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PENINSULAR FLORIDA TORNADO OUTBREAKS

(1950-1993)

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1. INTRODUCTION

A systematic investigation of central Florida tornado environments began in late 1989 at the Melbourne National Weather Service (NWS) Office. Early research concentrated on establishing a tornado climatology (Schmocker et al. 1990) and investigating seasonal characteristics of tornado proximity soundings (Hagemeyer and Schmocker 1991). Further analysis of the tornado forecast challenge concentrated on the characteristics of central Florida tornado outbreaks (Hagemeyer and Schmocker 1992, Hagemeyer and Matney 1993a and 1993b). The investigation was expanded to include all of peninsular Florida (south of 30° latitude) in the fall of 1993. The results of this latest study are presented here in the form of a detailed peninsular Florida tornado outbreak climatology and brief case studies of all known outbreaks from 1950 through 1993.

The case studies include plots of severe weather reports, soundings and hodographs most representative of the severe weather environment, and surface and upper air data. The case study presentations were inspired by the series of annual severe thunderstorm cases prepared by the National Severe Storm Forecast Center (Hales and Polston 1993). It is expected that the outbreak climatology and case study data will be useful training tools for new and seasoned forecasters alike. This study should facilitate a rapid accumulation of historical knowledge that would otherwise take many decades to accrue on the job. It can also serve as a ready historical reference to provide perspective as new outbreaks occur or are forecast to occur. Dissemination of this information will become more crucial over the next few years as changes in forecast staffing occur due to the Modernization and Associated Restructuring (MAR) of the NWS in Florida.

2. TORNADO OUTBREAK CLIMATOLOGY

What is a peninsular Florida tornado outbreak? This fundamental question had to be answered before an objective study of outbreak characteristics could proceed. Galaway (1977) looked into the need for a reasonable tornado outbreak definition that might apply to most of the nation east of the Continental Divide, but came up with no hard and fast rules. Grazulis (1993) used a six tornado outbreak definition in his book.

Peninsular Florida is isolated from surrounding states. It seemed likely then, that a unique ***regional*** definition of a tornado outbreak was needed. An analysis of the 1372 tornadoes documented by the National Severe Storms Forecast Center (NSSFC) from 1950 through 1992 at, or south of, 30° latitude in Florida was completed to address this issue.

The number of tornadoes reported per tornado day is shown in Fig. 1 (a tornado day is any calendar day with at least one tornado reported). The graph clearly shows that most tornadoes occur singly, and rarely are more than three tornadoes reported on one day. Indeed, only 41 (3%) of 920 tornado days had four or more tornadoes reported. This threshold of four tornadoes per day provided a logical starting point in the regional definition of an outbreak.

The next step was to establish an objective outbreak time limit. A graph of the minimum length of time it took for at least four tornadoes to occur in the 41 cases on which four or more tornadoes occurred on the same day is shown as Fig. 2. The graph clearly shows that the great majority (83%) of the four tornado or more events occur in four hours or less (outbreaks stretching over two days, i.e., in progress at midnight, were taken into account). Thus, a

peninsular Florida tornado outbreak was defined to be the occurrence of four or more tornadoes in four hours or less at, or south of, 30° latitude. This criterion seems reasonable for the Florida peninsula which is only 125 nm across at its widest point. Since most synoptic systems that cause outbreaks are relatively fast moving, the short duration of many of the outbreaks is understandable.

The beginning time of an outbreak was defined as the time of the first tornado, when four or more occurred in four hours or less. The ending time was defined as the time of the last tornado in the outbreak, prior to a four-hour break in tornado activity. These criteria eliminated seven of the 41 candidate cases.

A further constraint was that the tornadoes had to be related to the same synoptic forcing mechanism to be considered part of a true outbreak. An example of a case which would not be termed an outbreak would be during the wet season when two tornadoes might occur near Tampa, associated with the west coast sea breeze; and two tornadoes might occur along the southeast coast, associated with the east coast sea breeze, all within a few hours of each other. This criterion eliminated four of the 34 remaining candidate cases, and it is the reason readers will find most true tornado outbreaks to have occurred with strong synoptic forcing.

The yearly distribution of the outbreaks and their associated tornadoes from 1950-1993 is shown in Fig. 3. The documentation of outbreaks is probably reliable since the mid 1960s. The scarcity of outbreaks prior to 1964 is related to lower population density and the fact that only the most significant tornadoes tended to be reported prior to increased emphasis on verification in the 1970s. Grazulis (1993) provides a comprehensive discussion of the problems with the national tornado data base and the challenges of accurate tornado documentation.

A discussion of the significance of the outbreak distribution since 1964 is beyond the scope of this paper, but future research into long-range prediction of tornado outbreak potential is planned. It is noteworthy that the longest period without an outbreak since 1964 was the five years from March 1986 to March 1991, while five outbreaks occurred from March 1991 to April 1993.

Based on research by Grazulis (1993), which covered only F2 or greater tornadoes and killer tornadoes, it is likely the first documented pre-1950 tornado outbreak occurred on September 9-10, 1882, over north-central Florida and the Panhandle. Other documented outbreaks occurred on February 26, 1934; December 26-27, 1940; and October 5, 1948; but many other undocumented outbreaks undoubtedly occurred prior to 1950.

The monthly distribution of the 32 peninsular Florida outbreaks from 1950-1993 is shown in Fig. 4. These outbreaks are predominately associated with extratropical cyclones during the traditional dry season (November through April) with peak occurrences in March and April. Hurricanes have caused outbreaks in June, September, and October. Hybrid cyclones with tropical and subtropical characteristics and mid-latitude interactions have occurred in May, June, and October during the transitions from dry to wet or wet to dry seasons (Hagemeyer and Matney 1993b).

Noteworthy is the lack of outbreaks in July and August in the middle of the wet season when mid-latitude disturbances are least likely to affect the peninsula. These months are also between the early hurricane season tendency for tropical and hybrid cyclones to develop in the northwest Caribbean and southern Gulf of Mexico and the primary peak of tropical cyclone development from African easterly waves in September (NOAA, 1985).

The hourly distribution of outbreak tornadoes is shown in Fig. 5. There are too few tropical cyclone cases to make meaningful interpretation of their tornado distributions. With the extratropical cases, however, clearly most tornadoes occur from mid-morning to early afternoon, with peaks at 11 a.m. and 2 p.m. Anthony (1988) noted a secondary maximum of morning tornadoes in Florida. Schmocker et al. (1990) documented that most of the strong and violent tornadoes in central Florida occur during the dry season in the morning. The distribution of significant tornadoes in Grazulis (1993) also shows a peak in the morning for southeastern states in general, but the Florida morning maxima is most striking. Of the 32 outbreaks, 19 (59%) began before noon, 12 before 9 a.m., and seven before 6 a.m.

The monthly distribution of outbreak tornadoes by F-Scale (Fujita 1981) is shown in Fig. 6. Most outbreak tornadoes are F0 or F1 (72%), and their numbers peak in March. Of the outbreak tornadoes in the F2-F4 range, most are in fact F2s. Only five F3 and two F4 tornadoes were reported during the period of this study.

Statistics gleaned from *Storm Data* entries for each tornado outbreak are listed in Table 1. The outbreaks are listed in chronological order by month and day (but not year). Table 1 contains information on the duration of each outbreak, number and intensity of tornadoes, deaths and injuries and their causes, and whether reports were received of severe thunderstorm winds, hail, heavy rain or flooding, and lightning.

The outbreaks often produced hazardous weather, in addition to tornadoes, which have been responsible for 68 deaths and 1150 injuries. Most interesting is the fact that drowning accounted for 32 deaths while tornadoes accounted for 28 deaths. Drownings resulted from boats capsizing on lakes and coastal waters, storm surge inundation, river flooding, and urban flooding of roadways and drainage ditches. Tornado deaths and serious injuries were most often associated with occupants of trailers or wood-framed structures. Seven of the eight deaths attributed to severe thunderstorm winds occurred in "windstorms" associated with Hurricane Agnes that struck trailer parks in June 1972 (Case 26 in Table 1). These "windstorms" may have been tornadoes and are a subject of ongoing debate (Grazulis 1993).

TABLE 1

Peninsular Florida Tornado Outbreaks (1950-1993)

	Date	Duration (EST)	Tornadoes F0	1	2	3	4	?	▼Deaths/ Injuries	wind	hail	rain	lightning
1.	01-06-70	1005-1135		1	1			2	0/5	x			
2.	01-19-78	1350-1703	3	2					0/0	x			
3.	01-24-79	0200-0555						6	0/1	x			
4.	01-28-73	1135-1330		1	3				0/24				
5.	02-02-83	0430-1320	1	7	6				"2/31"	x			
6.	02-03-70	0730-0945	1	2	3			1	0/0	x			
7.	02-23-65	1050-1245		2	1	1			0/8	x			
8.	03-03-71	1431-1740	2	4	1				&1/1"	x			
9.	03-03-78	1235-1504		5					0/1"	x			
10.	03-03-91	0920-1450	5	3					0/1*	x	x		
11.	03-12-93	2338-0110	4	2	3				⊣&23/91&"⊣	x	x		
12.	03-14-86	0617-1045	4	4	1				0/1##	x			x
13.	03-17-73	0300-0500		3	2				0/3"	x			
14.	03-31-72	0415-0700	2	2	4				0/9"	x	x		
15.	04-04-66	0815-1015			1		1	2	11/530				
16.	04-05-93	0130-0430	8	1	1				0/5"	x			
17.	04-09-84	1250-1400	2	2					0/0	x	x	x	
18.	04-11-75	0930-1520	1	4					0/1	x		x	x
19.	04-15-58	1200-1309		1		2	1		0/36	-	-	-	-
20.	04-23-83	0830-1430		6					0/7	x			
21.	04-25-91	1417-1630	5	2					0/2"	x	x		
22.	05-04-78	0800-1500	6	1		1			3/97	x		x	
23.	05-08-79$	0530-1630	15	3	1				&4/49			x	
24.	06-08-57$	1458-1715		1	4			1	&5/?	-	-	x	-
25.	06-17-82$	1900-0309	3	5	2				&3/13	x		x	
26.	06-18-72*	1255-1846	1	4	5				&"8/67"	x			
27.	09-03-79*	1800-2100	2	1	2				0/0				
28.	10-03-92$	0940-1740	3	4	1	1			4/77	x		x	
29.	10-14-64*	1510-2250		4	4			1	&2/48				
30.	11-09-68	1255-1900		6	3				2/29				
31.	11-11-68	1115-1330		1	2			1	0/3	x			
32.	12-03-71	1000-1345		2	3				0/10	x		x	
		Totals:	**68**	**86**	**54**	**5**	**2**	**14**	**68/1150**	**24**	**5**	**8**	**2**

Tornado 28/1080
Drowning 21/0
St Surge 11/2
Tstm Wind 8/66
Lightning 0/1
Hail 0/1

▼Includes: Tstm Wind ("), Lightning (##), Hail (*), Drowning (&), and Storm Surge (⊣) victims
*** HURRICANE CASES (3)**
$ HYBRID CASES (4)

Major outbreaks can produce high seas, coastal flooding, beach erosion, storm surge, local flooding rains, and river flooding, as well as tornadoes and severe thunderstorms. Clearly, individuals at greatest risk are occupants of mobile homes or manufactured housing, mariners or motorists, and residents of the immediate coastal zone and other flood-prone areas.

The two deadliest outbreaks, April 4, 1966, and March 12-13, 1993, account for half (34) of all outbreak deaths. However, the most consistently deadly outbreaks have occurred in the wet season (May to October). Many of the extratropical outbreaks are at the lower end of the outbreak intensity spectrum, in terms of deaths. Less than a fourth of the extratropical dry season outbreaks caused fatalities while seven of the eight wet season outbreaks were killers, resulting in a combined total of 29 fatalities.

As can be seen from Table 1, severe thunderstorm winds (i.e., winds in excess of 50 kt) are common with tornado outbreaks (24 of 32); however, the severe thunderstorm database is deficient for earlier cases. Not surprisingly, every tornado outbreak since 1979 had severe thunderstorm winds reported. Large hail would appear to be rare in tornado outbreaks, but the hail database is more deficient for earlier cases than the thunderstorm wind database. Only one outbreak case prior to 1986 had hail reported. Lightning reports are noticeably lacking in the outbreaks. Remarkably, given the relatively high incidence of lightning-related injury in general, only one injury due to lightning and one instance of lightning damage were reported in the 32 tornado outbreaks.

Knowledge of the climatology of peninsular Florida tornado outbreaks is necessary to better forecast their occurrence and likely consequences. Knowledge of the synoptic patterns associated with tornado outbreaks and experience in diagnosing the observational data are equally important. In the following sections we provide more detailed information concerning each tornado outbreak.

3. OUTBREAK CASE DATA

Case study data for each outbreak are included in Appendix A. The cases are organized by day of the year to simplify synoptic pattern assessment through a normal yearly progression. The idea is to provide as much data as possible to allow readers to make their own interpretations. Rather than summarize these outbreaks by showing ***mean*** soundings and ***mean*** synoptic patterns, we believe there is value in presenting data for individual cases, especially for those who are responsible for forecasting severe weather for the Florida peninsula or requiring working knowledge of the characteristics of associated weather.

It should be remembered that data are shown only for peninsular Florida tornado ***outbreaks***, which comprise only 3% of the tornado days in Florida. Outbreaks present the greatest threat to life and property, but 97% of the tornado days do not meet our criteria for classification as outbreaks. We believe that most cases of several tornadoes in a day, or of isolated, strong tornadoes (even if they do not meet the outbreak criteria), will resemble the synoptic outbreak patterns to some degree. Patterns associated with single-tornado days will probably not. There is no doubt, however, that non-outbreak tornadoes have caused significant damage and injuries, and some deaths.

Severe weather plots were made using the *Severe Plot* program for PCs developed at NSSFC (Hart 1992). All severe reports on the day of an outbreak were plotted, including those that occurred north of 30° latitude. Tornadoes are indicated by either their F-Scale number or a dark triangle. Paths of tornadoes are shown as heavy dark lines. Severe thunderstorm wind reports are indicated by crosses, or the actual speed in knots, when reported. Reports of hail 0.75 in or greater are shown by either filled circles or the reported size in inches without a decimal (for example the April 9, 1984, outbreak plot on page A-56 shows 2.75-in hail between West Palm Beach and Miami).

