19980928H1_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 SEP 27, 1998 Aircraft N42RF Flight ID 980928H1

A. Participants:

HRD		AOC	
Function	Participant	Function	Participant
Lead Project Scientist	GAMACHE	Flight Director	CZY ZYK
Cloud Physics		Pilots	PHILLIPS, KENDALL
Radar	LEIGHTON	Navigator	TORREY RATHBUN
Workstation	LEIGHTON	Systems Engineer	MACMILLAN
Photographer/Observer	WILLOUGHBY	Data Technician	YOUNG, FENTERS
Omegasonde	LANDSEA/WILLOUGHBY	Electronics Technician	CARPENTER, DELGADO
AXBT/AXCP/Guest	CECIL	Other	

Take-Off: 3073 Location: TAMPA

Landing: 0114Z Location: TAMPA

Number of Eye Penetrations: 8

B. Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP	Maximum Wind
27/21Z	29.0	88.5		95 kts
28/6Z	29.5	89.1		95 kts
28/18	30.0	89.6		95 kts
29/18	31.0	89.6		45 kts inland

C. Mission Briefing:

D. Equipment Status (Up, Down, Not Available, Not Used)

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

REMARKS:

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

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

Lead Project Scientist Event Log

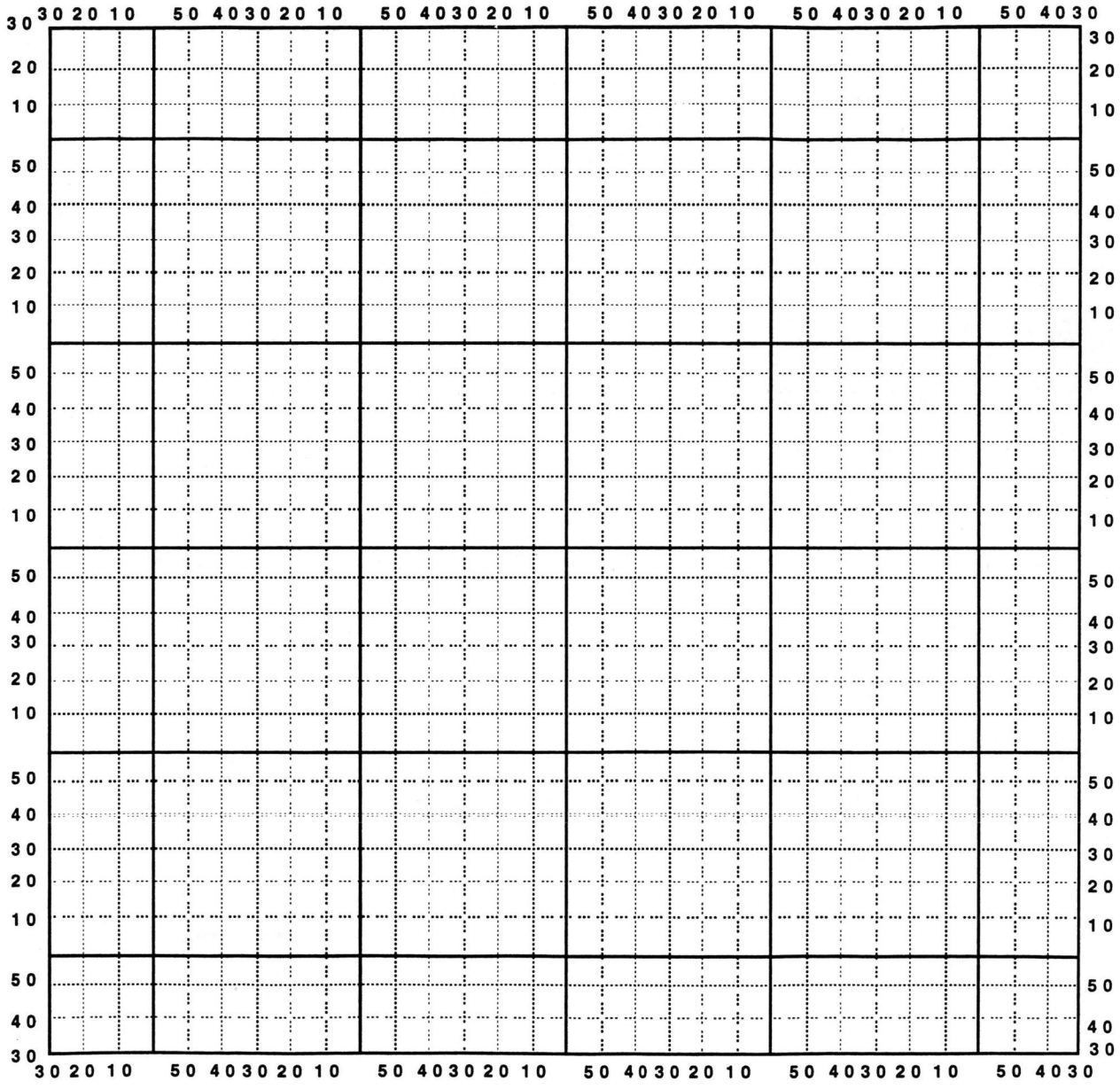
Date SEP 28, 1998 Flight 980928H1 LPS GAMACHE (WILLOUGHBY)

Time	Event	Position	Comments
030713	T/O	MACDILL	
033637	DROP OVER BUOY 42036 (1)	28°30' 84°32'	GPS DROP
035408	DROP OVER BUOY 42039 (2)	28°49' 86°3'	GPS & BT 27.3°C
042327	DROP OVER 42040	29°12' 88°15'	GPS & BT & BT GOOD SONDE 26.0
043113	GPS DROP at 6		WINDS AT 38 SEC
0431	6	29°36.8 88°38.1	3 kts
044830	GPS DROP (4)	29°18 90°3'	WINDS G-OD
050348	TURN (5)	29°18' 91°18'	END OF WEST RUN
050518	GPS DROP (5)	29°12' 91°15'	GOOD WINDS DROP AT END OF W. RUN
052315	GPS DROP (6)	28°45' 89°37'	
054502	GPS & BT (7)	29°2' 87°39'	SST 25.6°C
055817	EYEWALL DROP	29°33' 88°30'	
055844	EYEWALL DROP	29°35' 88°33'	
062041	LAKE PONCH	30°3' 89°56'	
063200	DROP GRANDISLE	29°17' 89°57'	
063948	(11) DROPSW of 6	29°4' 89°26'	
065816	EYEWALL DROP	30°11' 88°31'	NO WINDS
07???	EYEWALL DROP	~ 30°24' 88°22'	
071927	LAKE PONCHETRAIN	30°15' 89°56'	
072854	W Eyewall Drop	30°3' 89°10'	only about 50 kts at flight level
073407	6 & GPS Drop	~ 30°2' 88°42'	

Hurricane Recco Plotting Chart

True at 25° Latitude, in Degrees and Minutes

Date _____ Flight ID _____ LPS _____.



