19990141I1_LPS

Mission Summary
991014I Aircraft 43RF
Reconnaissance Mission for Hurricane Irene

Scientific Crew (43RF)

Lead Scientist	J. Cione
AXBT Scientist	J. Cione
GPS Scientist	M. Black
Radar Scientists	P. Dodge

Mission Briefing:

This was an NHC-tasked reconnaissance mission into Hurricane Irene. Such missions are routinely required when Tropical Cyclones (TC) move in close proximity to Cuba. Under these conditions, the Air Force Reserves cannot conduct TC reconnaissance missions. During the 991014I mission we also made a conscious effort to obtain ocean thermal structure out ahead of the TC (predominantly to the north and east of the system) while still fulfilling our flight requirements of 21Z, 00Z and 03Z center fixes. In addition to the AXBT drops we also deployed several GPS sondes in and around areas of active convection throughout flight 991014I.

Mission Synopsis

The flight departed MacDill AFB at 1856 UTC on 10/14 and landed there at 0355 UTC, on 10/15 for a duration of 9 hours. The flight pattern consisted of a direct path to the Dry Tortugas C-MAN site (24.40N 81.50W). From there we headed SE to the IP (23.33N 80.50W). Along that leg 5 AXBTs were deployed within the relatively deep waters of the Loop Current north of Cuba. For 3 of the 5 AXBTs launched, concurrent atmospheric soundings from GPS sondes were obtained. 4/5 of the AXBTs were successful. Unfortunately the one failure was launch number one which was with a GPS comparison at the Dry Tortugas C-MAN site. After this leg we headed SW for the 21Z fix which ended up being located only a couple miles SW of Havana. The 00Z and 03Z fixes were located just off shore and north of Havana. Due to the location of the center of circulation we alternated between 105 mi. coastal patrol legs (i.e. E-W legs along northern Cuba coastline) and 'half pie slice' radial legs away from the center (see attached sketch in flight log). After our 03Z fix we headed out north and west of the circulation center 24N 84.3W. At this location we were in deeper water associated with the loop current and as such, deployed 4 AXBTs along our flight back to MacDill.

A total of 11 AXBTs, were deployed. Of these 11, SST was recorded for 10 drops (i.e. a 91% success rate). SST measurements ranged from 27.7 - 29.0C. Of the 11 drops MLDs were obtained from only 6 AXBTs (i.e. a 55% success rate). MLDs ranged from 40 – 67m. We also launched 15 GPS dropwindsondes during flight 991014I. For 4 of these GPS sondes we obtained thermal ocean structure from 4 concurrent AXBT launches. Of the 15 GPS sondes deployed, 7 measured a 10m surface wind. The maximum surface wind observed by GPS for this flight was 46kts within the west wind maxima ~20 miles north and west of the center (SFMR reported maximum surface winds ~60kts). Minimum surface pressure extrapolated from 5k ft was 988mb at 21Z. Doppler and C-band radar systems in addition to SFMR were used throughout the mission.

Problems:

There were several minor/moderate problems associated with this mission. The AXBT signal strength was noticeably weak especially when we were above 10k ft and in precipitation (inbound and outbound legs). A recommendation for future AXBT deployments is that the aircraft speed remain below 225kts and flight level should be at or below 10k ft. Under these conditions the data seems to be much less noisy and in general more reliable. Also SFMR winds illustrated a consistent 'high bias' when compared with the GPS surface winds. This may or may not have something to do with the presence of a rapidly moving loop current in this region. (It is also possible that other issues may be at play.) This problem/inconsistency should be given high priority given the obvious operational potential of SFMR. Another area of concern is with the continual/habitual failure of the GPS sondes in obtaining near-surface winds (i.e. 8/15 – a 53% failure rate). This season the GPS sondes have often not been able to obtain the average boundary layer winds and/or 10m surface winds. It is possible that a dialogue with Viasala may be necessary(?) Finally, both radar systems worked without any major problems throughout the mission.