Summaries of the total number of severe reports and numbers of tornado, hail, and high wind reports are contained along the left margin of each plot. Numbers of tornadoes on the plots and on Table 1 may not match, because only the tornadoes occurring in the actual outbreak interval are included on Table 1, while an effort was made to include all severe weather associated with the weather system causing the outbreak on the plots to gain greater appreciation of their magnitude and extent. There are also some limitations on plotting tornado segments with the *Severe Plot* program that are discussed by Hart (1992); however, manual verification of the outbreak plots indicated the tornado database contains few errors.

Thermodynamic soundings and hodographs for each case were made from the best available upper air observation, most representative of the severe weather environment, using the *Skew-T/Hodograph Analysis and Research Program (SHARP*, Hart and Korotky 1991). Thermodynamic indices were calculated using the mean low-level lifted parcel, and dynamic indices were calculated using the default storm motion (see Hart and Korotky 1991). Caution should be used in correlating the sounding data to the tornado outbreak environment without allowing for time and space adjustments. In a number of cases, especially with fast moving synoptic systems, maxima of important indices occurred between scheduled sounding release times. A good example is the so-called "Storm of the Century" of March 12-13, 1993. The 0000 UTC March 13 Tampa Bay (Ruskin) sounding indicated a relatively low 0-3 km storm-relative helicity value of 179 m^2/s^2, but helicity calculated just five hours later using hourly surface data and data from the Melbourne WSR-88D radar was over 700 m^2/s^2 (see page A-31).

Available information on surface and upper air features is included for each outbreak case. Data for cases prior to the late 1970s were of varying quality. In a number of cases the microfiche of the original hand-analyzed NMC charts provided poor quality copies. In all but one case the two surface analyses most closely bracketing the outbreak period are included. In most cases 850 mb, 700 mb, 500 mb, and 200 mb charts, or at least a low-level and high-level chart, are included to provide for basic synoptic pattern recognition. Composite severe weather analyses for five of the outbreaks have been published previously and are included with their case data for reference. Data for the six outbreaks which occurred since 1986 were available through the Service Record Retention System (SRRS) which is managed by NCDC. The data are presented without analysis so they may be used in diagnostic training exercises.

A few WSR-88D products are included for the last three outbreaks (cases 11, 16, and 28 in Table 1). Interested readers should also be able to acquire gridded NMC model data for use with PC-GRIDDS for these three outbreaks.

4. CONCLUDING REMARKS

The authors anticipate that readers with an interest in peninsular Florida tornado outbreaks will find this summary to be a valuable forecast reference and that they will also try their hands at diagnosing the six most recent cases which include the "Storm of the Century" and the hybrid Tampa Bay area outbreak. A challenge is issued to the most perceptive of analysts to diagnose the case of April 25, 1991—perhaps the most unusual of all tornado outbreaks. It is hoped this paper will contribute to improvements in forecasting future peninsular Florida tornado outbreaks.

ACKNOWLEDGEMENTS

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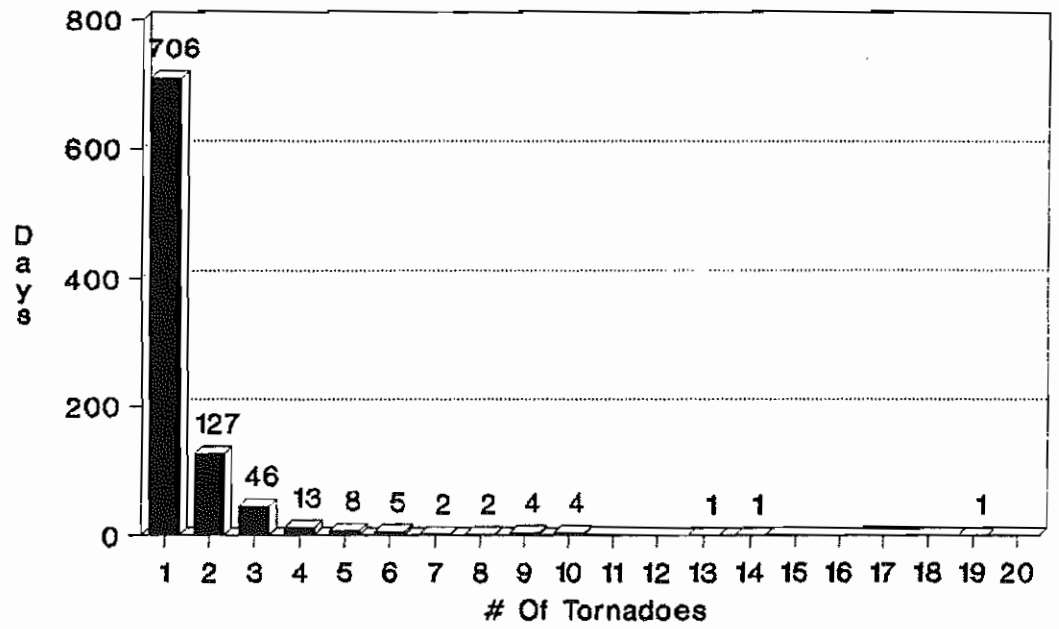
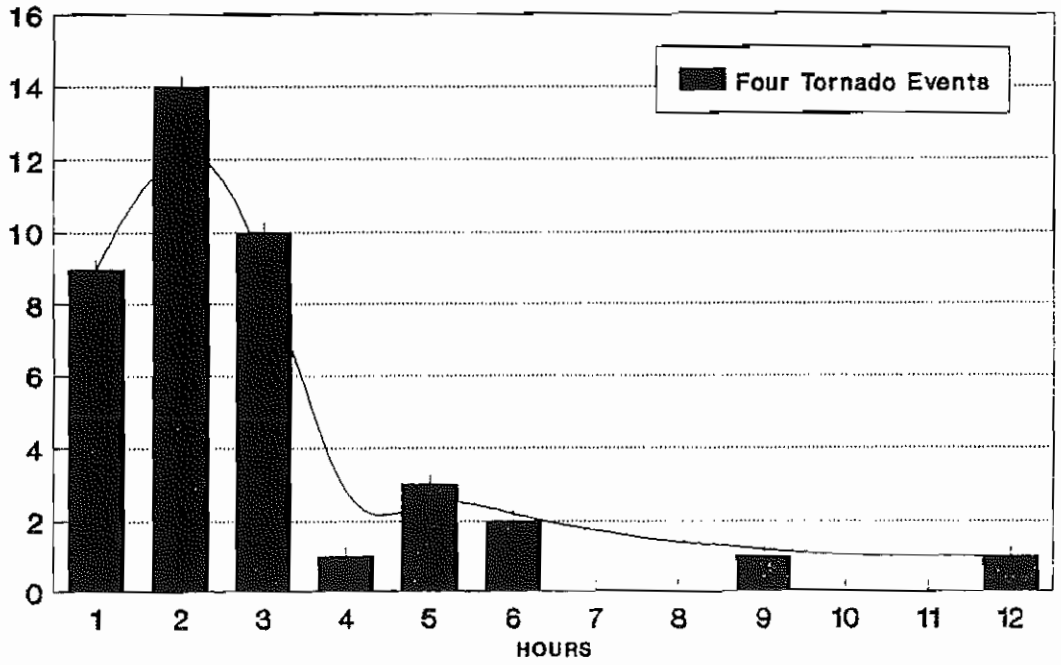
PENINSULAR FLORIDA TORNADOES PER TORNADO DAY (1950-1992)



Tornado Day = At Least One Reported Tornado (1372 Tornadoes In 920 Tornado Days)

Fig. 1

Minimum Durations Of Four-Tornado Occurrences In Peninsular Florida (1950-1992)



41 Four-Tornado Or Greater Days

Fig. 2

YEARLY DISTRIBUTION OF TORNADO OUTBREAKS AND OUTBREAK TORNADOES (1950-1993)

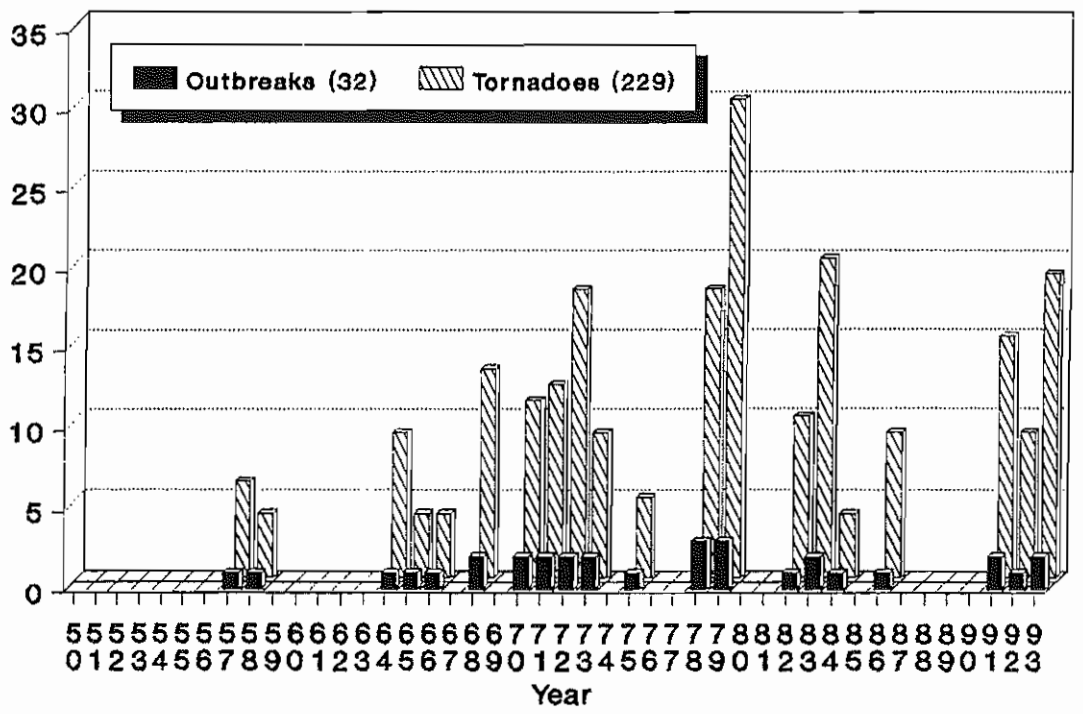
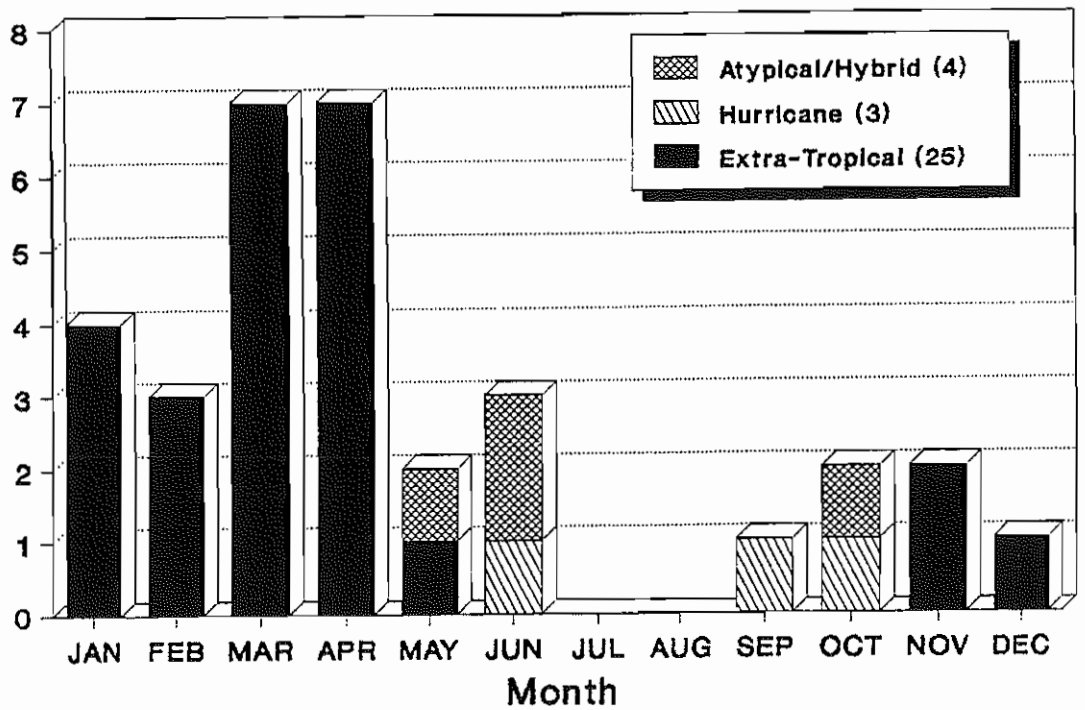


Fig. 3

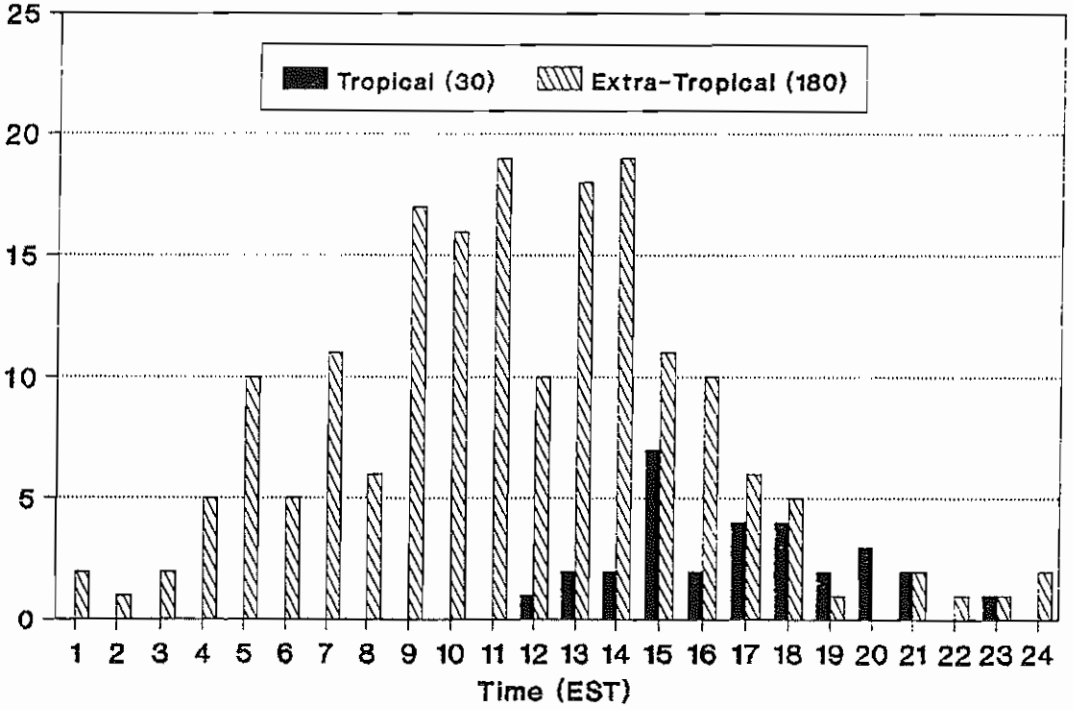
MONTHLY DISTRIBUTION OF PENINSULAR FLORIDA TORNADO OUTBREAKS (1950-1993)



