'					NW of G			Good

Hurricane Research Division

AOML/NOAA
4301 Rickenbacker Causeway
Miami, FL 33149-1026
Ph: (305) 361-4400
Fx: (305) 361-44402
Hugh.WIlloughby@noaa.gov

September 23, 1999

MEMORANDUM FOR: F. D. Marks

FROM: H. E. Willoughby

SUBJECT: Flight 990913I mission summary

Planning: Flight 990913I into Hurricane Floyd was an eXtended Cylone Dynamics eXperiement (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 (Naval Postgraduate School). 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 12,000 ft.

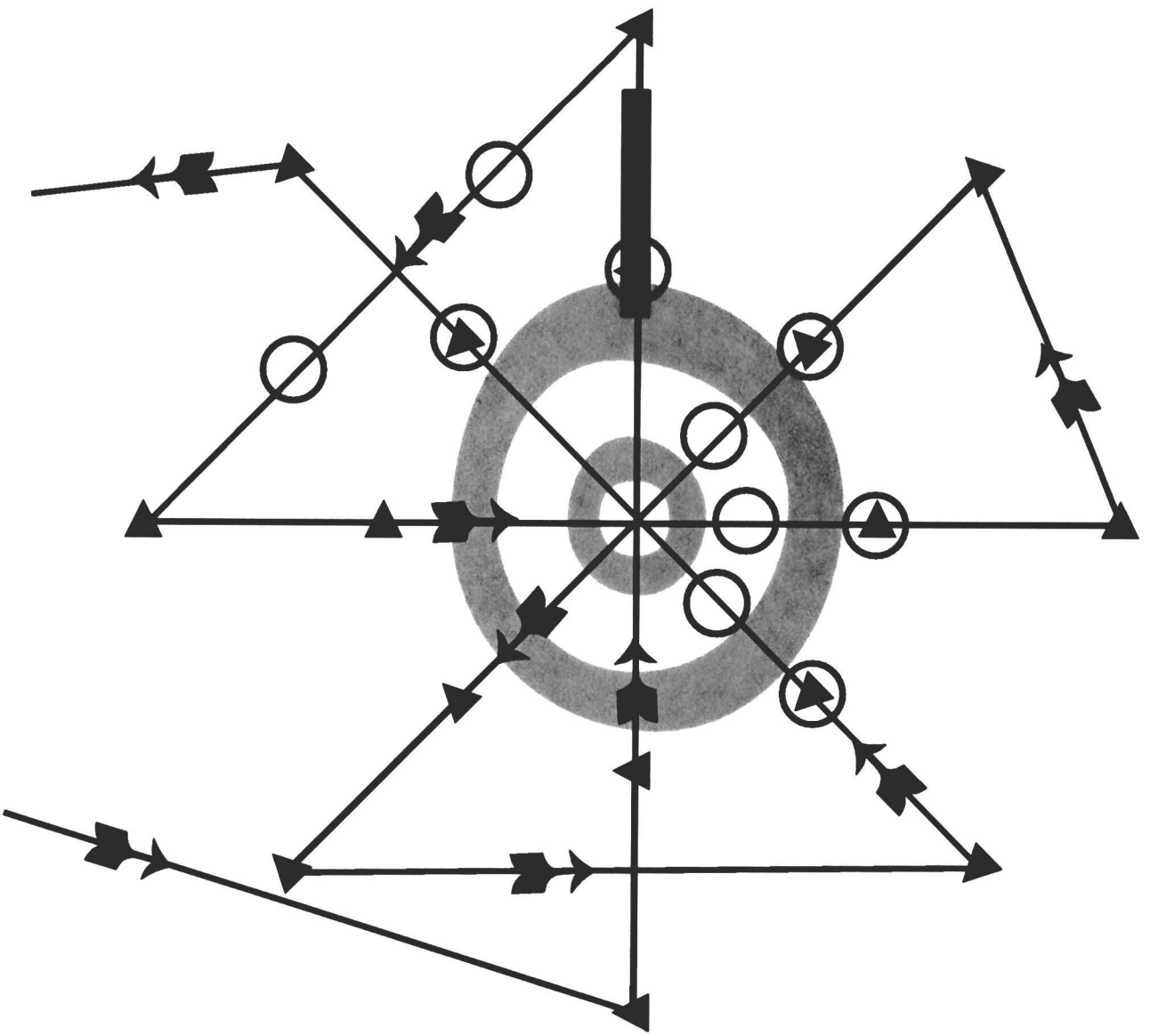
Operations: N43RF took off from Miami at 1738 UT on 13SEP99, arrived at its initial point south of the center at 1916, and approached the eye at 12,000 ft on a nominal due-north track. Because the (malfunctioning) lower fuselage radar presentation showed low reflectivity and did not provide useful guidance, 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.