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 10/14/99 Aircraft 43RF Flight ID 991014I

A. Participants:

HRD		AOC	
Function	Participant	Function	Participant
Lead Project Scientist	J. Cione	Flight Director	J. Parish
Cloud Physics	—	Pilots	Tennesen/Kaad
Radar	P. Dodge	Navigator	C. Newman
Workstation	P. Dodge	Systems Engineer	G. Bart
Photographer	—	Data Technician	S. McMillan
Omegasonde	M. Black	Electronics Technician	G. Gonzalez
AXBT/AXCP	J. Cione	Other	T. Lynch

Take-Off: 18:56 Location: MacDill Landing: 03:55 Location: MacDill

B. Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP	Maximum Wind

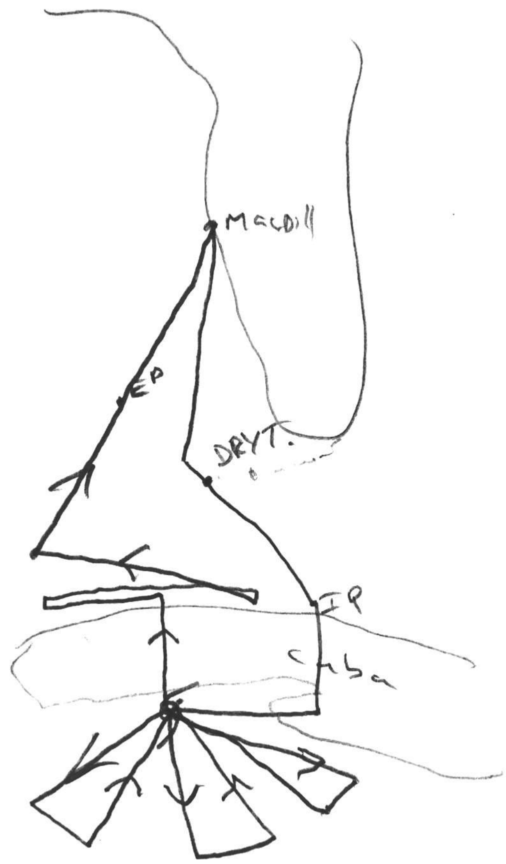
C. Mission Briefing: Reconnaissance Mission for "Hurricane" Irene. Center location is due south of Havana ~18Z 10/14

D. Equipment Status

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

REMARKS:

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

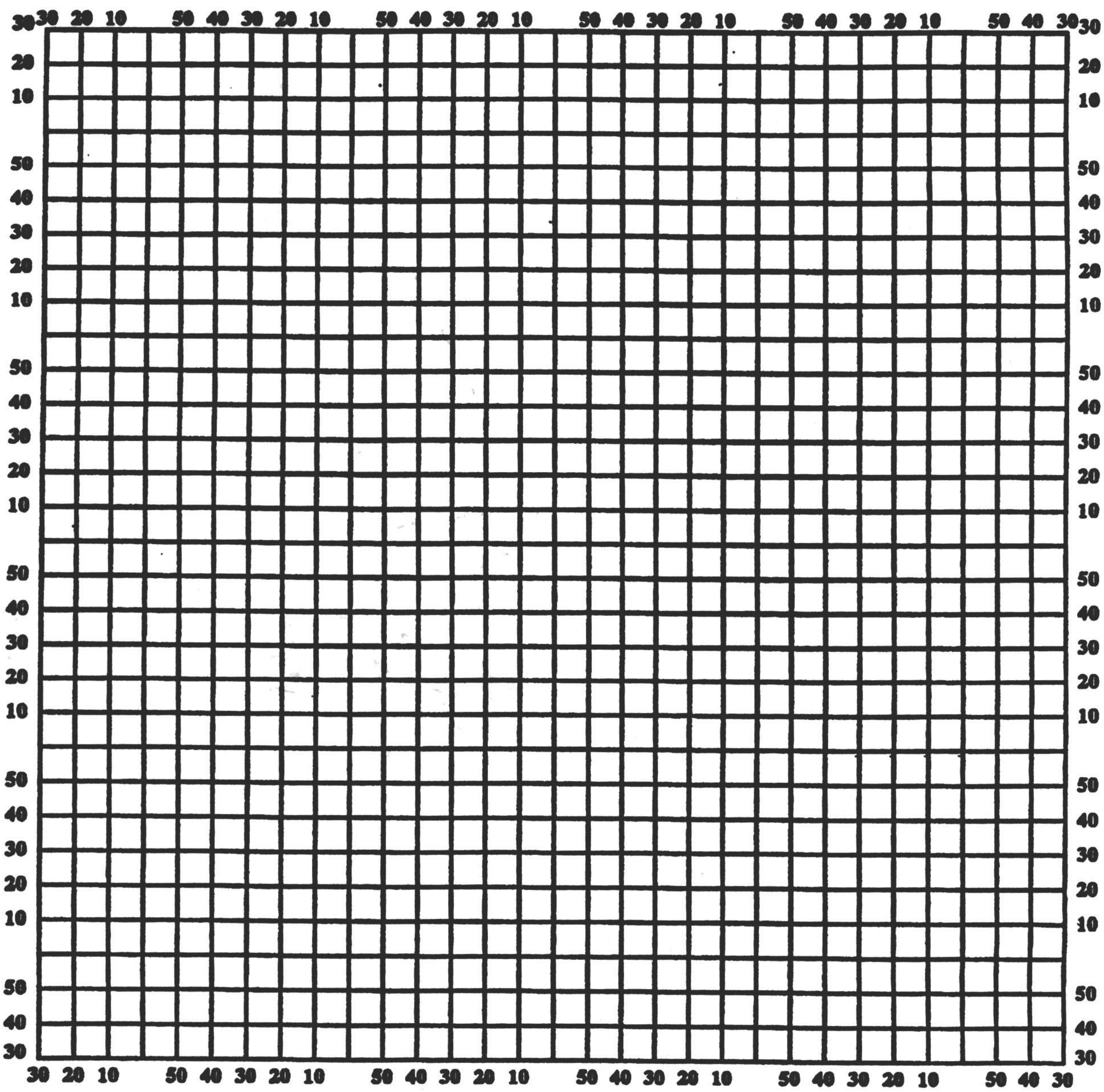


E. (II) **Actual Flight Pattern**

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 10/14/99 Flight 991014I LPS Clone

Time	Event	Position	Comments
18:56	Take-OFF	MacDill	—
19:47	Ferry to IP	25°13 82°59	all systems up + OK; ASDL ok;
19:55:24	BT1 ch16	24°40 8247	Launch SST - MLD - Dud
"	GPS1	"	Launch winds
19:59	Center estimate	2238 8225	Navigator -- from Radar
20:00:48	BT2 ch12	2421 8231	Launch SST ~27.7 MLD - X
20:07:09	BT3 ch16	24°01' 82°14'	land SST 28.1 MLD = 57m
"	GPS 2	"	land winds ✓
20:11:51	BT4 12	23 46 8201	land SST - Dud
20:15:56	BT5 16	23°34 81°51	launch SST - 28.4
NOTE:	Drops in Convection + ~13K ft wk signal?		
	May have to drop below ~@10K ft in convection		
Leg 1 over ~20:20 [5 BTs - 2 questionable; 1 out; 2 OK]			
20:34	going due East to find center		
20:54	Center fix	2302 8235	estimates from Flows
Note: we are over Cuba (~30 mi inland) Massive flooding			
21:05	going N of center, then SW, then E through center		
21:05	SFMR winds	2336 8311	~50 kts
21:47	Not center Begin E-W legs	~22°30 84°25'	will attempt Fix 2
22:07:50	Wind Max West	2306 8251	GPS drop Flow
22:10!	Center Fix 2	2309 8242	SLP 987