32 Outbreaks

Fig. 4

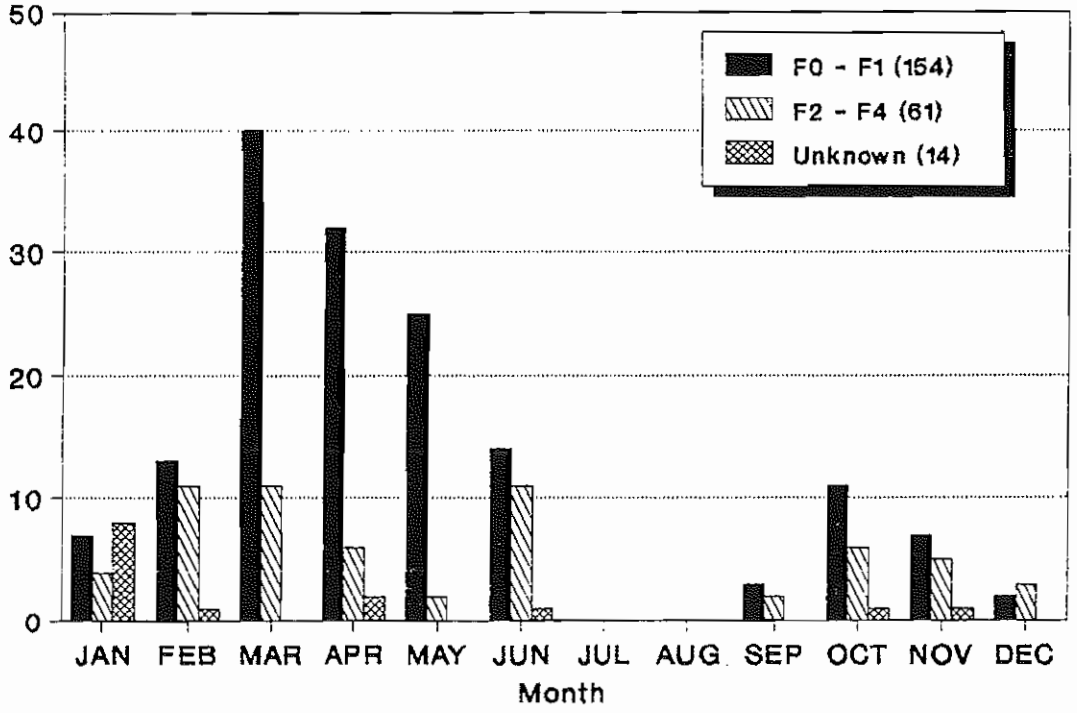
HOURLY DISTRIBUTION OF PENINSULAR FLORIDA OUTBREAK TORNADOES (1950-92)



210 Outbreak Tornadoes (30 Outbreaks)

Fig. 5

DISTRIBUTION OF OUTBREAK TORNADOES BY F-SCALE (1950-1993)



229 Total Outbreak Tornadoes

Fig. 6

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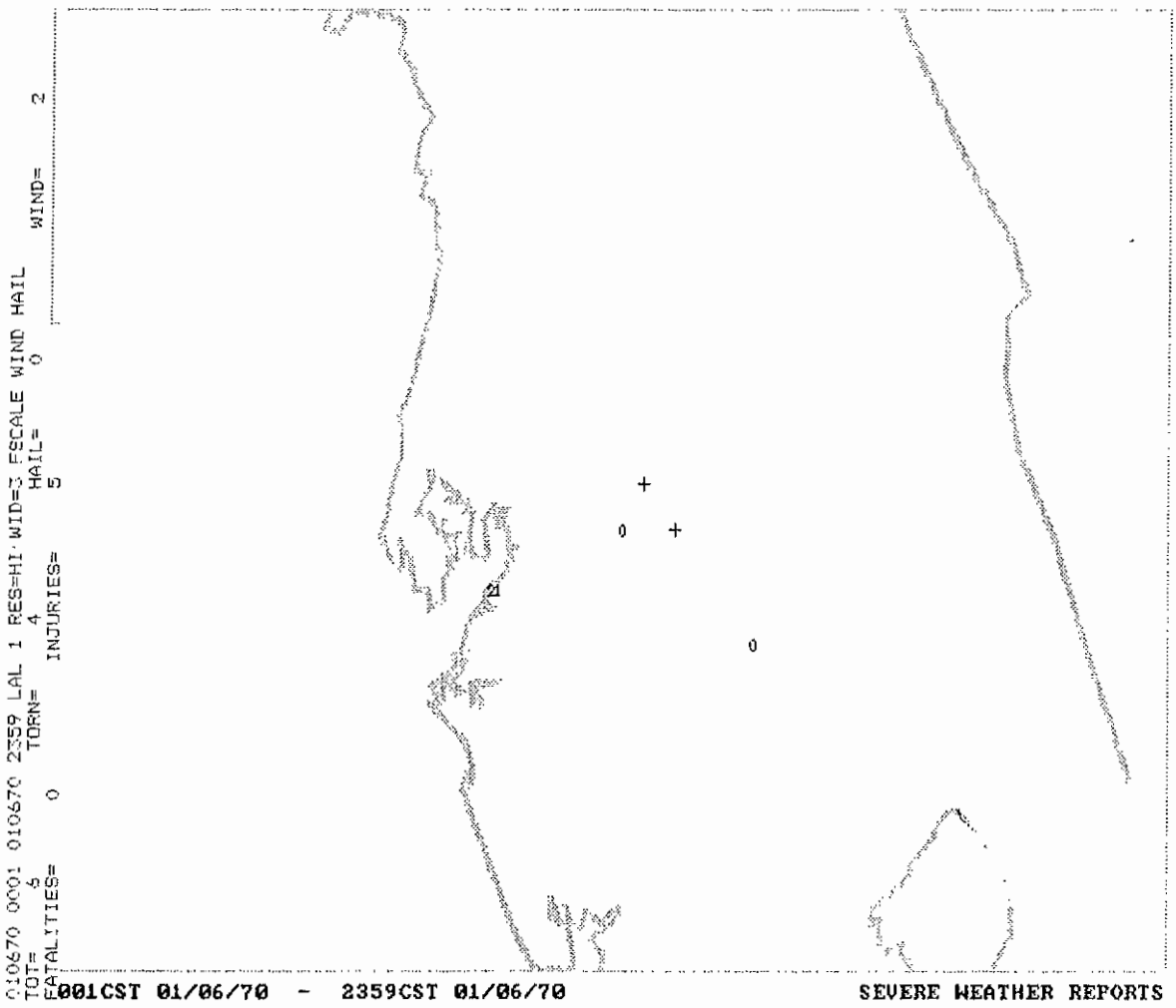
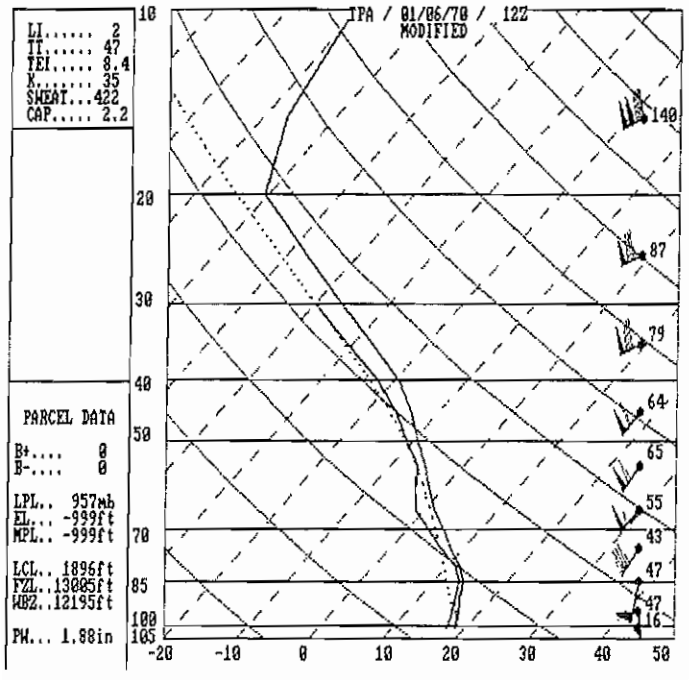
APPENDIX A

Peninsular Florida Outbreak Case Studies

Date	Appendix Page
January 6, 1970	1
January 19, 1978	3
January 24, 1979	5
January 28, 1973	8
February 2, 1983	10
February 3, 1970	14
February 23, 1965	16
March 3, 1971	18
March 3, 1978	20
March 3, 1991	22
March 12-13, 1993	27
March 14, 1986	36
March 17, 1973	40
March 31, 1972	42
April 4, 1966	44
April 5, 1993	50
April 9, 1984	56
April 11, 1975	59
April 15, 1958	61
April 23, 1983	63
April 25, 1991	67
May 4, 1978	75
May 8, 1979	78
June 8, 1957	81
June 17-18, 1982	83
June 18-19, 1972	87
September 3, 1979	91
October 3, 1992	94
October 14, 1964	100
November 9, 1968	102
November 11, 1968	105
December 3, 1971	107


010670 0001 010670 2359 LAL 1 RES=HI WID=3 FSCALE WIND HAIL
TOT= 5 FATALITIES= 0
TORN= 4 INJURIES= 5
HAIL= 0
WIND= 2
0001CST 01/06/70 - 2359CST 01/06/70
SEVERE WEATHER REPORTS


TPA / 01/06/70 / 122
MODIFIED
LI..... 2
TT..... 47
VEI..... 8.4
K..... 35
SWEAT...422
CAP..... 2.2
PARCEL DATA
B+.... 0
B-.... 0
LPL.. 957mb
EL... -999ft
MPL.. -999ft
LCL.. 1896ft
FZL..13085ft
WB2..12195ft
PW... 1.88in
140
87
79
64
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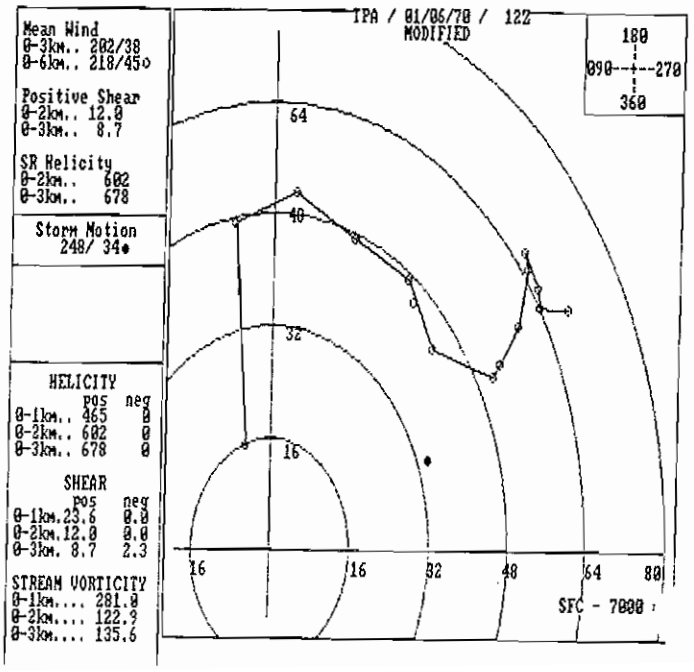
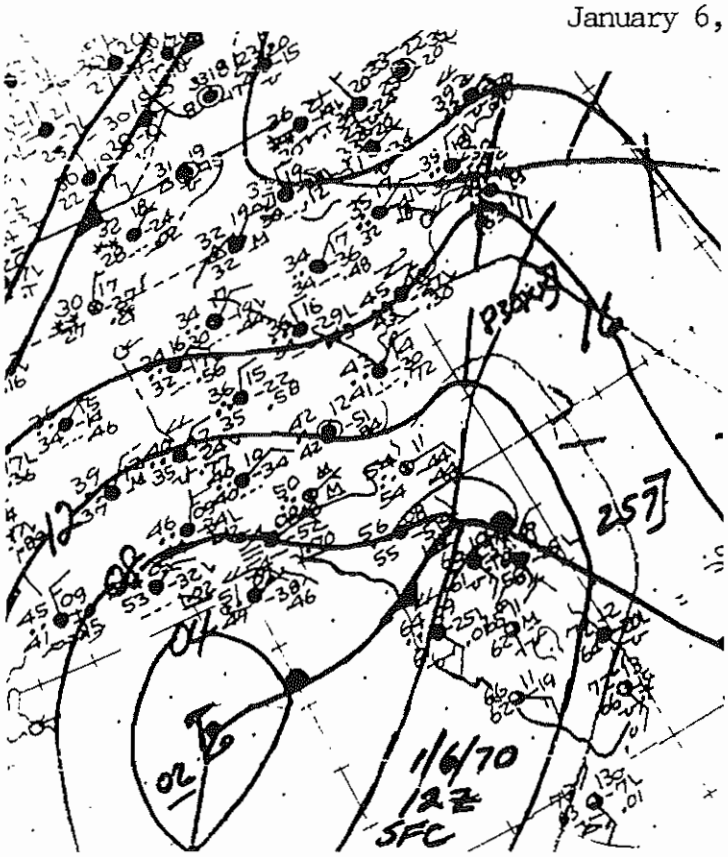
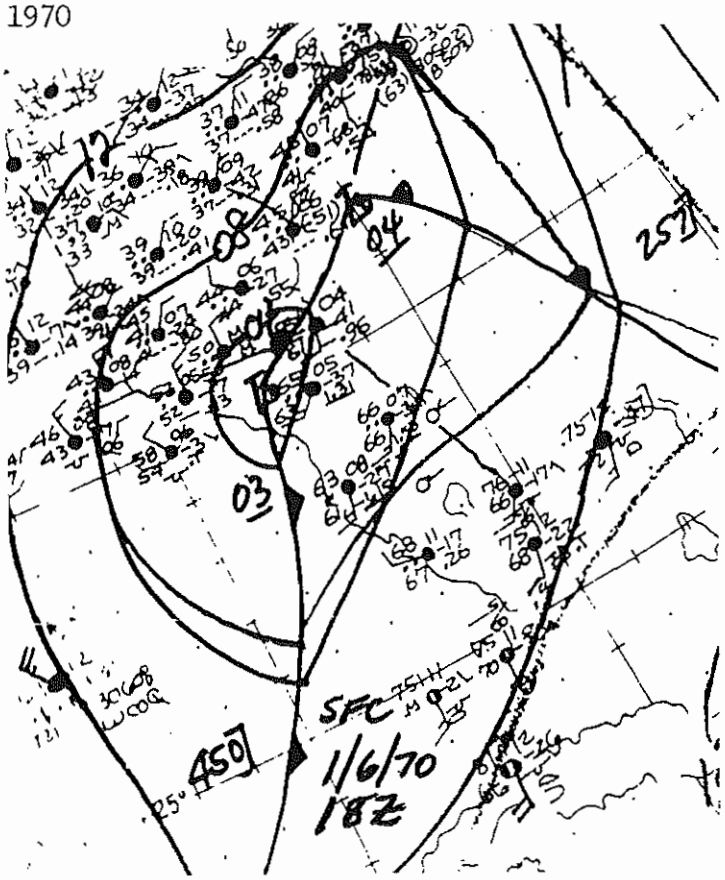
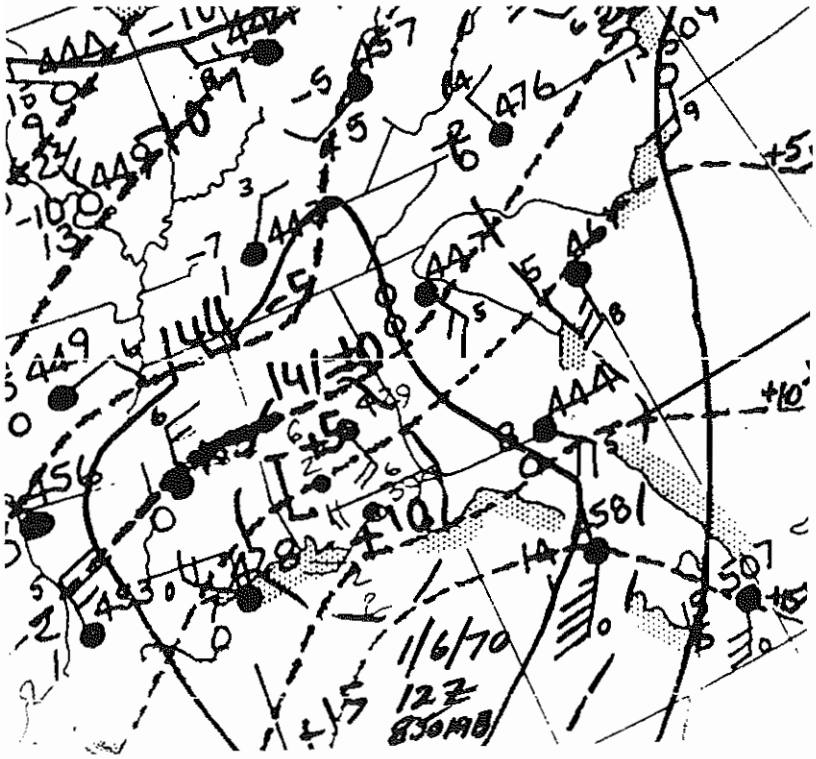
47
47
16
-20 -10 0 10 20 30 40 50