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

Lead Project Scientist Event Log

Date SEP 28, 1998 Flight 980928H1 LPS GAMACHE

Time	Event	Position	Comments
073319	Eyewall drop	29 48 8824	
074107	" "	29°42' 88°18'	
075935	GPS DROP	29°2' 87°14'	
080808	SONDE & BT	29°40' 86°58'	SONDE NO GOOD 27.3
081050	SONDE	29°52' 86°40'	REPLACEMENT SONDE
081619	SONDE	30°5' 86°14'	NEAR EGLIN
082823	SONDE	30°11' 87°1'	ALONG COAST
084030	SONDE		ALONG COAST
0850	G	30°12' 88°49'	
085340	SONDE (PROFILER)	30°10' 89°6'	PROFILER COMPARISON
090230	TURN	30°4' 89°45'	TURN BACK TO N
091350	G & DROP	~30°14' 88°48'	
0914	G	30°14.4' 88°50.5'	
091830	DROP (eyewall)	30°13' 88°3'	
092030	DROP (eyewall)		
093338	DROP IN BAND	30°1' 87°26'	
094406	DROP IN BAND	30°10' 88°96'	
101012	G	30°19.4' 88°54.4'	Good presentation
1054	SONDE & BT	29°21 85°46'	HOPE THIS WAS A
			SPOT WHERE
			GEORGES WAS

1142 LANDING MAC DILL

Lead Project Scientist Event Log

Date ____________________ Flight ____________________ LPS ____________________

Time	Event	Position	Comments

Lead Project Scientist Event Log

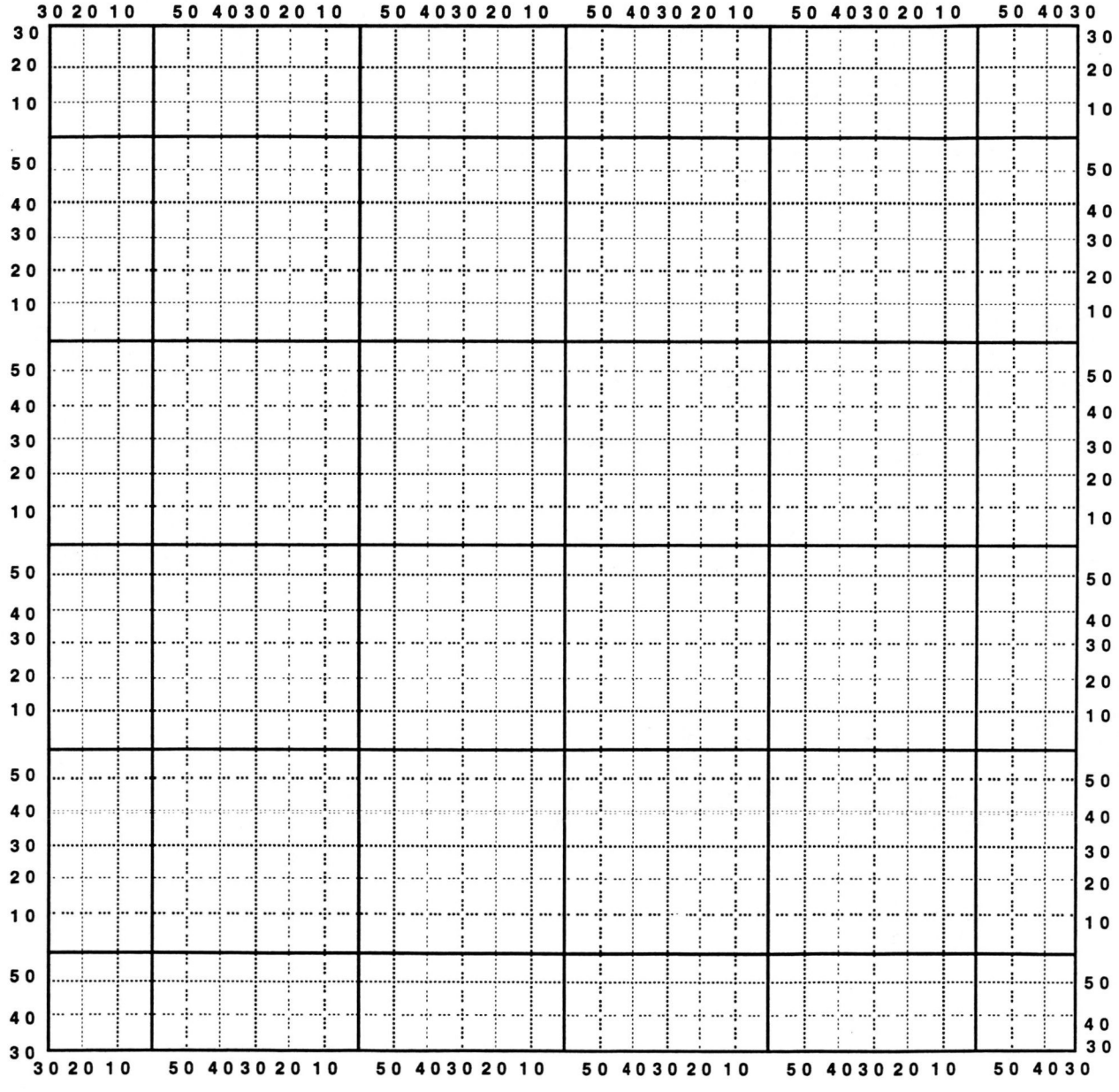
Date ____________________ Flight ____________________ LPS ____________________

Time	Event	Position	Comments

Hurricane Recco Plotting Chart

True at 25° Latitude, in Degrees and Minutes

Date _____ Flight ID _____ LPS _____.



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

Mission Summary
Hurricane Georges - Winds at Landfall

980928H Aircraft N42RF

Scientific Crew (N42RF)

Chief Scientist	John Gamache
Observer	Hugh Willoughby
Flight Meteorologist	Stan Czyzyk
Doppler Scientist	Paul Leighton
Workstation	Paul Leighton
Dropwindsonde	Chris Landsea
AXBT	Dan Cecil (Texas A&M)
Cloud Physics	Dale Carpenter (AOC)

Mission Briefing:

At mission planning time, Hurricane Georges was officially a category 2 hurricane bearing down on the Gulf coast, with New Orleans a possible target. HRD wind analyses suggested, however, that the storm had maximum surface winds of about 75 knots, and thus was a category 1 storm. WSR-88D radar composite loops immediately before take-off indicated that the hurricane no longer had a closed radar eye, but instead was open to the southwest. Little precipitation was evident to the west of the eyewall. Previous reconnaissance flights suggested that the strongest wind would be found well to the east (~100 nm) of the hurricane center.

The mission selection was a Winds at Landfall experiment, and the flight was expected to be about 9 hours long. Take-off was scheduled for 0300 UTC, 28 September, or 2300 EDT, 27 September, from MacDill Air Force Base in Tampa, Florida.

The expected flight plan began with, N42RF flying over buoys located to the east of the center, then a pass through the center, followed by a flight leg over to 91°W, or about 100 nm to the west of the expected center location. N42RF would then fly to a position 75 nm approximately SE and then SW of the storm center, before beginning a "figure 4" pattern that was also lined up approximately along radials to both Slidell and Mobile WSR-88D Doppler radar sites. After the Figure 4 the aircraft would do one more radial outward from Slidell, fly 100 nm to the SE of the storm center and set up on a radial to the Doppler radar at Eglin Air Force Base, Florida. This would be followed by a coastal survey during which several drops would be done, including near a portable profiler station. Several more radials centered on Slidell, were planned, followed by a southern route back to MacDill. During the mission 6 Airborne Expendable Bathythermographs (AXBT's) were to be dispatched to measure the sea-surface temperature under Georges.

Mission Synopsis:

Figure 1 shows the flight track for the on station portion of the flight. N42RF departed MacDill Air Force Base at 030713 UTC. During its ferry to the storm center it dropped sondes and AXBT's over buoys 42039 and 42040. It then fixed the center at 0431 UTC at 29.61°N, 88.64°W, where it dropped a sonde that showed a central pressure of 960 mb. It then headed westward to 29.3°N, 91.3°W, essentially along the coast. The turning point represents the point furthest west in the flight. Flight-level winds on this side were 35 kts.

The aircraft then proceeded to the points 75 nm SW and SE of the storm center. At the point SE an AXBT indicated a sea-surface temperature (SST) of 25.6°C. N42RF then passed through the center on a NW track to the Slidell WSR-88D site. This was also the first of the 2 EVTD Doppler runs, so the tail radar was scanned in perpendicular continuous mode. From there it flew south after dropping a sonde in Lake Ponchertrain. On this pass and throughout the night the lights of New Orleans could be seen. The plane proceeded south, dropping a sonde near a C-MAN station. As it lined up to begin its NE EVTD run (see

Figure 2 for display of EVTD winds at 1-km level) N42RF also dropped a sonde near the BURL1 C-MAN station. Again the tail radar was operated in continuous perpendicular scanning as it flew on a radial toward the Mobile WSR-88D site. The plane turned left flew along the coast, and again turned at Slidell, dropping another sonde into Lake Ponchertrain.