Not received not time on MacDill

Navy Notify

questionable receive time on of drop

2672 / 2001 184

2611 / 20 220

est ~28.5 MLD ? MLD 67

988 mb

SFMR 50 kts

U 13 K ft SPS

2242 8425

2242 8425

2214 / 2313

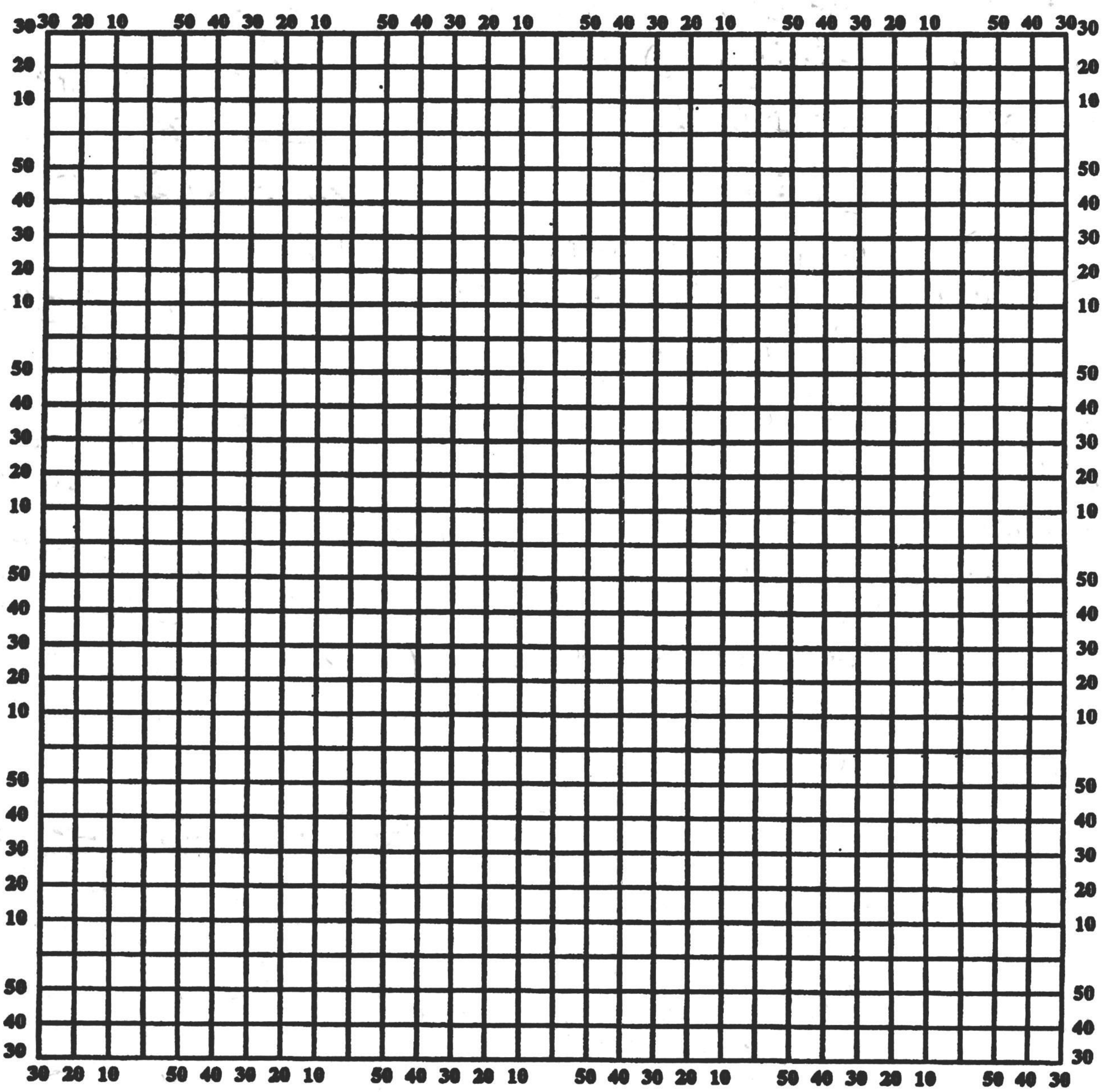
305 7 kts

2314 8224

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.

2

Lead Project Scientist Event Log

Date Oct 14 Flight 991014I LPS J Cione

Time	Event	Position	Comments
22:15:00	GPS WindMax	23°14' 82°24'	w "eyeball"
22:15:00	BT 16 (#6)	" "	drop in w eyewall — SST=28.2 MLD 60m
22:25:32	(GPS) East Rainband	2320 8139	40 DBZ Rainband
23:04:42	GPS/Buoy Drop	2440 8103	SMKF1 Sombrero Key Marathon
23:05	Begin SW track for Penetration 3		
23:22:15	Missed/Backup BT #7	2354 8205	#4 was Bad; redo — SST=28.6 MLD ~45
"	also did sonde	"	Sonde/BT combo — Noisy but ok
233211	NE "eyewall GPS	2326 8240	max Fl lev — Bad
23:38:00	3rd Fix	2328 8245	Disorganized
23:44:45	GPS	2326 8248	←
235320	GPS NW	2358 8254	NW leg (N of Center)
00:40	Begin Fix leg 4 SE		
NOTE	Storm fully apart, slow	Drift + even SW track!	
Something	has really	affected structure	
01:06	Fix 4	2301 8239	Very tough center to find 988 SE move
01:00	SFMR Max V	—	~50Kts 20mi
0135	GPS	2405 8109	large convective
02:01:07	GPS win/max	2341 8130	SFMR 67Kts & PP? 53Kts
02:20	Fix 5	2304 8231	on beach — 28.6
02:46:20	BT 8 (EW 26)	2359 8417	NE leg here SST MLD
02:52:50	BT 9 (12)	2427 8406	SST=28.5 MLD=40 — SST 28.5 MLD=40

26=20 · 28 · MLD=?