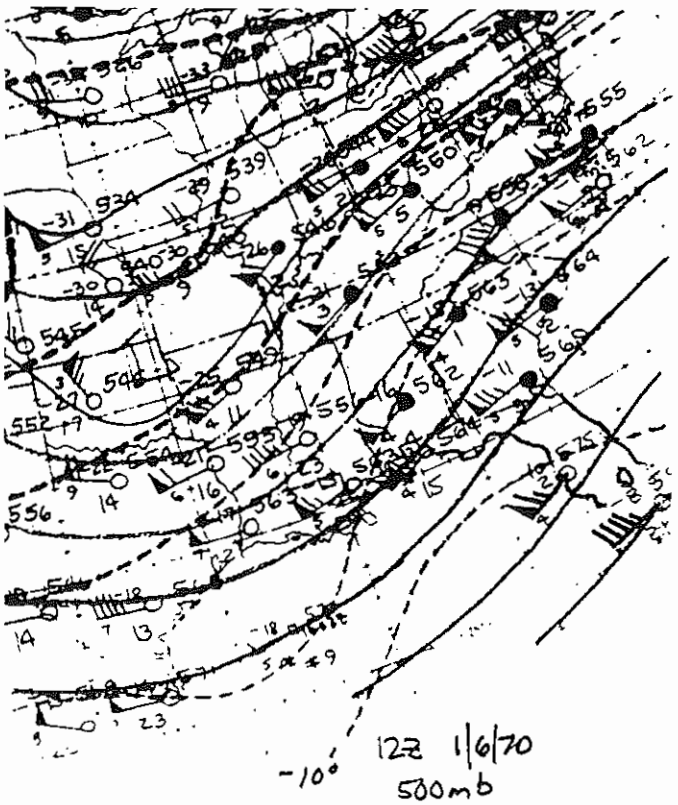

TPA / 01/06/70 / 122
MODIFIED
Mean Wind
0-3km.. 202/38
0-6km.. 218/45
Positive Shear
0-2km.. 12.0
0-3km.. 8.7
SR Helicity
0-2km.. 602
0-3km.. 678
Storm Motion
248/ 34
HELICITY
pos neg
0-1km.. 465 0
0-2km.. 602 0
0-3km.. 678 0
SHEAR
pos neg
0-1km.. 23.6 0.0
0-2km.. 12.0 0.0
0-3km.. 8.7 2.3
STREAM VORTICITY
0-1km.... 281.0
0-2km.... 122.9
0-3km.... 135.6
180
090
270
360
64
48
32
16
16 16 32 48 64 80
SFC - 7000