The center was then fixed for the second time at 0734 UTC at a position of 30.03°N, 88.7°W, and the dropsonde showed a surface pressure of 959 mb. The plane then proceeded to a point about 100 nm to the SE of the storm center, where an AXBT revealed an SST of 27.3°C. N42RF then flew approximately along a radial toward Eglin Air Force Base, proceeding to a point nearly directly over the coast. The convection here, at a position nearly 200 nm from the storm center, was the most intense. The rainband consisted of a series of high reflectivity cells, and observations indicated fairly strong vorticity along the line. The pilots had to pick their way through the convection until they reached Pensacola, Florida. From there eastward the flight was less choppy. It was decided to make four runs along the coast (2 round trips) between Pensacola and Slidell to map the winds along the coast and near the storm center, since the storm center was nearly over the coast. During the seventh pass through the storm center (last westward pass) the center was fixed and the last eye sounding done. The sonde showed a surface pressure of 961 mb, and the center was 30.23°N, 88.84°W. The radar structure during the last pass through the storm center is shown in Figure 3.

During the passage from Pensacola to MacDill on the way back, the aircraft had to pass through the convective rainband. Flight-level winds just to the west were 35 kts while just to the east they were measured at over 70 kts. The aircraft landed at MacDill at 1142 UTC, for a total flight time of 8 hours, 35 minutes. Dropsonde winds available at 925 mb are shown in Figure 4.

Evaluation:

The mission appears to have been highly successful, mapping the winds near landfall, using airborne and WSR-88D Doppler radars, and portable profilers and ground-based Doppler radars. Thirty-four sondes were also dropped, helping to map the winds in the eyewall, as well as document the vertical structure of the boundary-layer winds along the coast, for comparison with C-Man and buoy observations. The airborne Doppler radar appeared to work perfectly, and an EVTD wind analysis was radioed back to the hurricane center, showing the winds out to about 70 km from the storm center. There will also be some close-up Doppler observations of the intense cells in the convective rainband well to the east of storm center. Finally the flight was able to accompany the storm center right to the coast line before ending its mission. The passes back and forth along the coast line should provide a continuous Doppler mapping of the winds.

Problems:

1) Three GPS dropsondes worked poorly enough not to transmit the data back to the hurricane center. The other 31 were worked up and sent out.

John Gamache
5 October 1998

Flight points

Point	Time	Position	Comments
T/O	030713 UTC	MacDill AFB	
1	033637 UTC	28° 30°N, 84° 32°W	Buoy 42036
2	035408 UTC	28° 49°N, 86° 02°W	Buoy 42039
3	042327 UTC	29° 12°N, 88° 14°W	Buoy 42040
4	043100 UTC	29° 37°N, 88° 38°W	eye fix (4 kts)
5	044830 UTC	29° 18°N, 90° 03°W	
6	050348 UTC	29° 12°N, 91° 15°W	Westernmost portion of flight
7	050518 UTC	29° 13°N, 91° 16°W	
8	052315 UTC	28° 45°N, 89° 37°W	
9	054503 UTC	29° 2°N, 87° 39°W	
10	060240 UTC	29° 43°N, 88° 45°W	CPA to hurricane center (25 kts)
11	062000 UTC	30° 13°N, 89° 56°W	Slidell/Lake Ponchetrain
12	063200 UTC	29° 17°N, 89° 57°W	Grand Isle C-MAN
13	063948 UTC	29° 4°N, 89° 26°W	
14	065420 UTC	29° 57°N, 88° 43°W	CPA to hurricane center (9 kts)
15	070150 UTC	30° 24°N, 88° 22°W	
16	071927 UTC	30° 15°N, 89° 56°W	Slidell/Lake Ponchetrain
17	073407 UTC	30° 02°N, 88° 42°W	eye fix (4 kts)
18	075730 UTC	28° 52°N, 87° 24°W	Beginning of Eglin radar radial
19	081740 UTC	30° 16°N, 86° 14°W	End of Eglin radar radial (conv. Rainband)
20	085030 UTC	30° 11°N, 88° 50°W	eye fix (5 kts)
21	090200 UTC	30° 07°N, 89° 47°W	West end of coastal run
22	091350 UTC	30° 14°N, 88° 48°W	eye fix (2 kts)
23	093150 UTC	30° 11°N, 87° 17°W	easternmost point of coastal run
24	095210 UTC	30° 10°N, 88° 51°W	CPA to hurricane center (22 kts)
25	100230 UTC	30° 12°N, 89° 39°W	westernmost point of coastal run
26	101200 UTC	30° 19°N, 88° 54°W	eye fix (5 kts)
27	103340 UTC	30° 01°N, 87° 09W	easternmost point of coastal run (climb home)
Land	114200 UTC	MacDill AFB	

GPS Sonde Drops

Drop	Sonde ID	Time	Position		comments
1	981820039	033640	28.50	84.50	Eye Drop
2	982630092	035408	28.82	86.03	AXBT 27.3 C
3	981130033	042327	29.19	88.25	SE eyewall
4	983310085	043109	29.62	88.64	Eye
5	981820005	044826	29.30	90.03	
6	981830005	050511	29.21	91.27	
7	982720417	052318	28.76	84.62	Eye Drop
8	974530097	054502	29.03	87.62	Rainband
9	982720415	055821	29.55	88.49	SE Eyewall
10	982710019	055840	29.58	88.54	SE Eyewall
11	984510077	062051	30.24	84.93	
12	981830020	063159	29.29	89.95	
13	982720413	063943	29.07	89.44	
14	981750006	065819	30.19	88.53	NE Eyewall (bad winds)
15	981820029	070117	30.35	88.38	NE Eyewall
16	982720291	071927	30.25	89.94	
17	982010108	072854	30.06	89.17	W Eyewall (bad winds)
18	983310137	073402	30.03	88.70	Eye
19	982720314	075959	29.04	87.25	
20	982720369	073914	29.80	88.41	E eyewall
21	983310002	074105	29.71	88.31	E eyewall
22	983310035	080808	?	?	Rainband (bad winds)
23	981740040	081050	29.85	86.67	Rainband
24	982010058	081619	30.17	86.29	
25	982720315	082813	30.19	87.00	
26	982720396	084030	30.19	88.00	
27	982720394	085353	30.17	89.11	W eyewall
28	983310017	091347	30.24	88.83	Eye
29	983310030	091829	30.22	88.41	E eyewall
30	983310101	092021	30.22	88.25	E eyewall
31	983310072	093330	30.16	87.40	Rainband
32	983310026	094359	30.17	88.24	E eyewall
33	983310044	095513	30.17	89.10	W eyewall
34	983310079	105326	29.37	85.79	Far to east with AXBT