Lead Project Scientist Event Log

Date ____________________ Flight ____________________ LPS ____________________

Time	Event	Position	Comments

③

Lead Project Scientist Event Log

Date 10/14/99 Flight 991014I LPS Clone

Time	Event	Position	Comments
0258:11	BT10	24 50 8357	SST ? very noisy
03:04:52	BT11	25 18 8344	last SST=30.2
NOTE	: 10K ft	level max	220Kts max

shallow

SST≈29

Salvagable

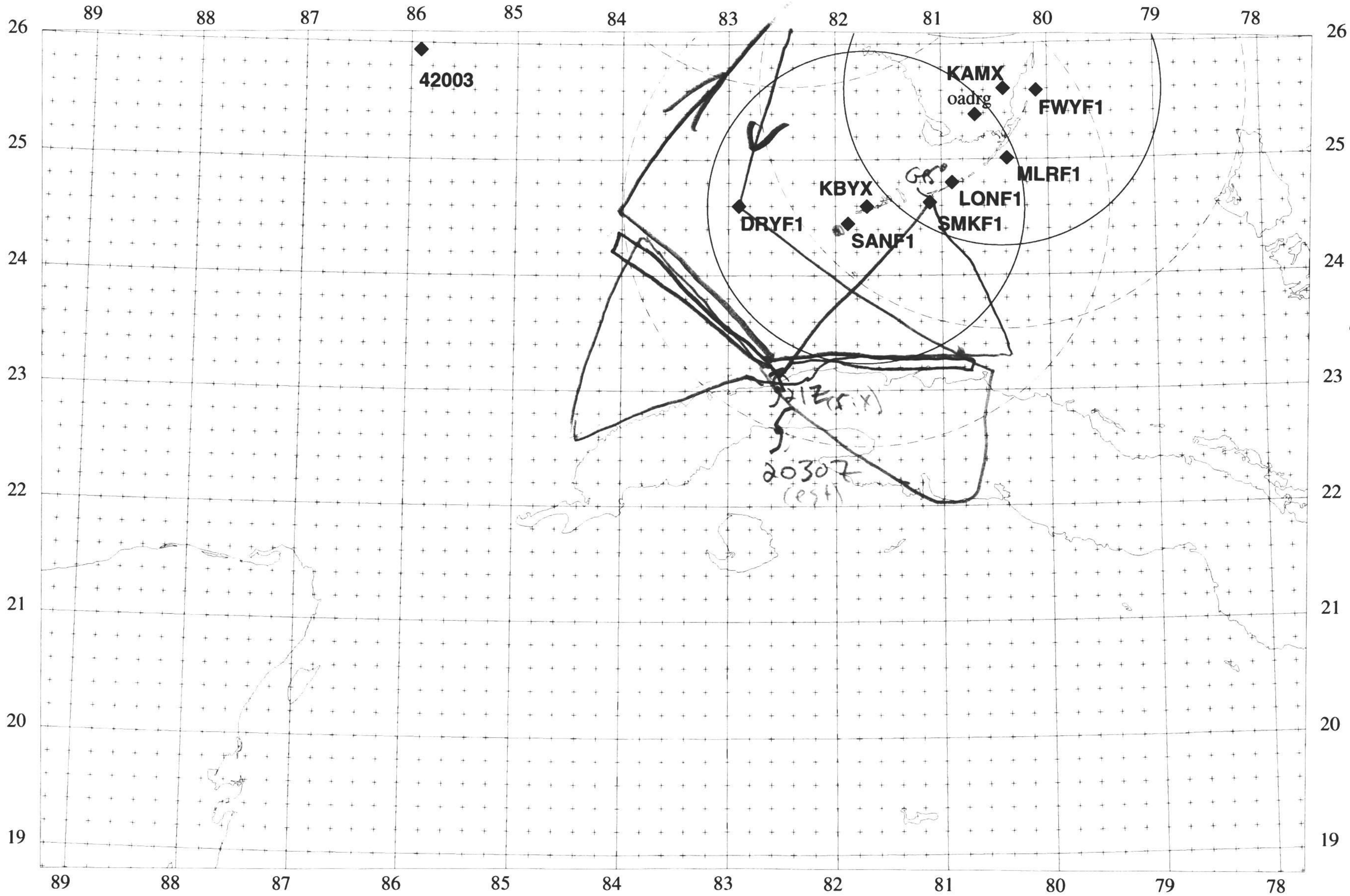
and cloud

27.9

MLD~40

~75m

Depth

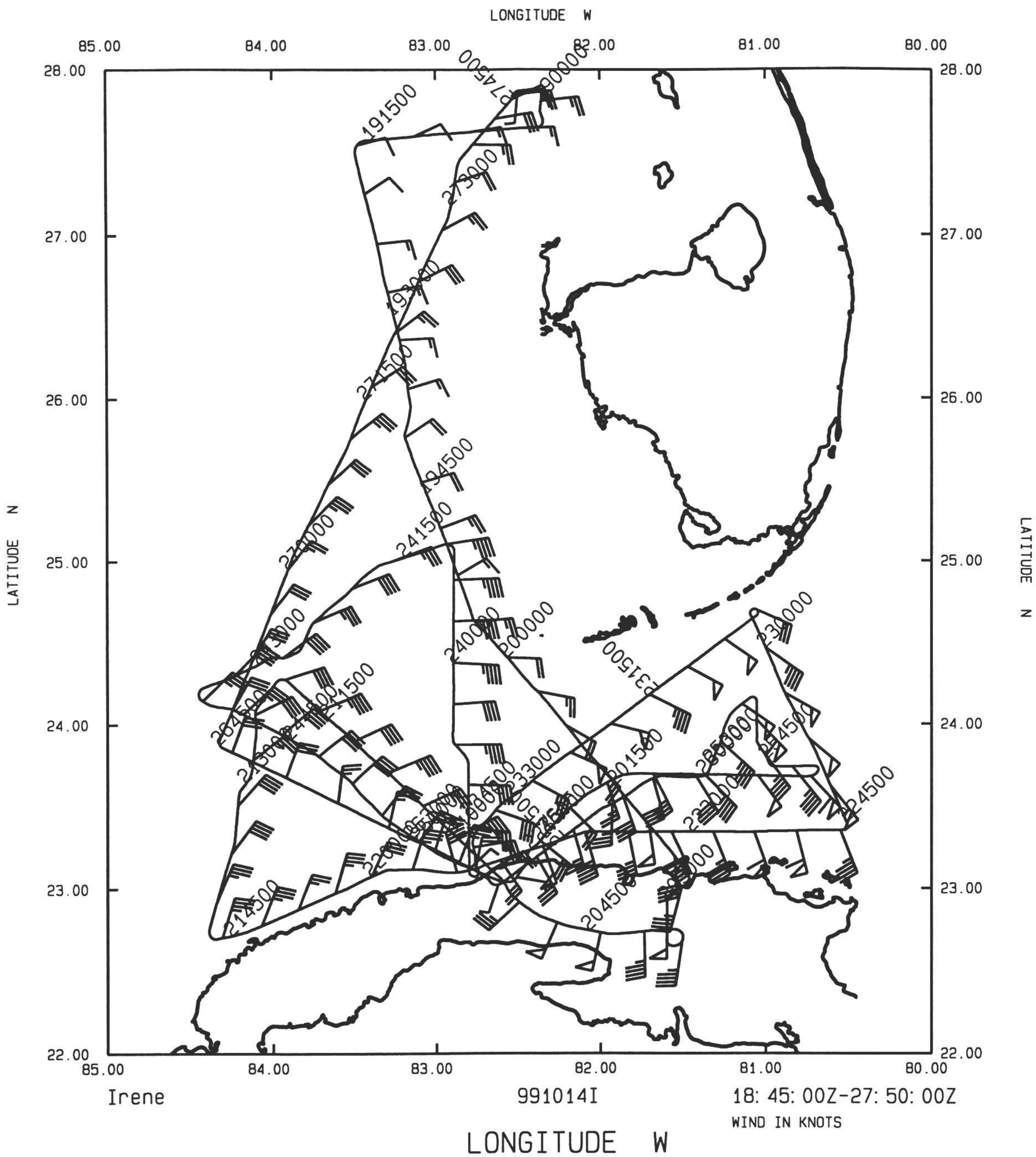


5

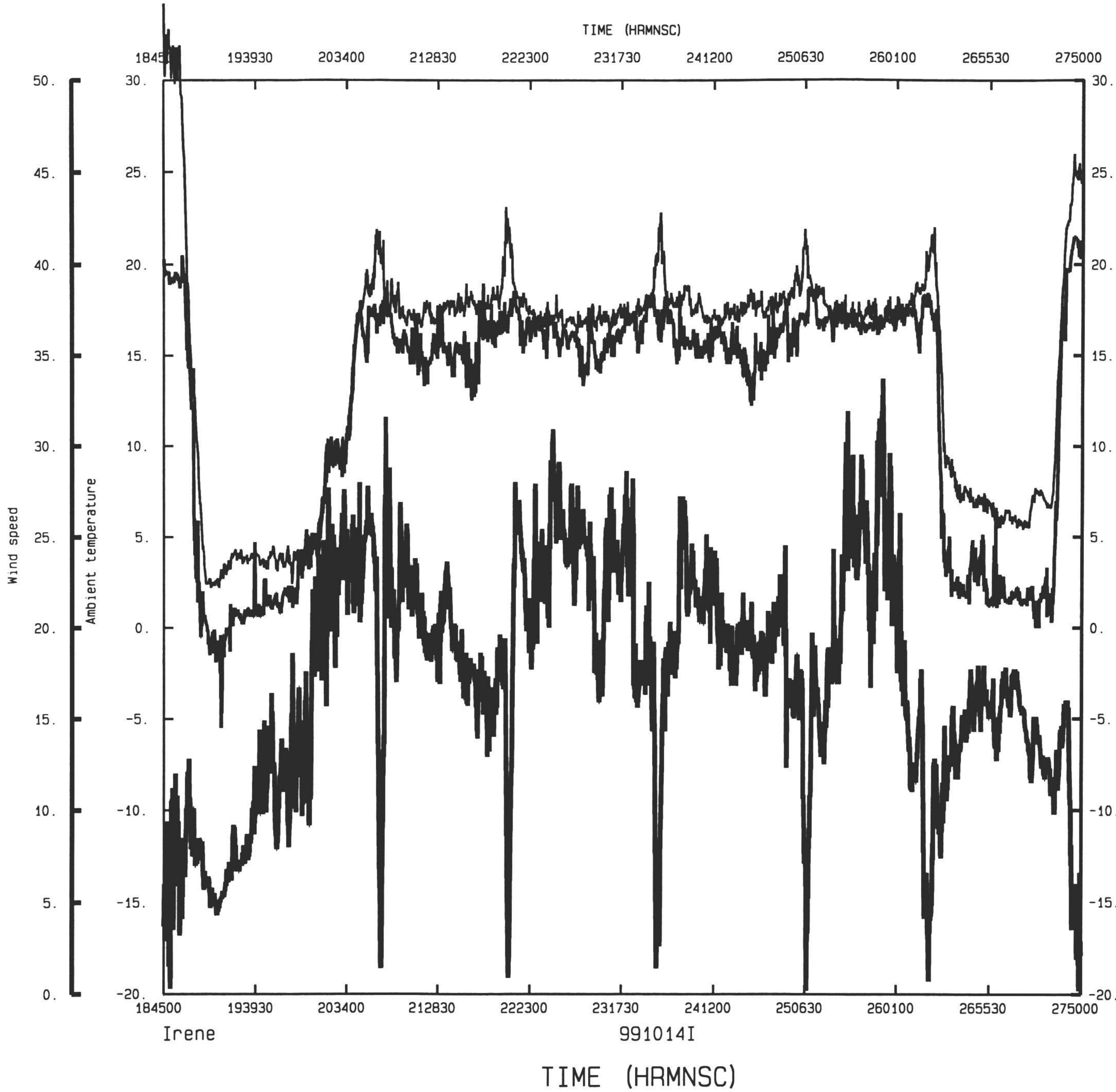
0 100 200 km

230 km range rings
150 km haze rings

Center Lat: 22.50 Lon: -83.50

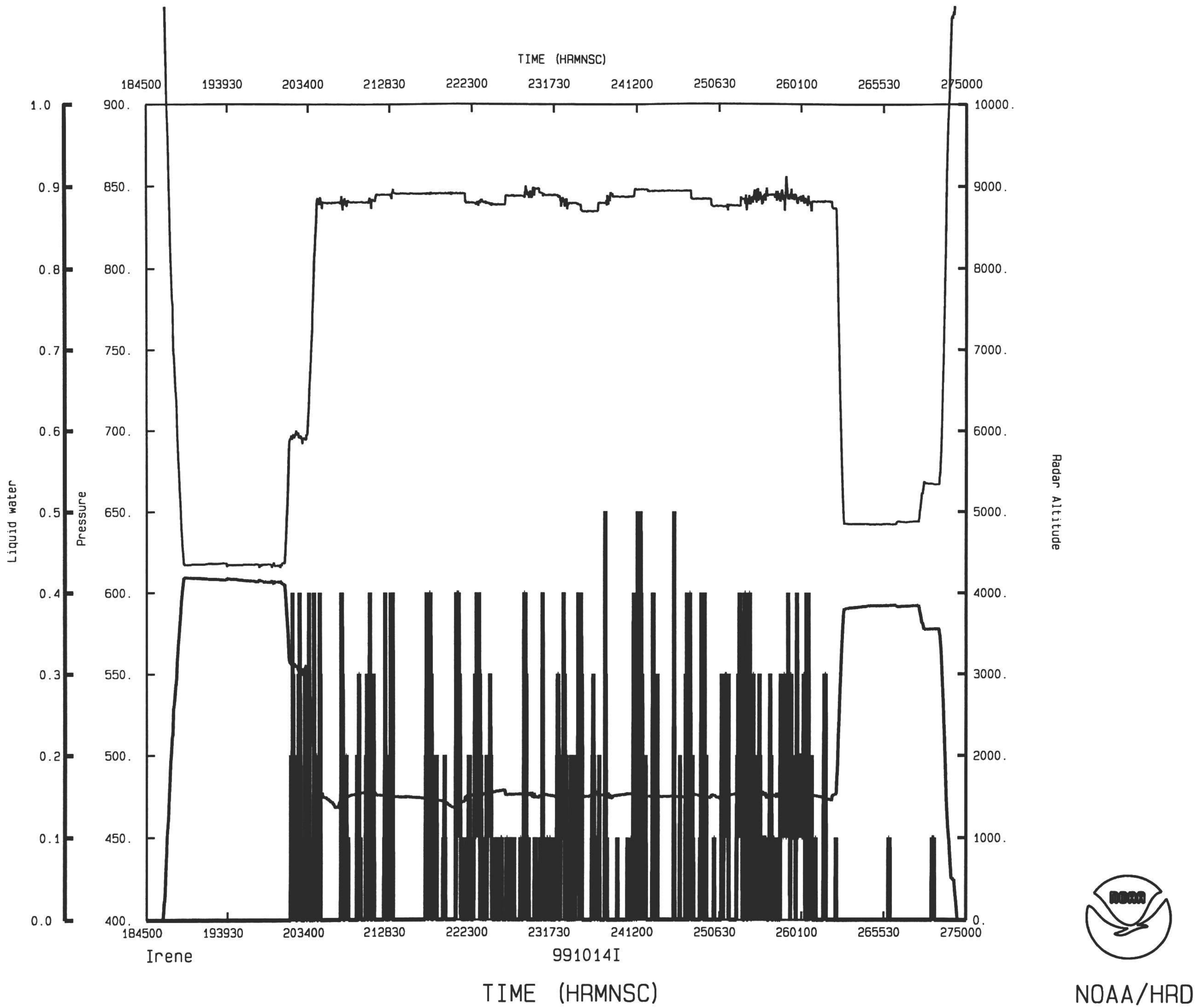


LONGITUDE W
85.00
84.00
83.00
82.00
81.00
80.00
28.00
27.00
26.00
25.00
24.00
23.00
22.00
LATITUDE N
Irene
991014I
18: 45: 00Z-27: 50: 00Z
WIND IN KNOTS
LONGITUDE W



TIME (HRMNSC)
184500
193930
203400
212830
222300
231730
241200
250630
260100
265530
275000
Wind speed
Ambient temperature
Dew point
Irene
991014I
TIME (HRMNSC)

NOAA/HRD



TIME (HRMNSC)
184500
193930
203400
212830
222300
231730
241200
250630
260100
265530
275000
Liquid water
Pressure
Radar Altitude
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
900.
850.
800.
750.
700.
650.
600.
550.
500.
450.
400.
10000.
9000.
8000.
7000.
6000.
5000.
4000.
3000.
2000.
1000.
0.
Irene
991014I
TIME (HRMNSC)
NOAA/HRD