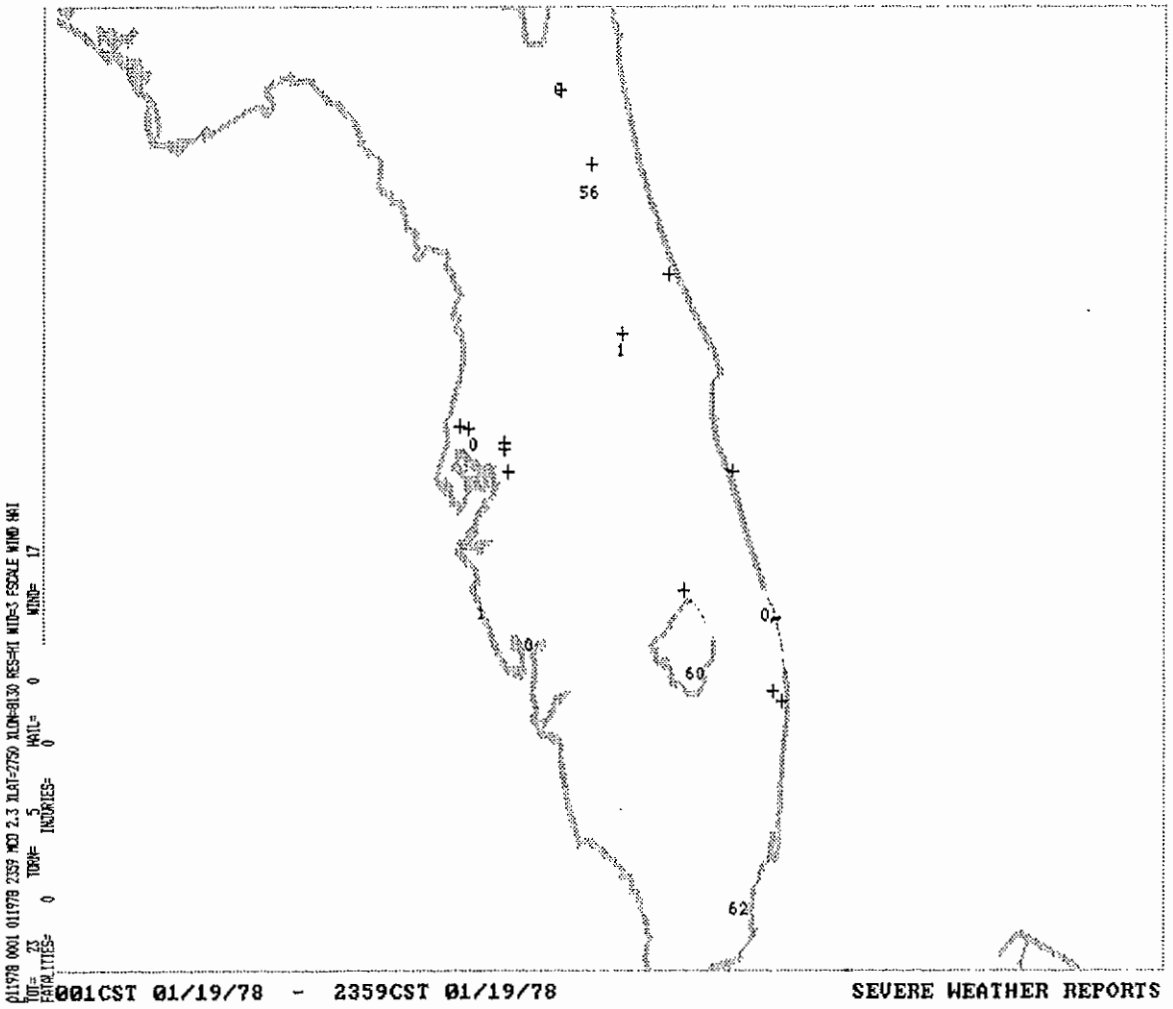
January 6, 1970

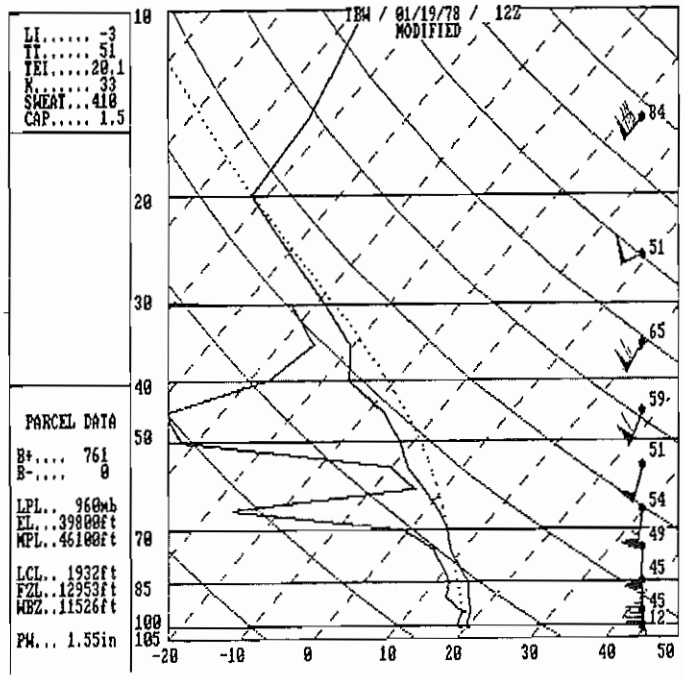


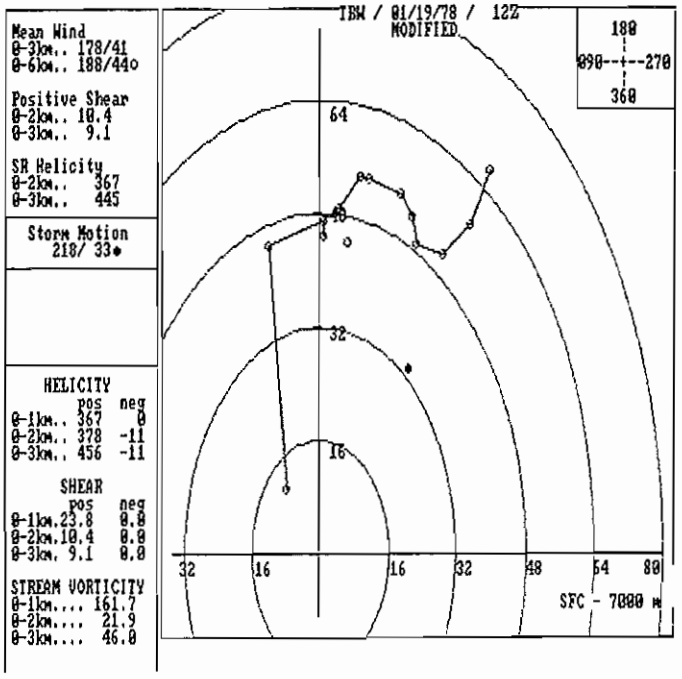


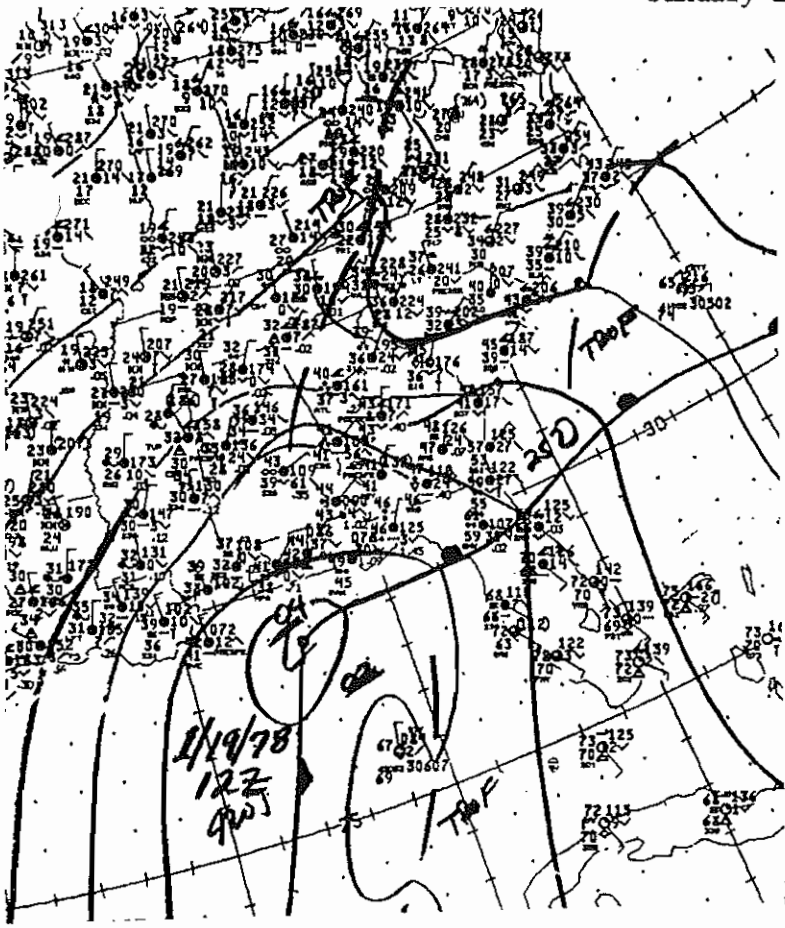


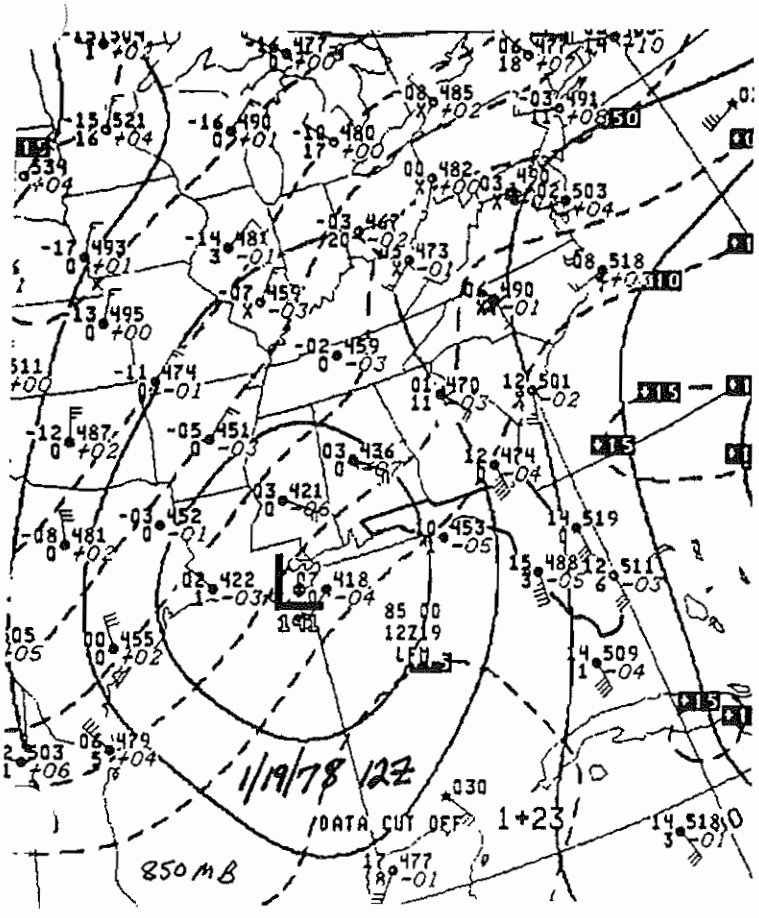


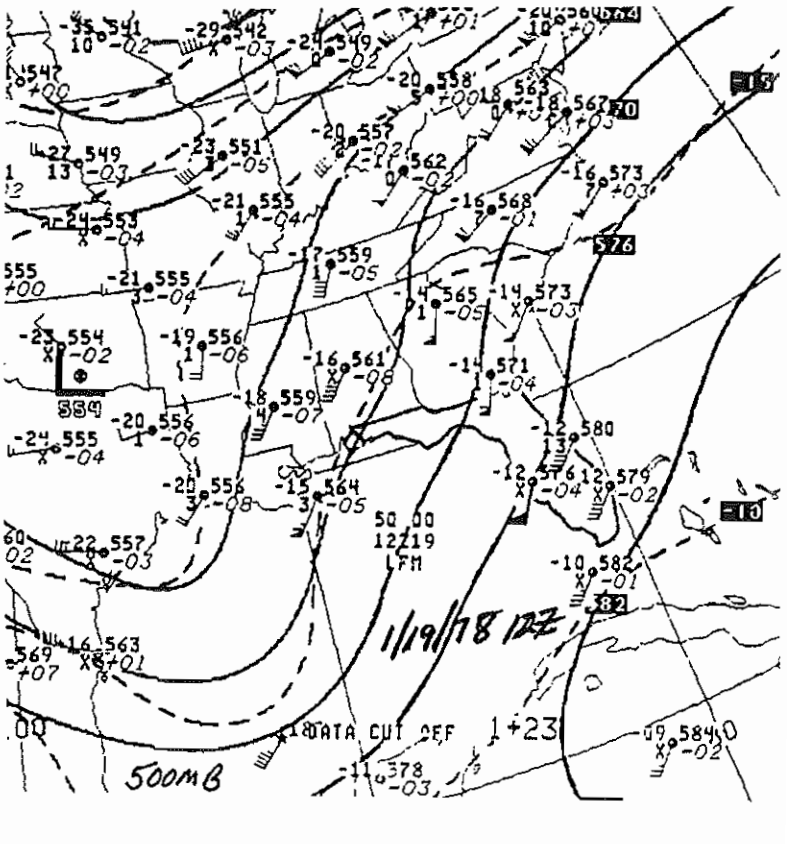

011978 0001 011978 2359 MDD 2.3 NLAT=2750 XLON=8130 RES=HI WID=3 FSCALE WIND HAI
TOT= 23
FATALITIES= 0
TORN= 0
INJURIES= 5
HAIL= 0
0
WIND= 17
56
1
0
0
60
0
62
001CST 01/19/78 - 2359CST 01/19/78
SEVERE WEATHER REPORTS

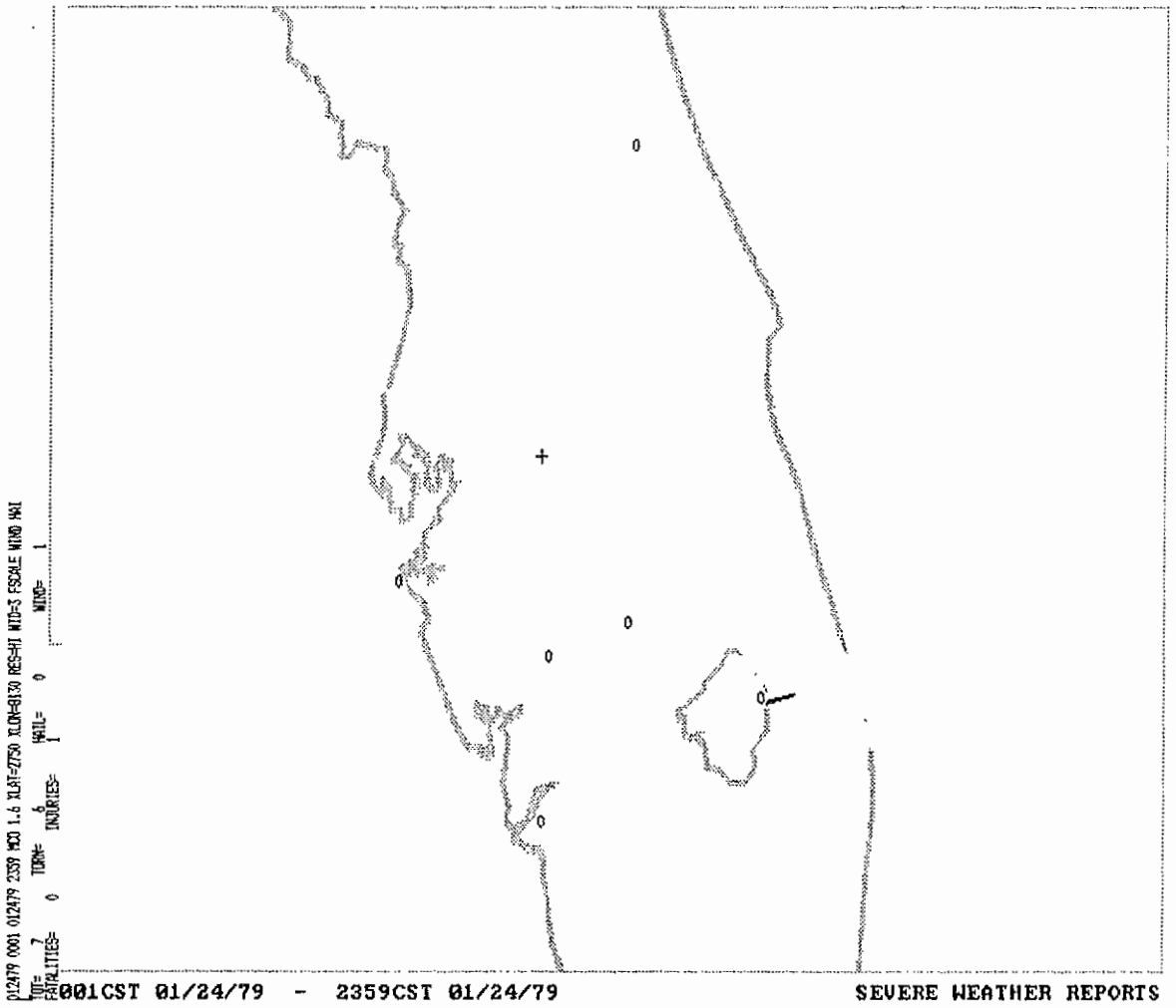

LI..... -3
TT..... 51
TEI.....20.1
K..... 33
SWEAT...410
CAP..... 1.5
PARCEL DATA
B+.... 761
B-.... 0
LPL.. 960mb
EL...39800ft
MPL..46100ft
LCL.. 1932ft
FZL..12953ft
WBZ..11526ft
PW... 1.55in
TBW / 01/19/78 / 12Z
MODIFIED
84
51
65
59
51
54
49
45
45
12
10
20
30
40
50
70
85
100
105
-20
-10
0
10
20
30
40
50

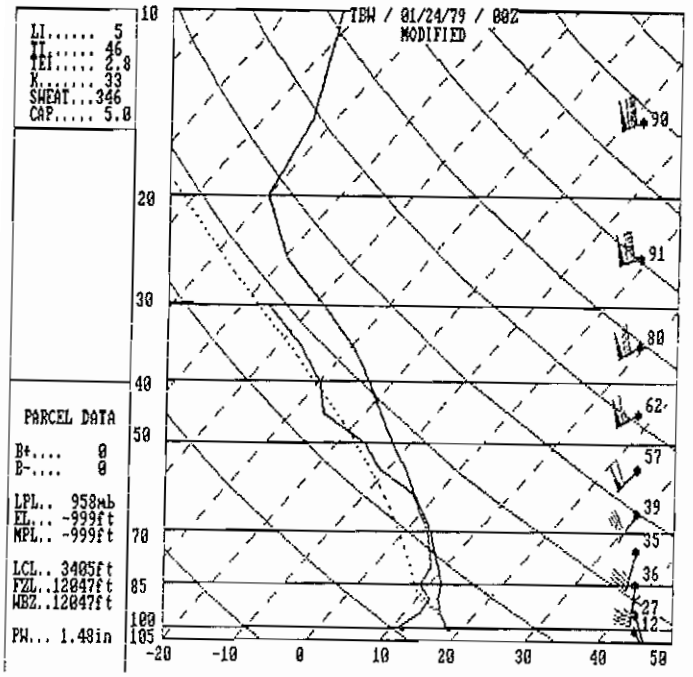

Mean Wind
0-3km.. 178/41
0-6km.. 188/44
Positive Shear
0-2km.. 10.4
0-3km.. 9.1
SR Helicity
0-2km.. 367
0-3km.. 445
Storm Motion
218/ 33
HELICITY
pos neg
0-1km.. 367 0
0-2km.. 378 -11
0-3km.. 456 -11
SHEAR
pos neg
0-1km.23.8 0.0
0-2km.10.4 0.0
0-3km. 9.1 0.0
STREAM VORTICITY
0-1km.... 161.7
0-2km.... 21.9
0-3km.... 46.0
TBW / 01/19/78 / 12Z
MODIFIED
180
090
270
360
64
32
16
32
16
32
48
64
80
SFC - 7000 m