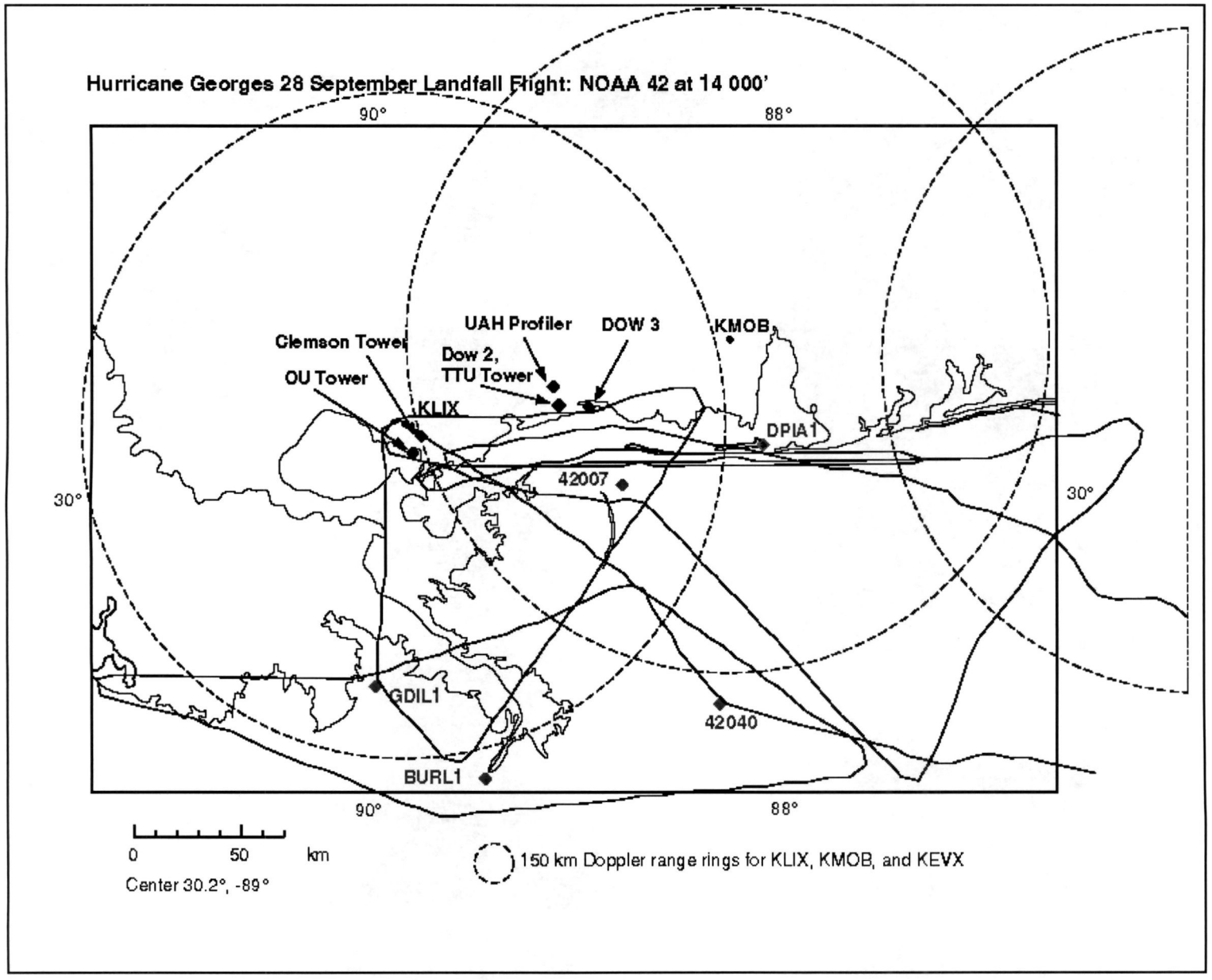

Hurricane Georges 28 September Landfall Flight: NOAA 42 at 14 000'
90°
88°
30°
UAH Profiler
DOW 3
KMOB
Clemson Tower
Dow 2,
TTU Tower
OU Tower
KLIX
DPIA1
42007
GDIL1
42040
BURL1
0
50
km
Center 30.2°, -89°
150 km Doppler range rings for KLIX, KMOB, and KEVX

Figure 1

Figure 2

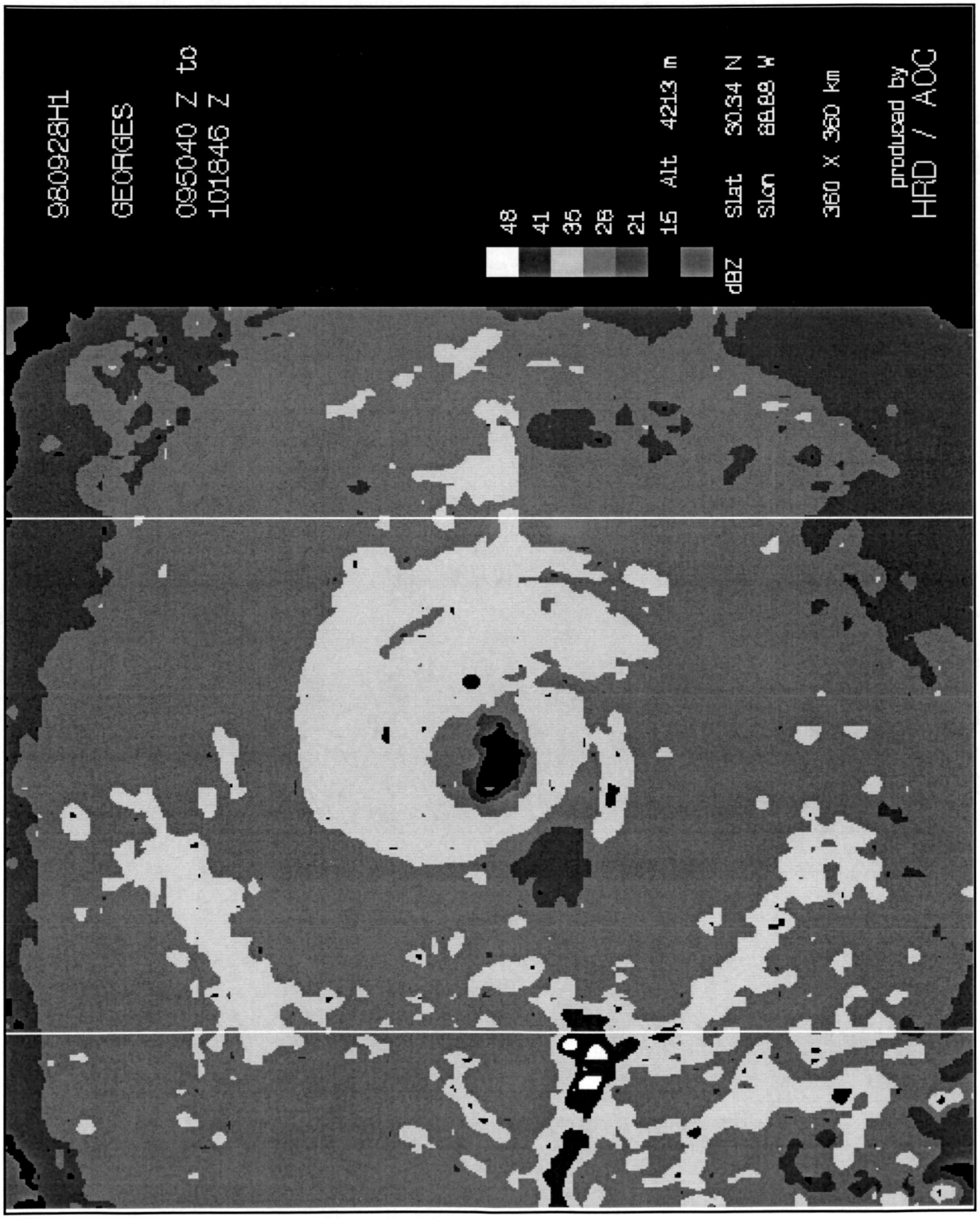
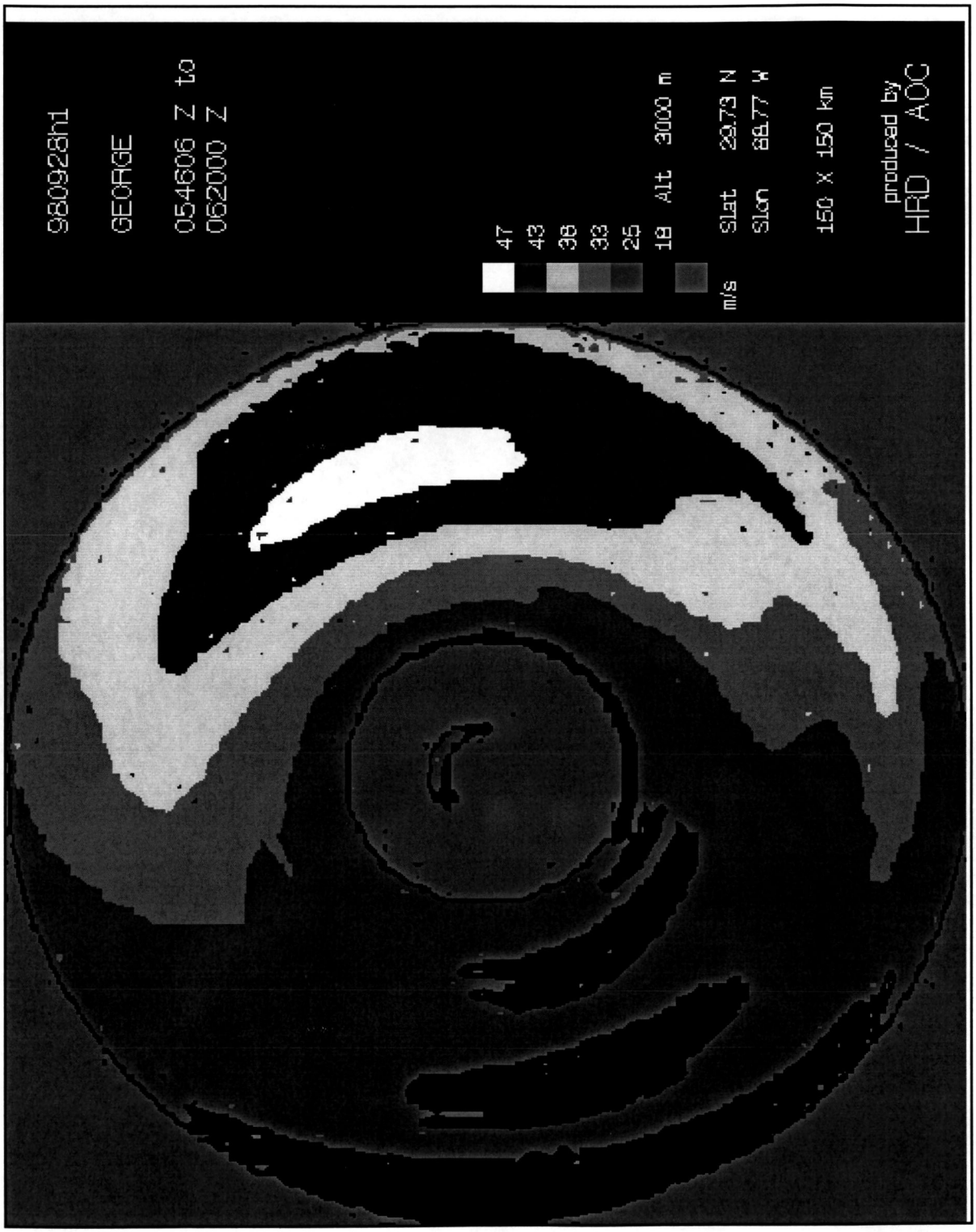