Equipment: 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.

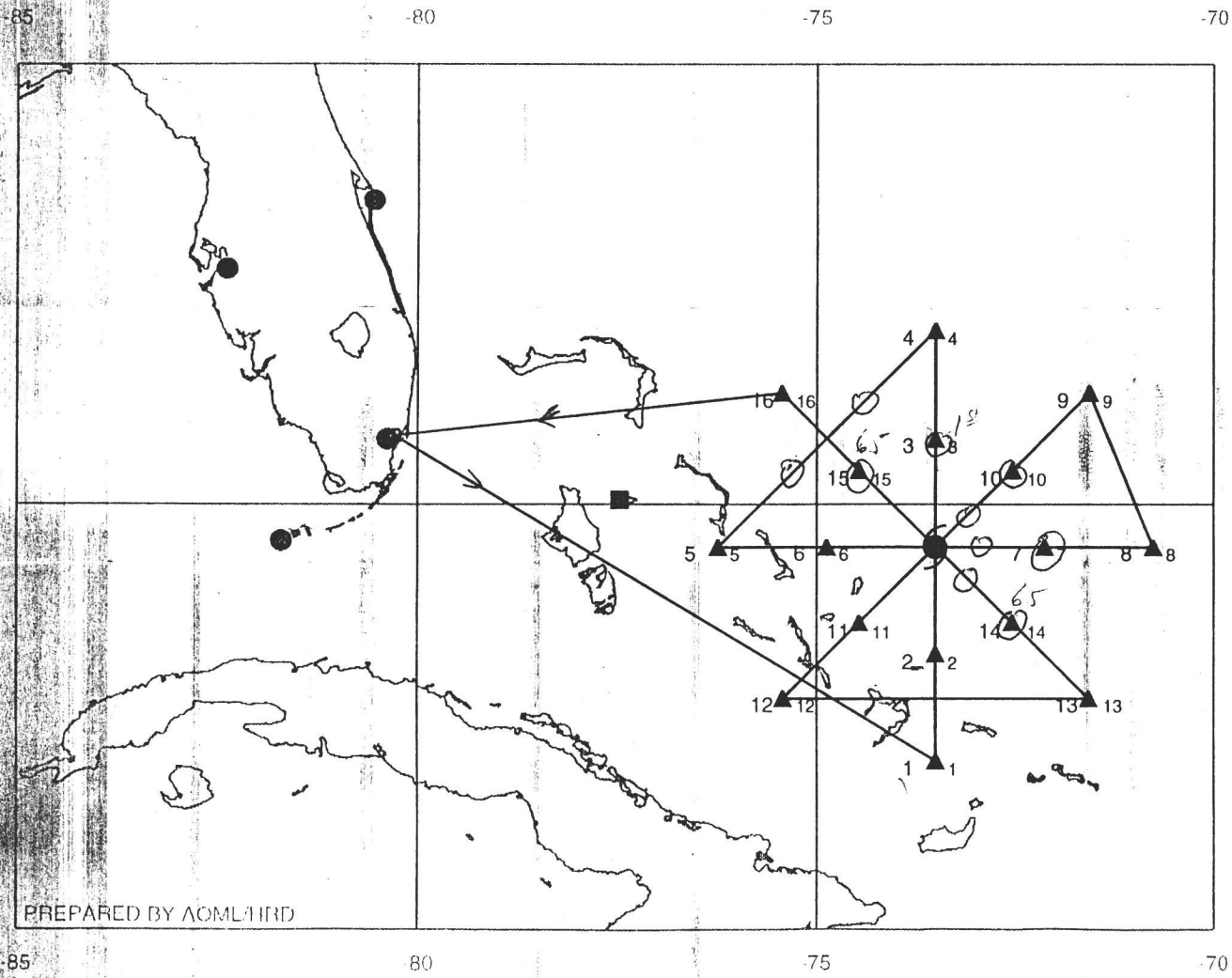
Critique: Floyd was essentially in a steady state during an eyewall replacement after an episode of rapid deepening on the previous day. Average storm motion during the flight was 11 kt toward 290° This is a unique data set, compromised by equipment problems.