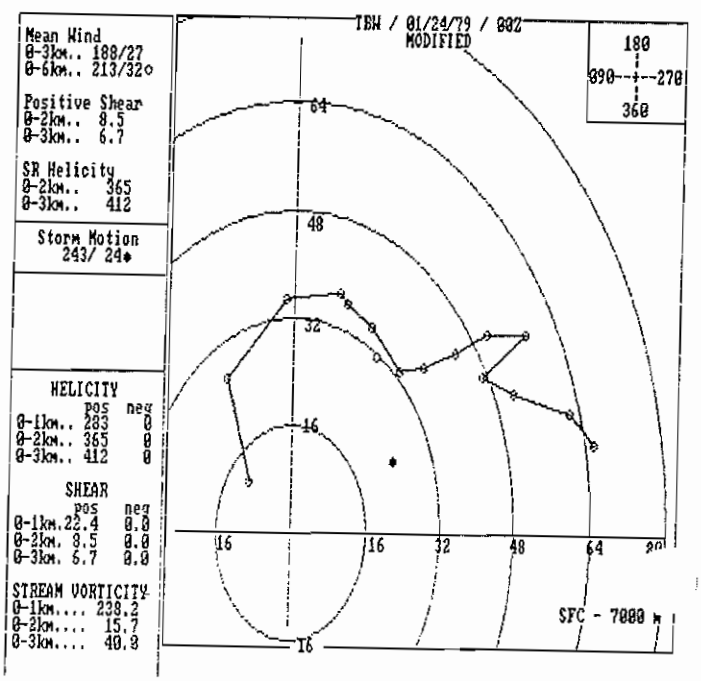

1/19/78
12Z
1/20/78
00Z

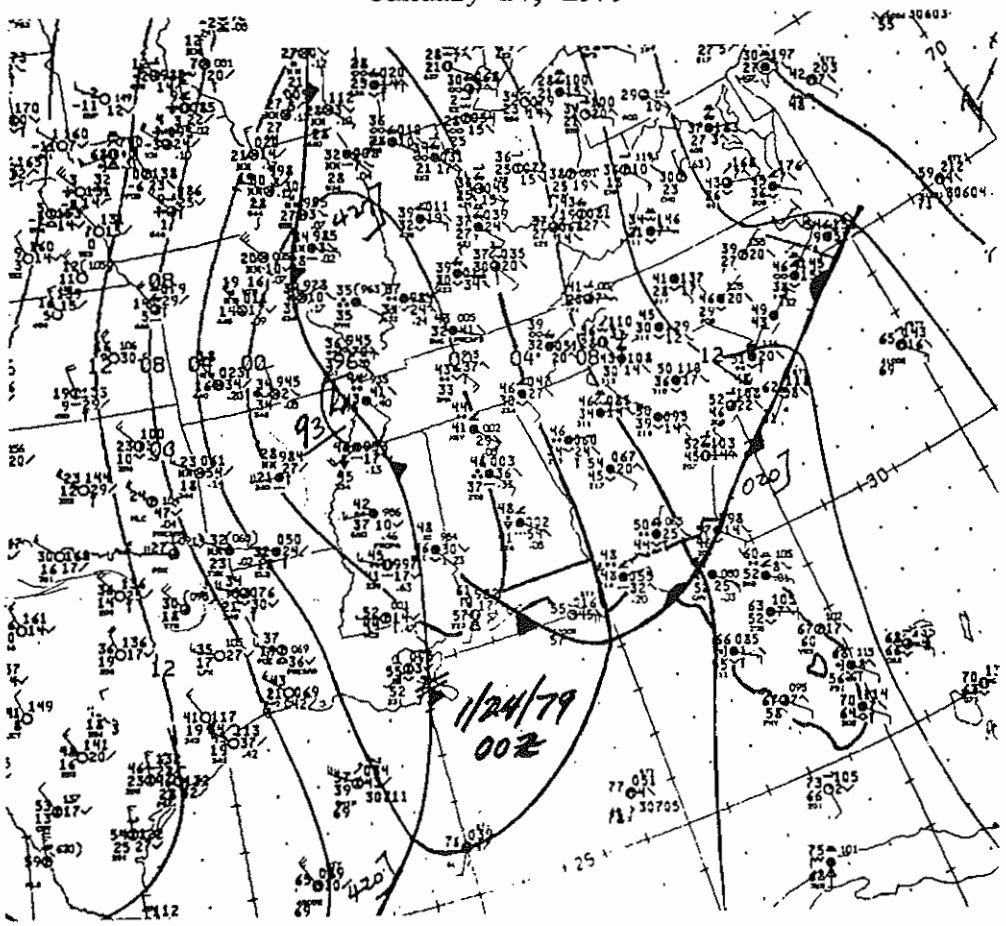

1/19/78 12Z
DATA CUT OFF
1+23
850MB

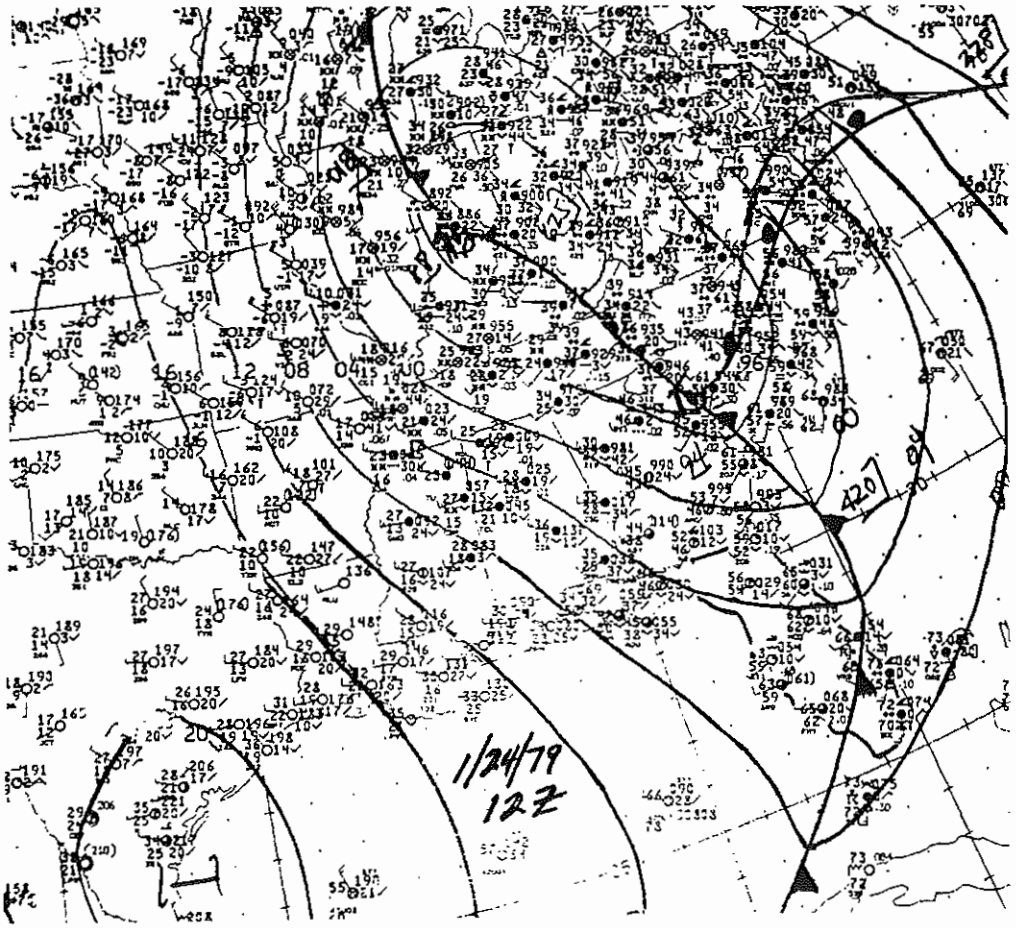

1/19/78 12Z
DATA CUT OFF
1+23
500MB

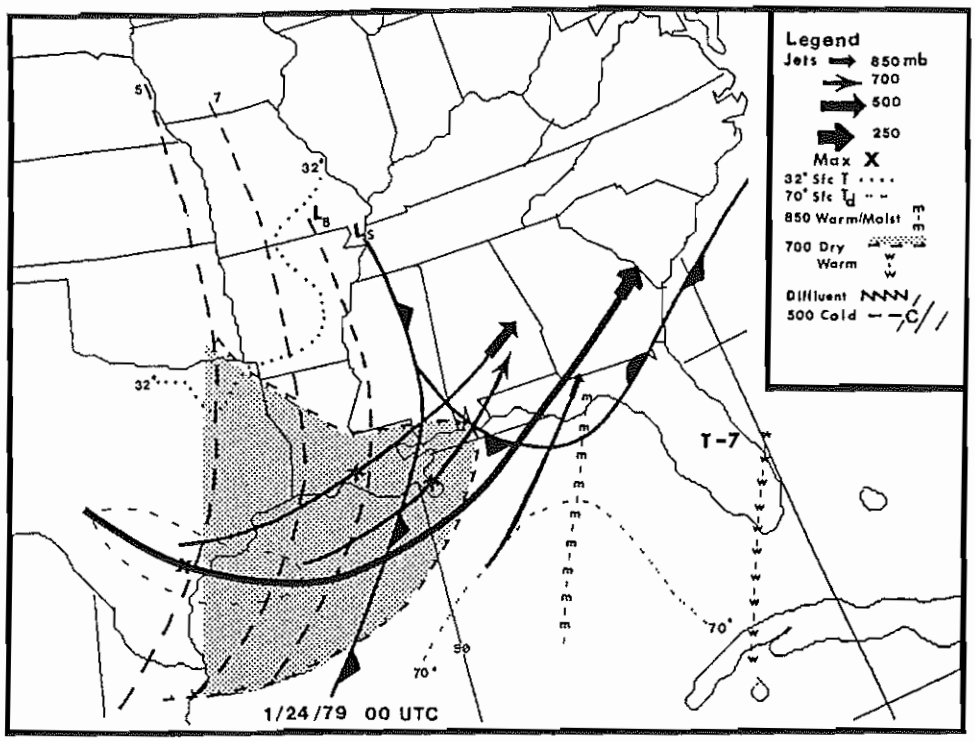

012479 0001 012479 2359 MDI 1.6 XLAT=7750 XLON=9130 RES=HI WND=5 FSCALE WIND HAI
TOT= 7 TORN= 0 INJURIES= 6 WIND= 1
PARALITIES= 0 HAIL= 0 1
0001CST 01/24/79 - 2359CST 01/24/79
SEVERE WEATHER REPORTS


LI..... 5
TT..... 46
TEI..... 2.8
K..... 33
SWEAT...346
CAP..... 5.8
PARCEL DATA
B+.... 0
B-.... 0
LPL.. 958mb
EL... -999ft
MPL.. -999ft
LCL.. 3405ft
FZL..12047ft
WBZ..12047ft
PW... 1.48in
TBW / 01/24/79 / 00Z
MODIFIED
10
20
30
40
50
70
85
100
105
-20
-10
0
10
20
30
40
50
90
91
80
62
57
39
35
36
27
12

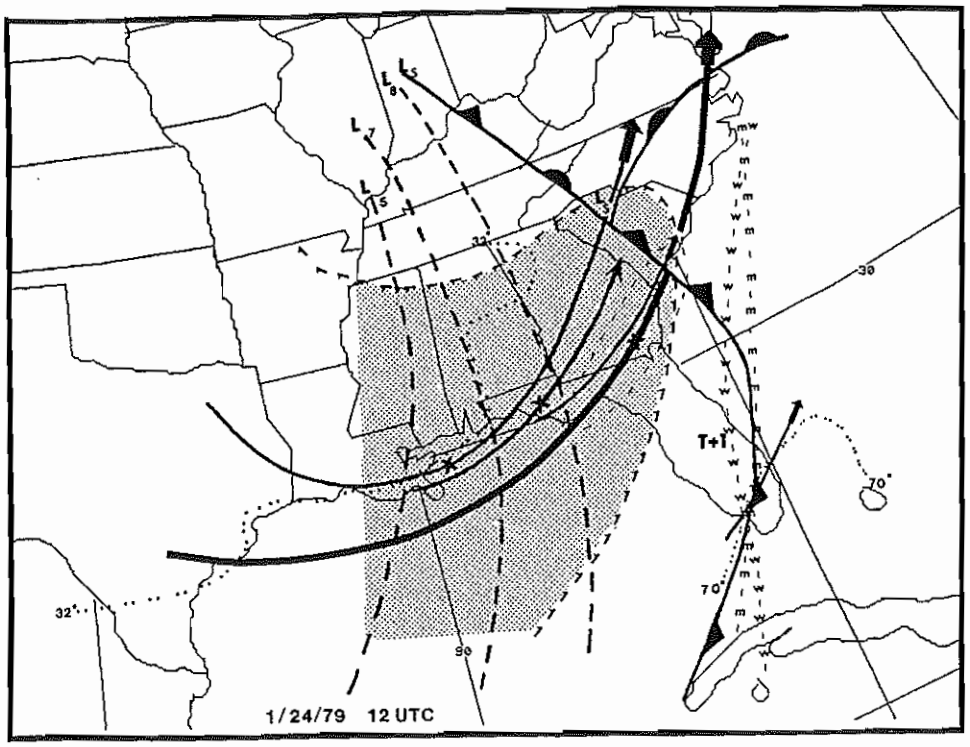

Mean Wind
0-3km.. 188/27
0-6km.. 213/32
Positive Shear
0-2km.. 8.5
0-3km.. 6.7
SR Helicity
0-2km.. 365
0-3km.. 412
Storm Motion
243/ 24
HELICITY
pos neg
0-1km.. 283 0
0-2km.. 365 0
0-3km.. 412 0
SHEAR
pos neg
0-1km.22.4 0.0
0-2km. 8.5 0.0
0-3km. 6.7 0.0
STREAM VORTICITY
0-1km.... 238.2
0-2km.... 15.7
0-3km.... 40.8
TBW / 01/24/79 / 00Z
MODIFIED
180
090
270
360
64
48
32
16
16
16
32
48
64
80
16
SFC - 7000 m


1/24/79
00Z


1/24/79
12Z



(From Hagemeyer and Schmocker 1992)