980928H1
GEORGES
095040 Z to
101846 Z
48
41
35
28
21
15 Alt 4213 m
dBZ Slat 30.34 N
Slon 88.88 W
360 X 360 km
produced by
HRD / AOC

Figure 3


980928h1
GEORGE
054606 Z to
062000 Z
47
43
38
33
25
18 Alt 3000 m
m/s
Slat 29.73 N
Slon 88.77 W
150 X 150 km
produced by
HRD / AOC

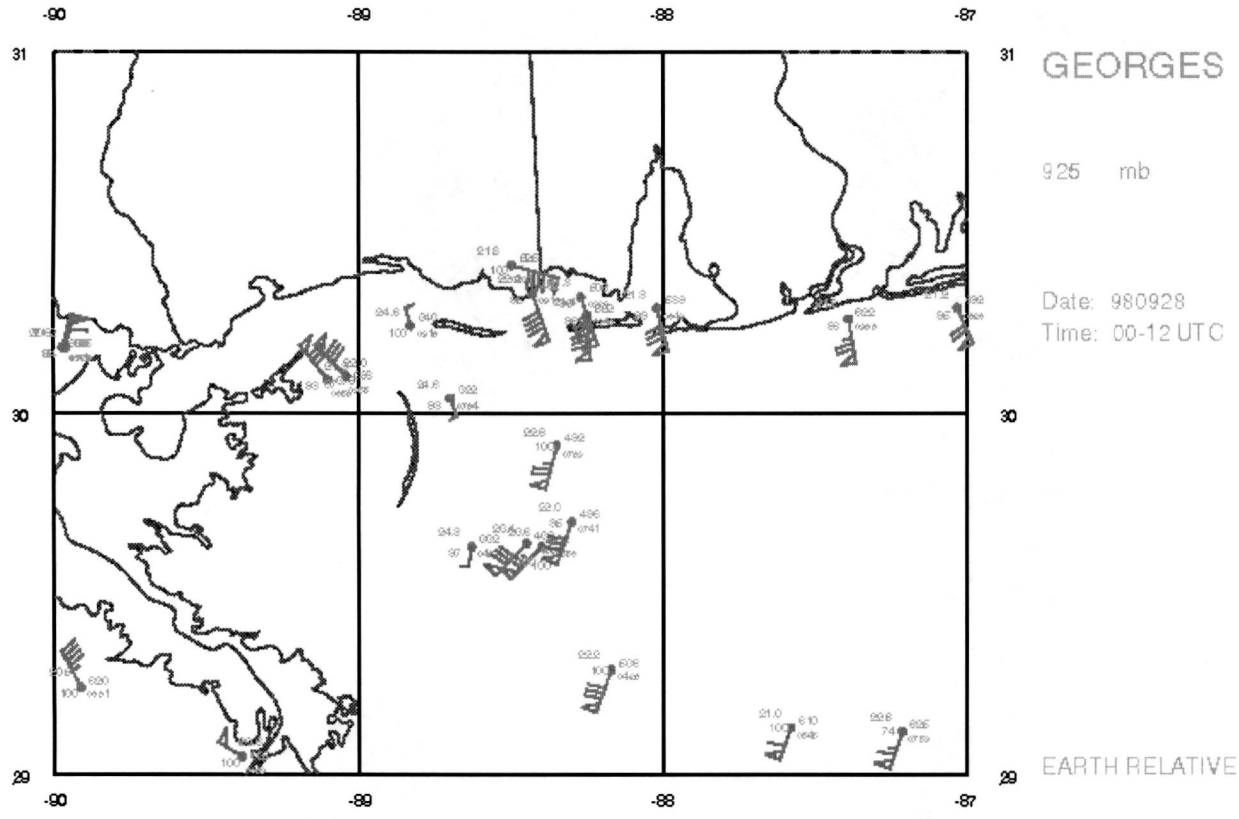
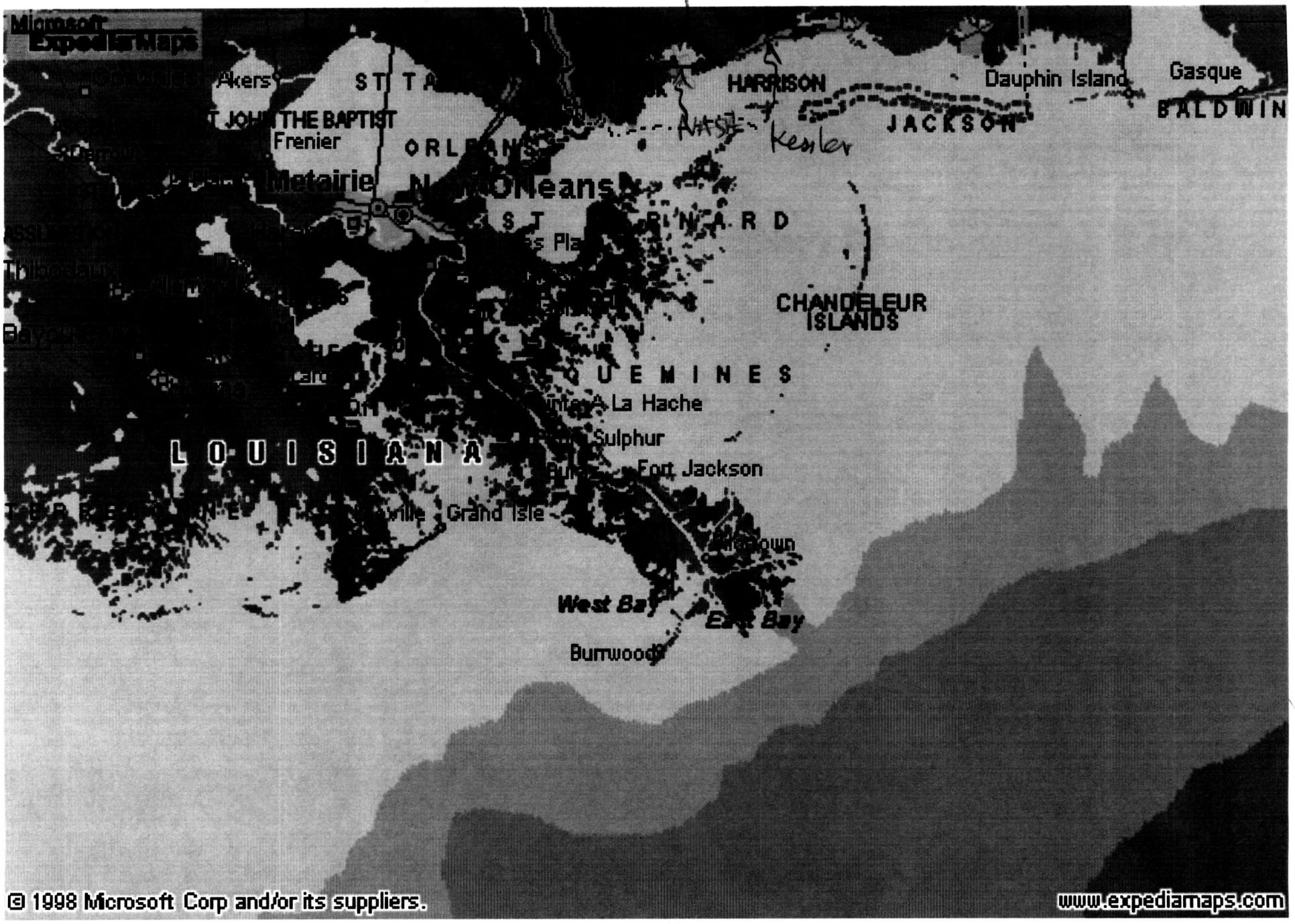