FLight 9909131, Floyd
XCDX



◀ GPS Drop

○ AXBT



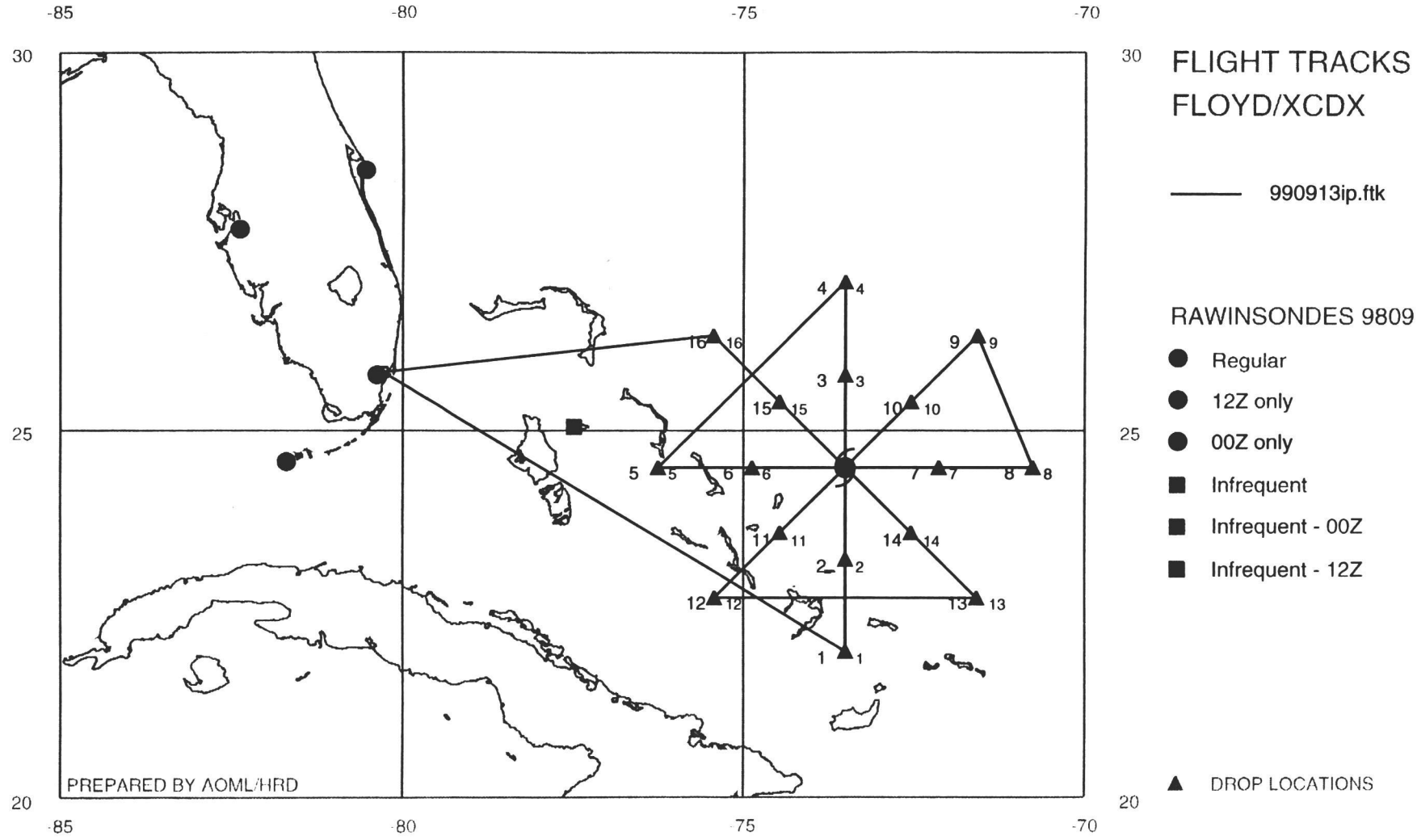
FLIGHT TRACKS
FLOYD/XCDX

990913ip.ftk

RAWINSONDES 9809

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

▲ DROP LOCATIONS



FLIGHT TRACKS
FLOYD/XCDX

990913ip.ftk

RAWINSONDES 9809

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

▲ DROP LOCATIONS