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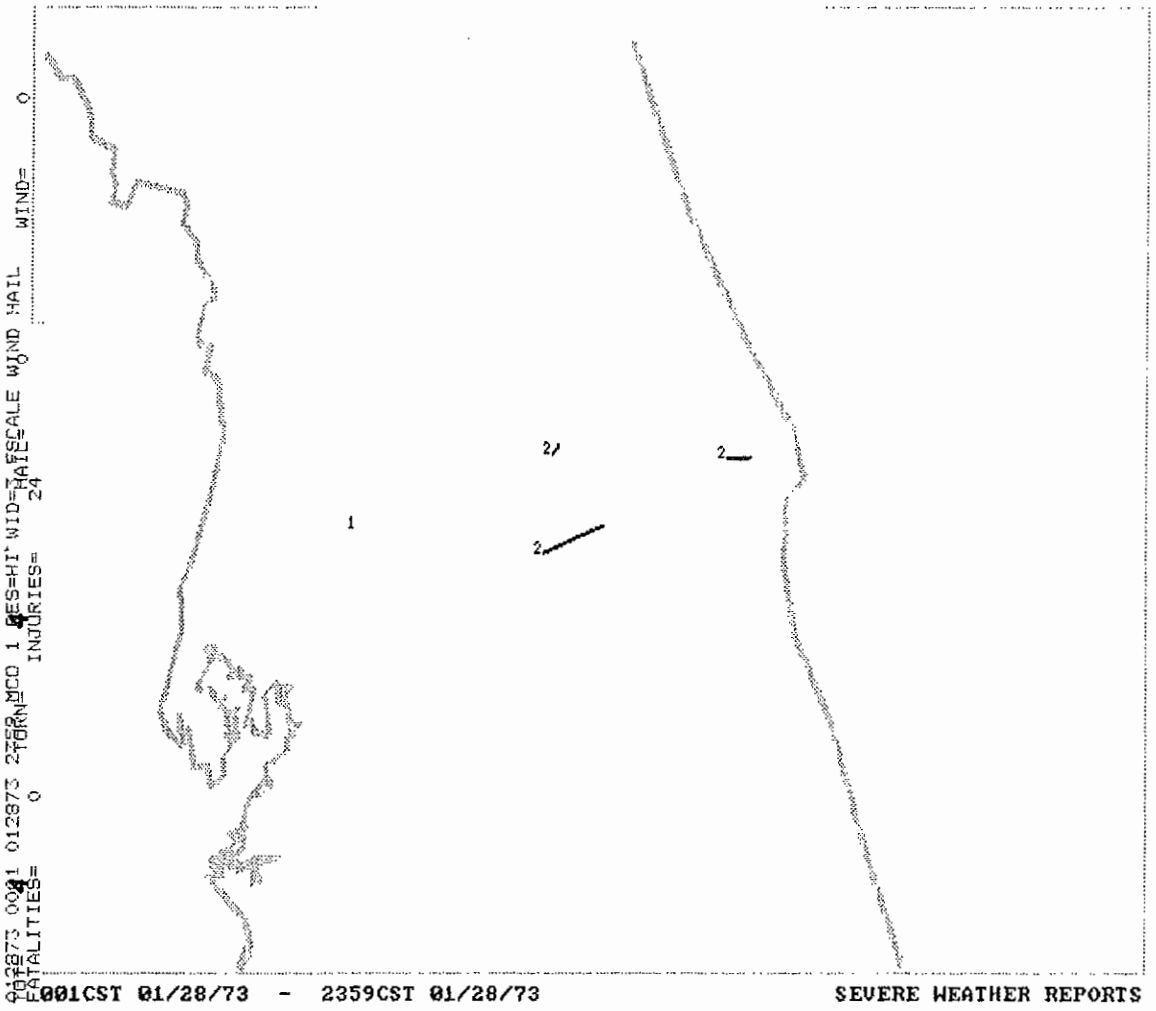
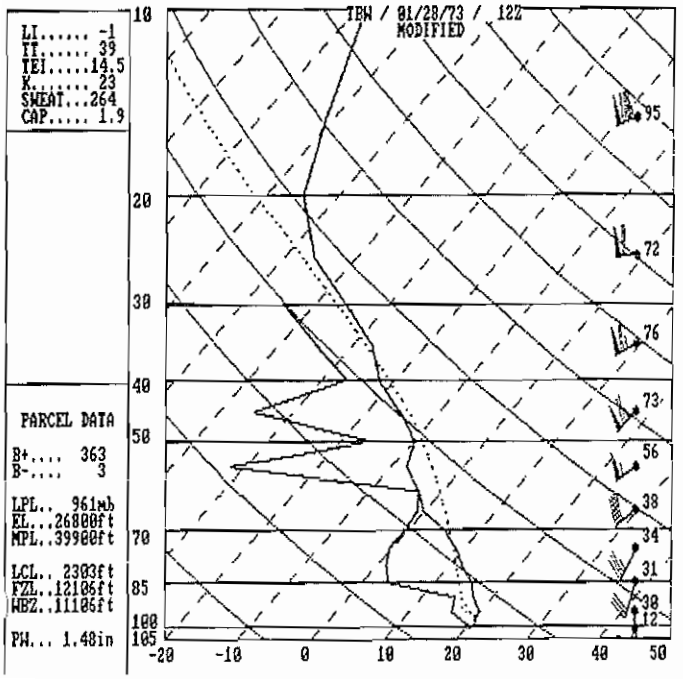
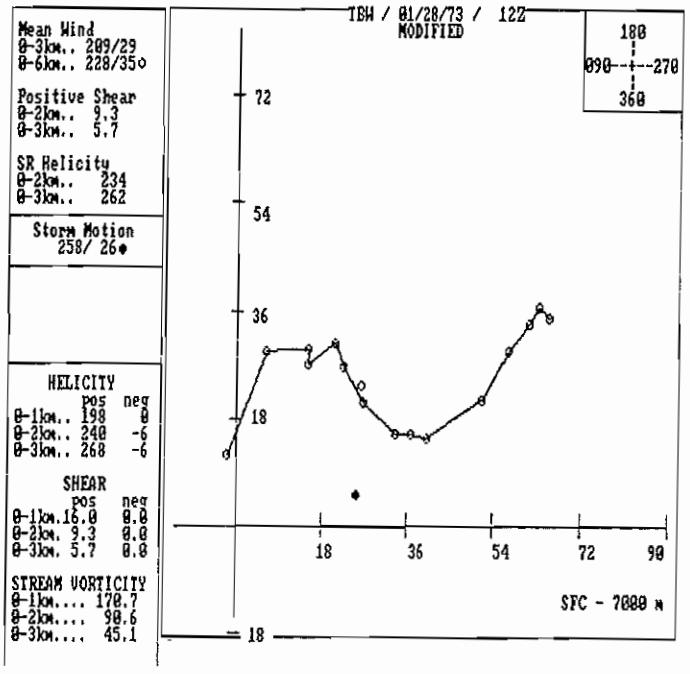
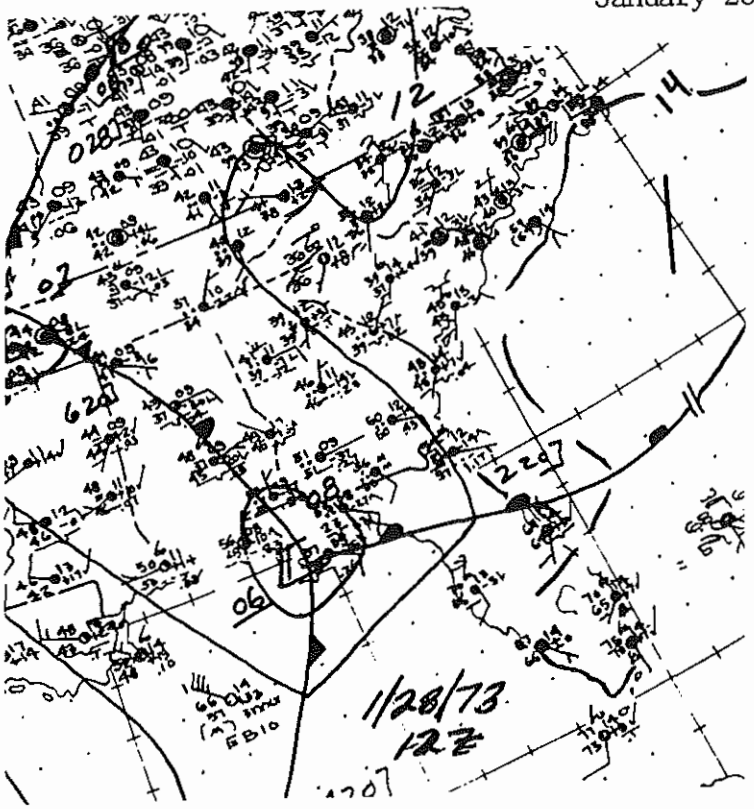
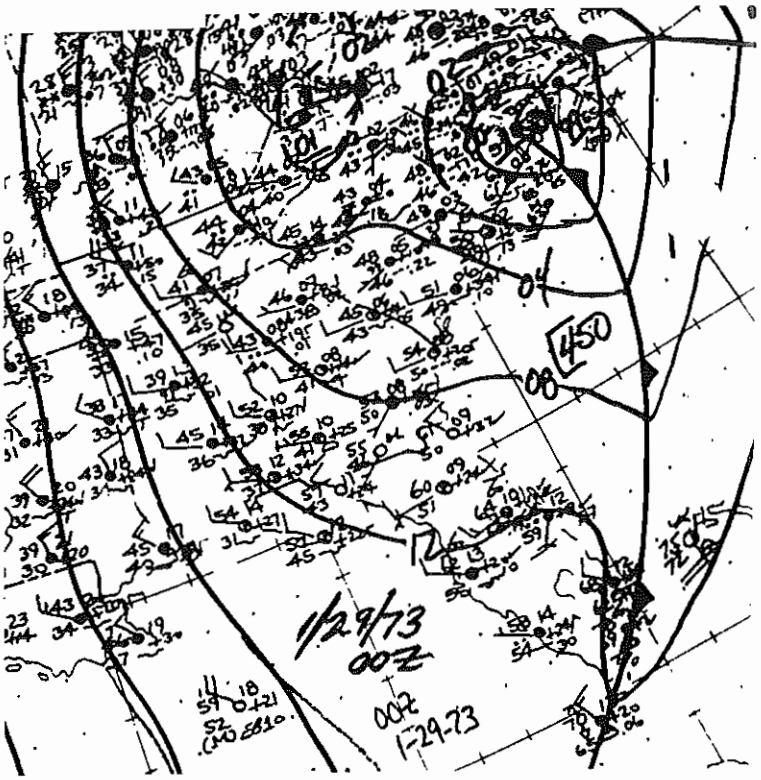
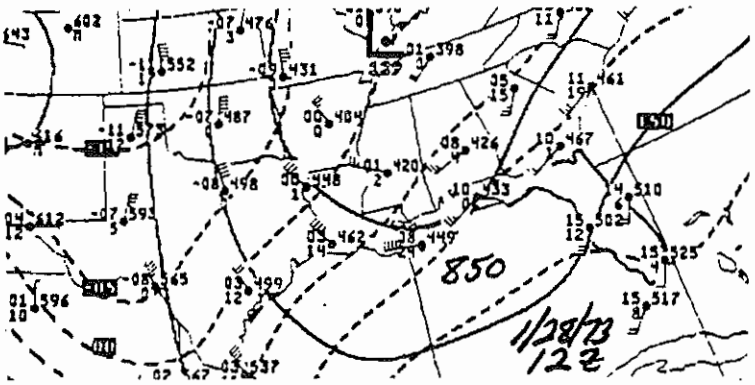

012873 0041 012873 2758 MCO 1 4 ES=HI WID=7 ESCALE WIND HAIL WIND= 0
012873 0041 FATALITIES= 0 INJURIES= 24 HAIL= 0
1
2
2
2
0001CST 01/28/73 - 2359CST 01/28/73
SEVERE WEATHER REPORTS

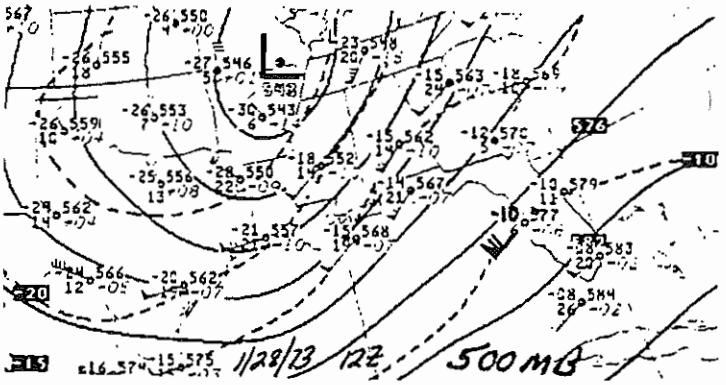

TBW / 01/28/73 / 122
MODIFIED
LI..... -1
TI..... 39
TEI.....14.5
K.....23
SWEAT...264
CAP..... 1.9
PARCEL DATA
B+.... 363
B-.... 3
LPL.. 961mb
EL...26800ft
MPL..39900ft
LCL.. 2303ft
FZL..12106ft
WBZ..11106ft
PW... 1.48in
10
20
30
40
50
70
85
100
105
-20
-10
0
10
20
30
40
50
95
72
76
73
56
38
34
31
38
12

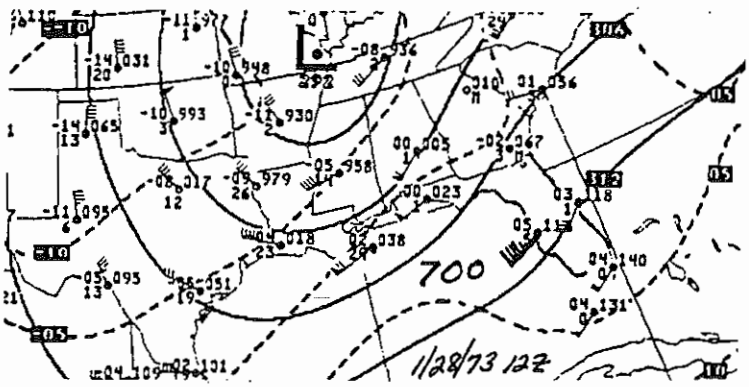

Mean Wind
0-3km.. 209/29
0-6km.. 228/35
Positive Shear
0-2km.. 9.3
0-3km.. 5.7
SR Helicity
0-2km.. 234
0-3km.. 262
Storm Motion
259/ 26
HELICITY
pos neg
0-1km.. 198 0
0-2km.. 240 -6
0-3km.. 268 -6
SHEAR
pos neg
0-1km.16.0 0.0
0-2km. 9.3 0.0
0-3km. 5.7 0.0
STREAM VORTICITY
0-1km.... 170.7
0-2km.... 90.6
0-3km.... 45.1
TBW / 01/28/73 / 122
MODIFIED
180
090
270
360
72
54
36
18
18
36
54
72
90
18
SFC - 7000 M