-90
-89
-88
-87
31
30
29
GEORGES
925 mb
Date: 980928
Time: 00-12 UTC
EARTH RELATIVE
NOAA/ERL/HURRICANE RESEARCH DIVISION

Figure 4

Texas Tech Tower 30°24'48"
89°4'10"



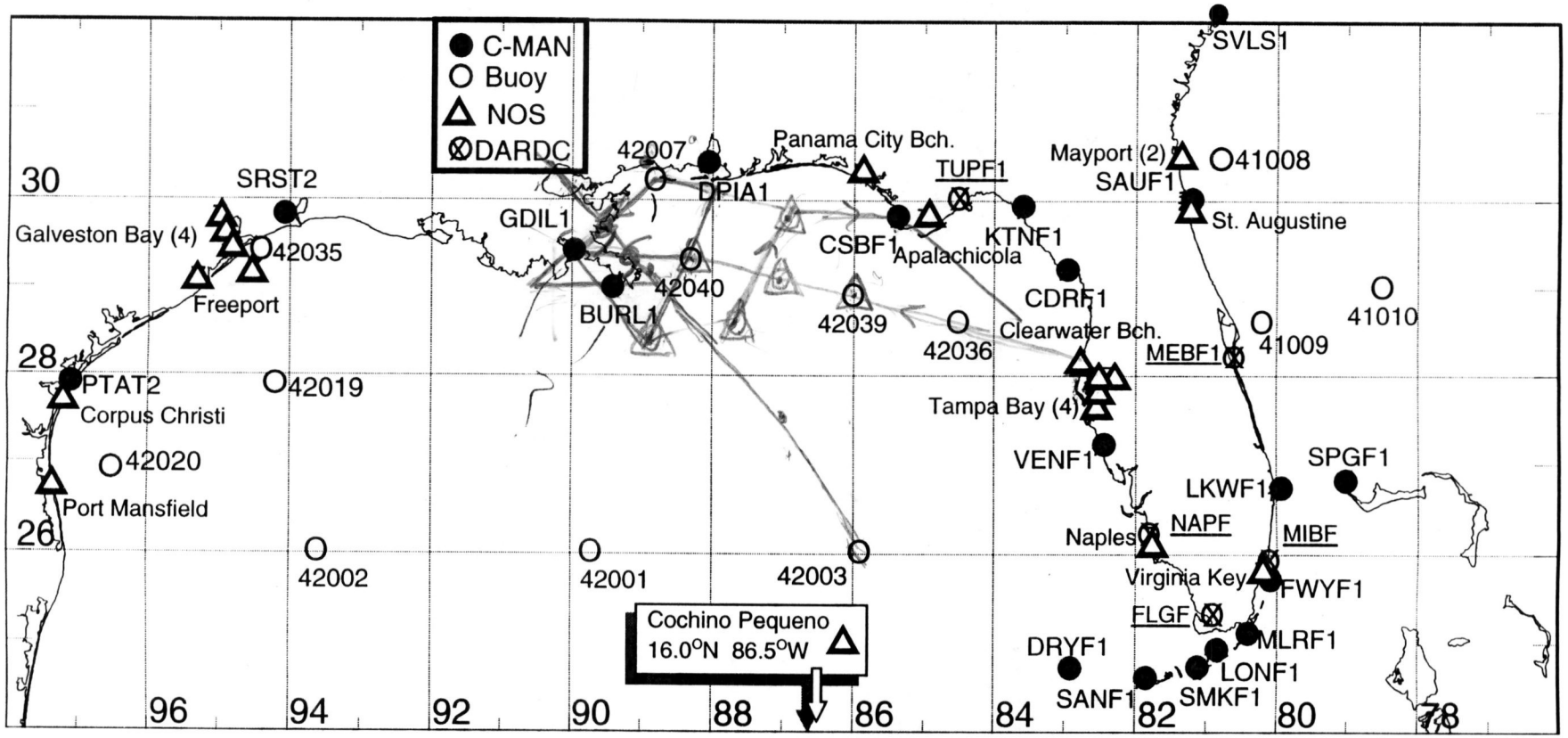


Fig. C-2. Marine buoy, C-MAN, NOS (lower case), and DARDC (underlined) locations in the Gulf of Mexico, Florida, and southern Georgia. See Tables C-3.1 -- C-3.5.

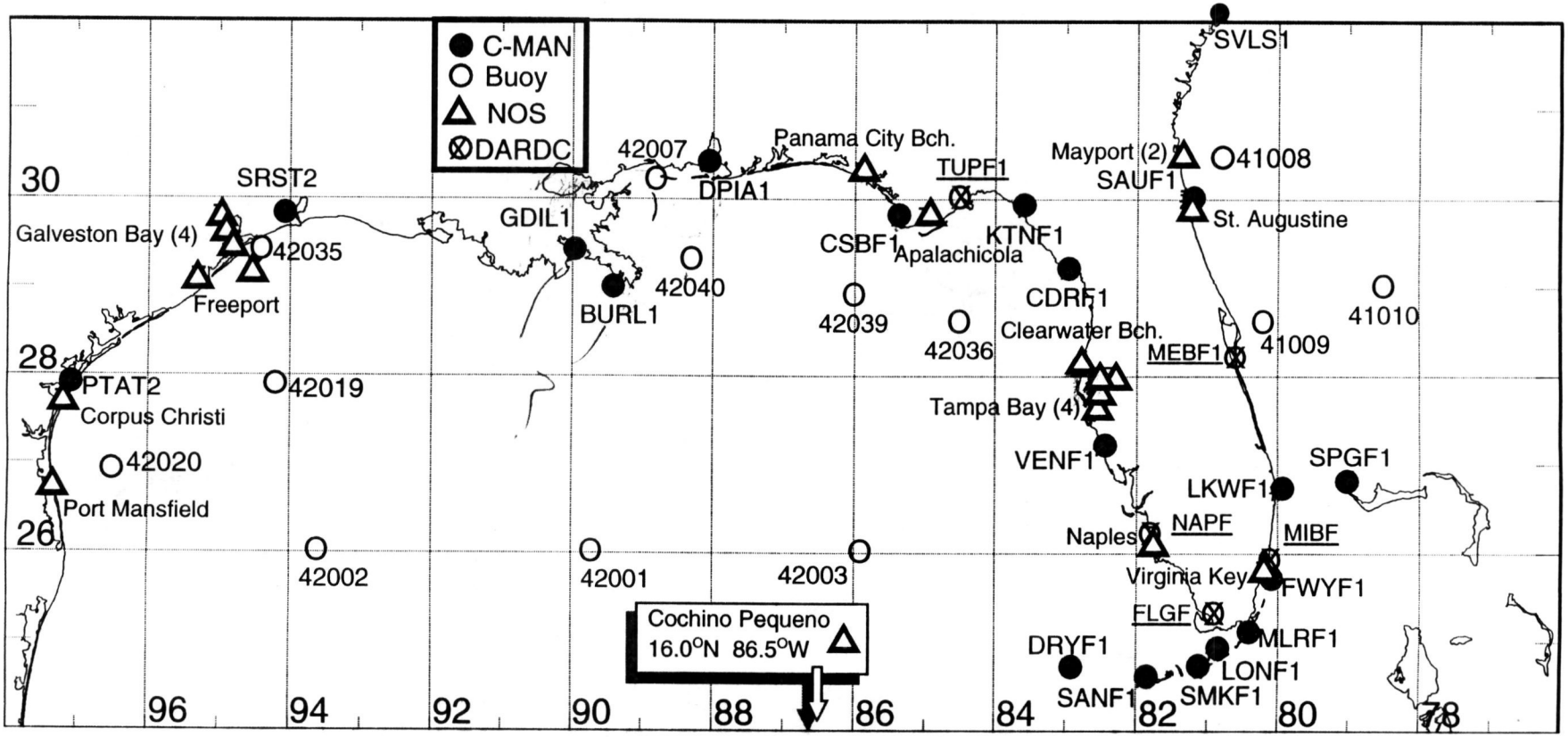


Fig. C-2. Marine buoy, C-MAN, NOS (lower case), and DARDC (underlined) locations in the Gulf of Mexico, Florida, and southern Georgia. See Tables C-3.1 -- C-3.5.

ZCZC MIATCDAT2
TTAA00 KNHC 270847
HURRICANE GEORGES DISCUSSION NUMBER 48
NATIONAL WEATHER SERVICE MIAMI FL
5 AM EDT SUN SEP 27 1998

THE INTENSITY OF GEORGES HAS NOT CHANGED SIGNIFICANTLY DURING THE PAST 24 HOURS. THE HURRICANE IS MOVING OVER A WARM OCEAN AND THE SHEAR IS LOW BUT...AT THIS STAGE...THIS DOES NOT APPEAR TO BE ENOUGH FOR THE HURRICANE TO INTENSIFY RAPIDLY. IT HAS BEEN DISCUSSED IN MOST OF THE HURRICANE INTENSITY CHANGE WORKSHOPS...THAT...FOR RAPID INTENSIFICATION...THERE SHOULD BE AN EYEWALL REPLACEMENT CYCLE AND/OR A TROUGH INTERACTION. THESE TWO PROCESSES ARE VERY DIFFICULT TO EVALUATE...BUT WITH THE LIMITED AVAILABLE INFORMATION...NONE OF THE ABOVE PROCESSES ARE LIKELY TO OCCUR BECAUSE THE INGREDIENTS ARE NOT PRESENT. THERE IS NOT A PERSISTENT AND WELL DEFINED INNER CORE...NO DOUBLE EYE STRUCTURE EITHER AND THERE IS NO UPPER-TROUGH APPROACHING THE HURRICANE. ONLY A SMALL INCREASE IN INTENSITY IS THEN FORECAST BEFORE LANDFALL. THIS IS AN ARRESTED FORECAST BECAUSE THE ABOVE PROCESSES ARE STILL IN THEORY AND HAVE NOT BEEN TRANSLATED INTO OPERATIONAL TOOLS YET.

INITIAL MOTION IS 310/09. THE STEERING PATTERN IS EVOLVING AS FORECAST. THEREFORE...NO CHANGE FROM THE PREVIOUS OFFICIAL FORECAST TRACK IS NECESSARY. MODELS CONTINUE TO SUGGEST THAT THE STEERING CURRENTS WILL COLLAPSE AS THE HURRICANE MAKES LANDFALL. THIS MEANS THAT THE HURRICANE WOULD SLOW DOWN CONSIDERABLY AND COULD PRODUCE EXTREMELY LARGE RAINFALL AMOUNTS COMBINED WITH A LONG PERIOD OF ONSHORE WINDS AND STORM SURGE FLOODING. GEORGES IS A VERY SERIOUS THREAT AND IT COULD BE EVEN WORSE IF THE HURRICANE STRENGTHENS MORE THAN
FORECAST.

AVILA

FORECAST POSITIONS AND MAX WINDS

INITIAL	27/0900Z	28.1N	87.6W	95 KTS
12HR VT	27/1800Z	28.7N	88.6W	100 KTS
24HR VT	28/0600Z	29.4N	89.3W	100 KTS
36HR VT	28/1800Z	30.0N	90.0W	80 KTS...INLAND
48HR VT	29/0600Z	30.5N	90.0W	65 KTS...INLAND
72HR VT	30/0600Z	31.0N	90.0W	50 KTS...INLAND

NNNN

305-361-4402

Mike,

heres JOHN'S and mine ideas.

If you look in users/peter

there files like NOB_MAP.PS

and draw that you could print

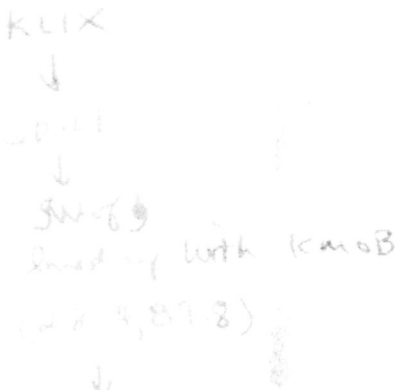
for sketches.

Peter

813-877-6721 room 216

813-877-6218 Tahitian Fax

Joint GAMACHES
Notes for 42



JOHN GAMACHES
Notes for 42

TAMPA

42036

(29.3, 89.2) (BURL)

SE

Sof at (27.5, 89)

KLIX

KLIX

Sonde

in Dropsonde

28 89 8

KLIX

KLIX

KLIX
↓
↓
lined up with KMOB
(28.9, 89.8)
↓
KMOB
KLIX
↓

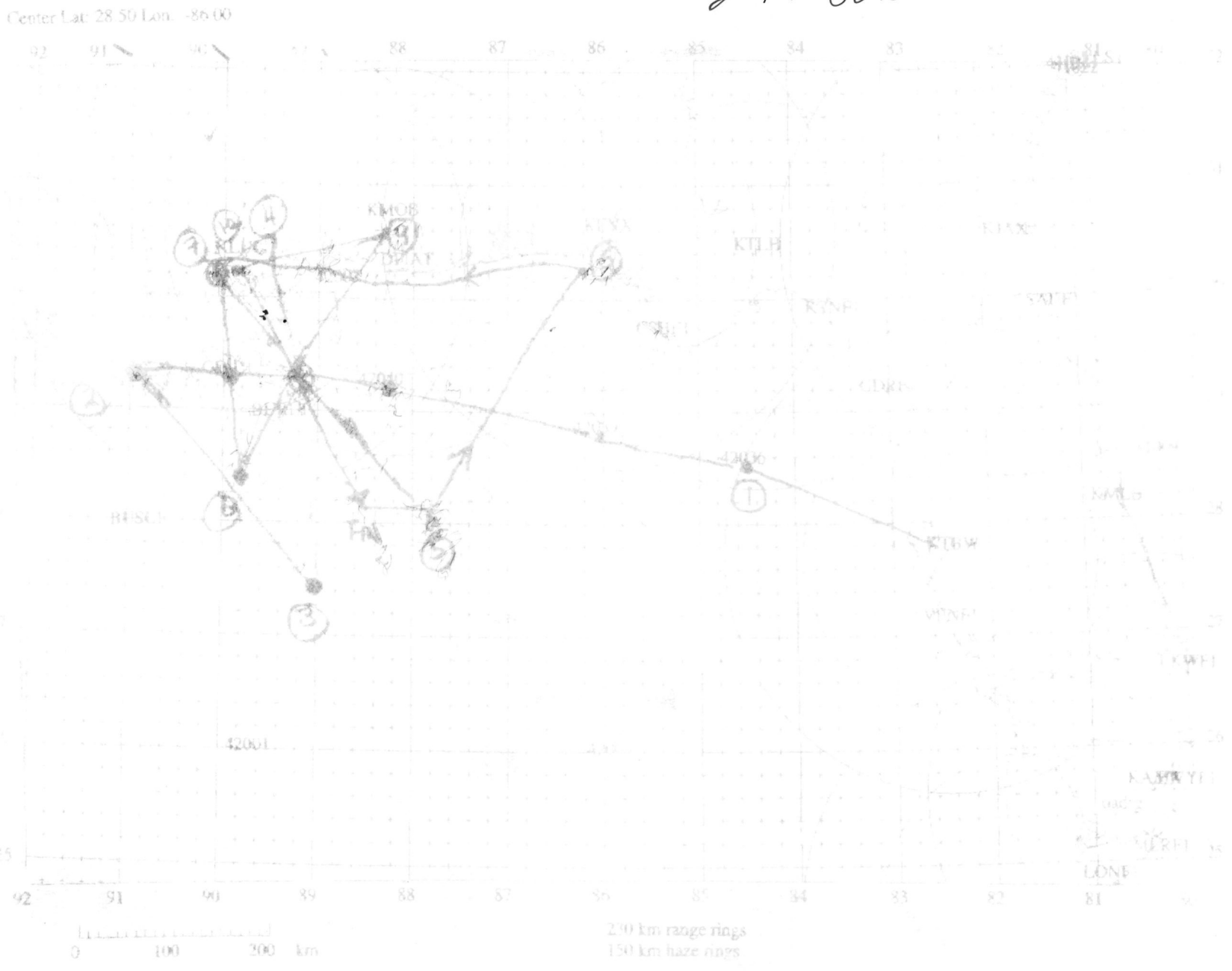
7°
2°
1.5°
1.5°
1.0°
2°
3.5°
3°
2
3

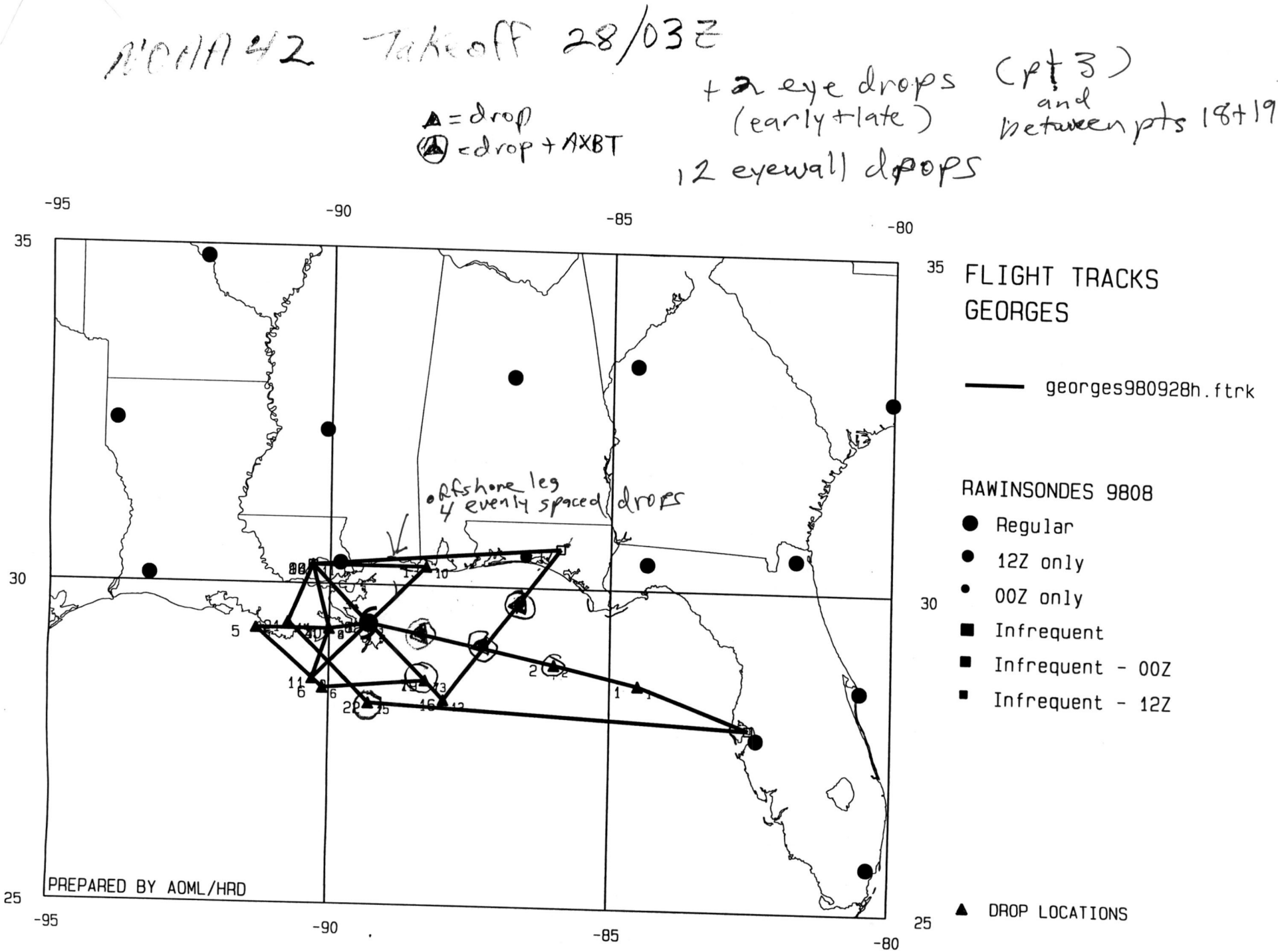
drop in L Ponchatrain after (4)

Possible 42

14,000

29.5 88.6




AOML #2 Takeoff 28/03Z
▲ = drop
⊛ = drop + AXBT
+ 2 eye drops (pt 3) and between pts 18+19
(early + late)
12 eyewall drops
offshore leg 4 evenly spaced drops
-95
-90
-85
-80
35
30
25
FLIGHT TRACKS
GEORGES
georges980928h.ftrk
RAWINSONDES 9808
Regular
12Z only
00Z only
Infrequent
Infrequent - 00Z
Infrequent - 12Z
PREPARED BY AOML/HRD
DROP LOCATIONS

NOAA 42 Takeoff 28/03Z

▲ = drop
Ⓐ = drop + AXBT

+ 2 eye drops (early + late) (pt 3) and between pts 18+19
12 eyewall drops