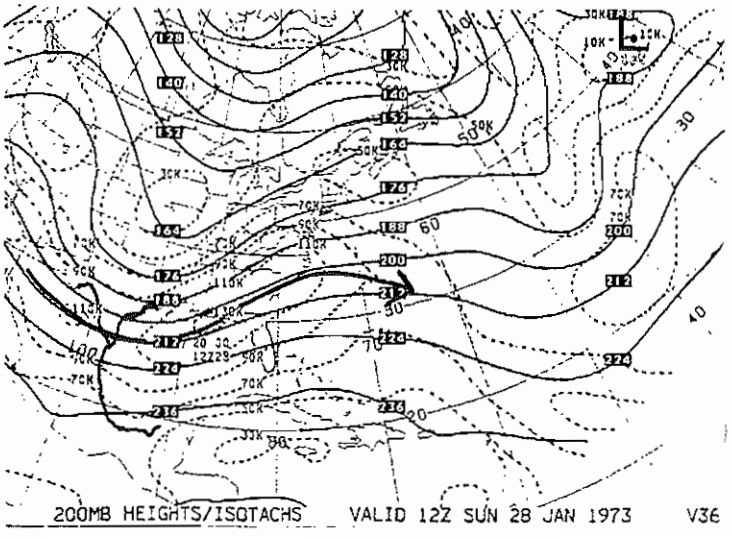

11/28/73
12Z

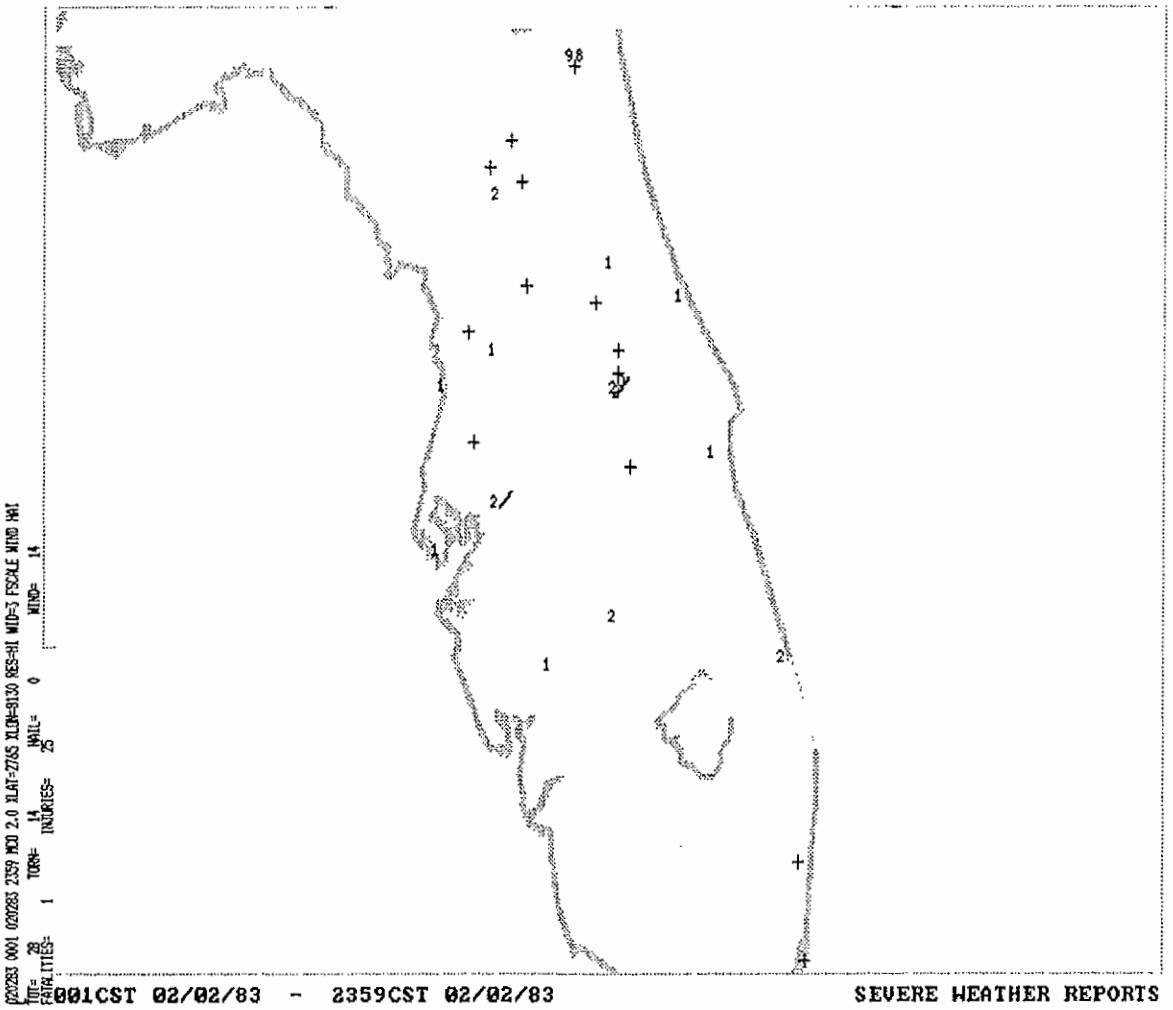

11/29/73
00Z
1-29-73


850
11/28/73
12Z

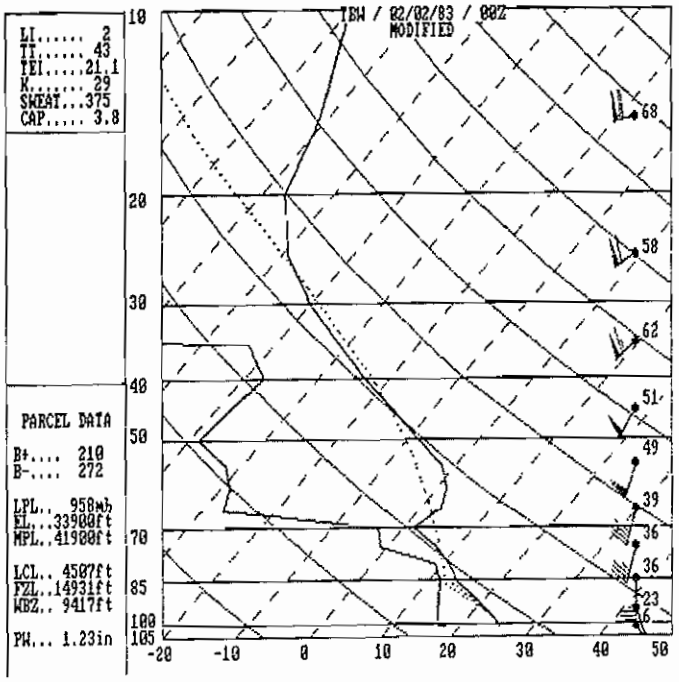

11/28/73 12Z
500MB

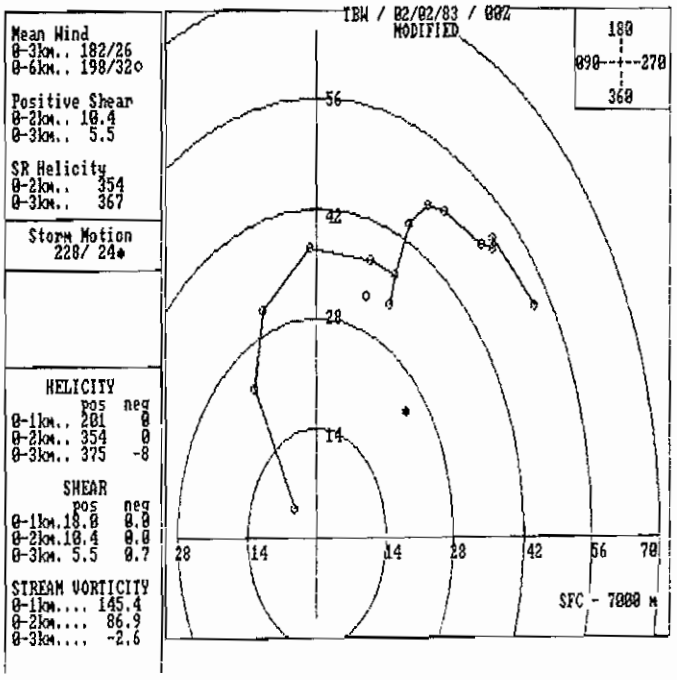

700
11/28/73 12Z


200MB HEIGHTS/ISOTACHS VALID 12Z SUN 28 JAN 1973 V36

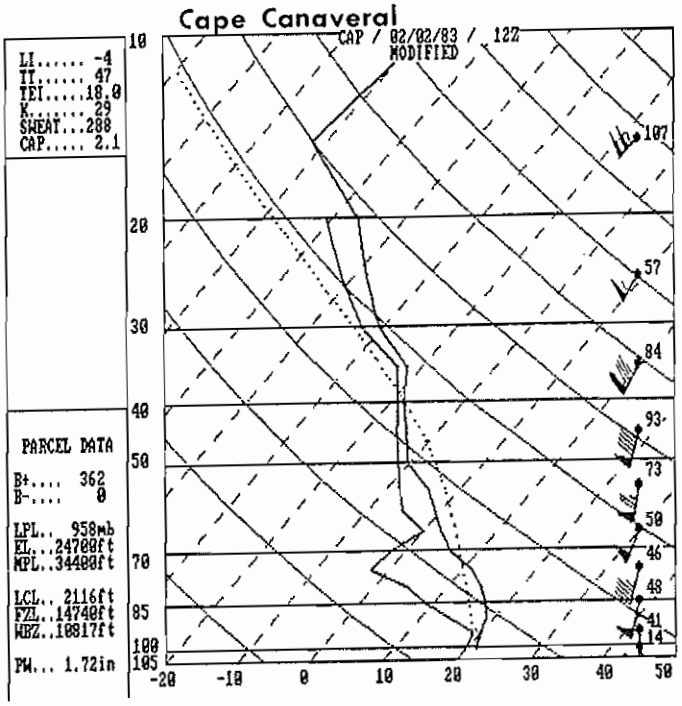


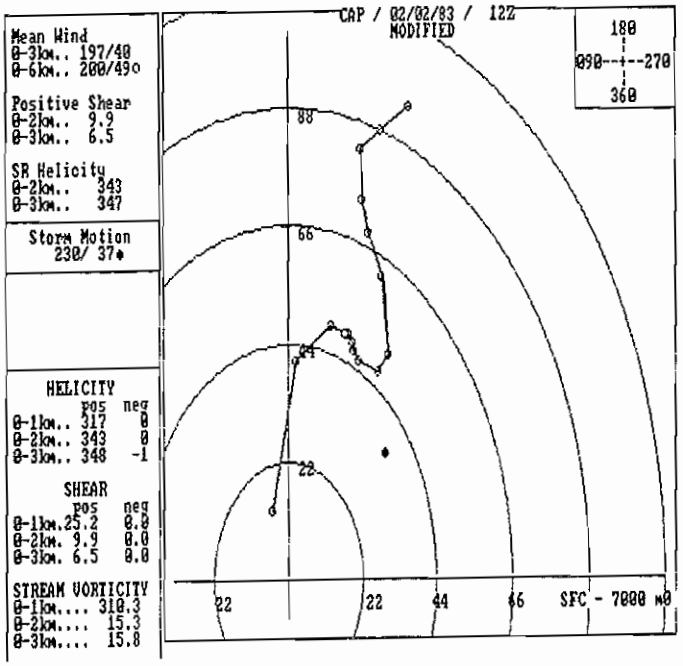
(See Colin 1983)

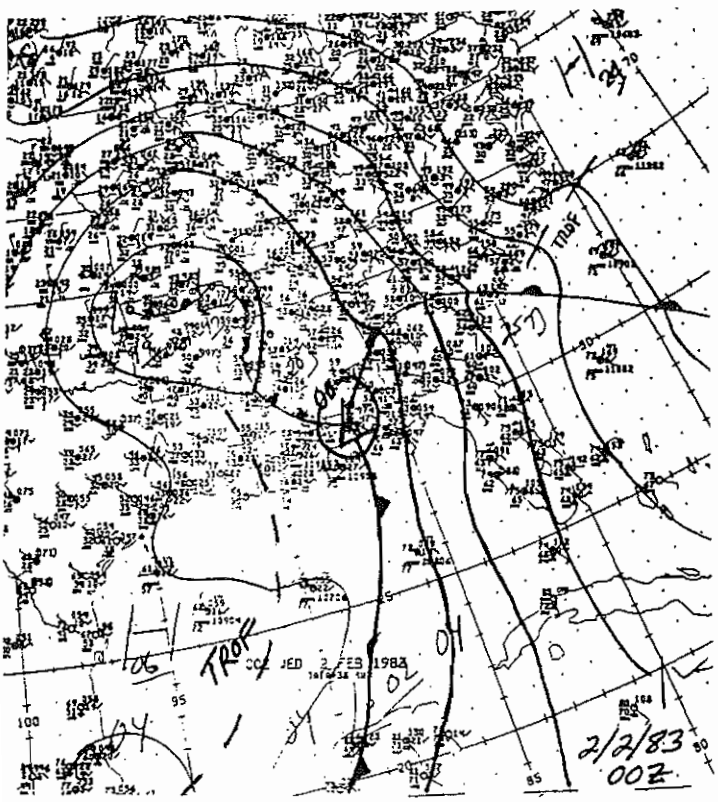


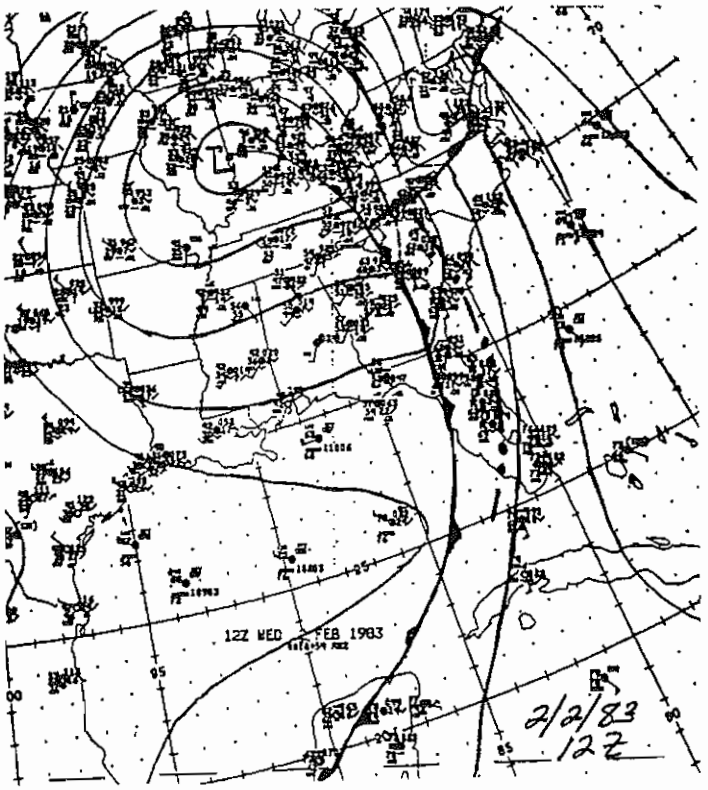


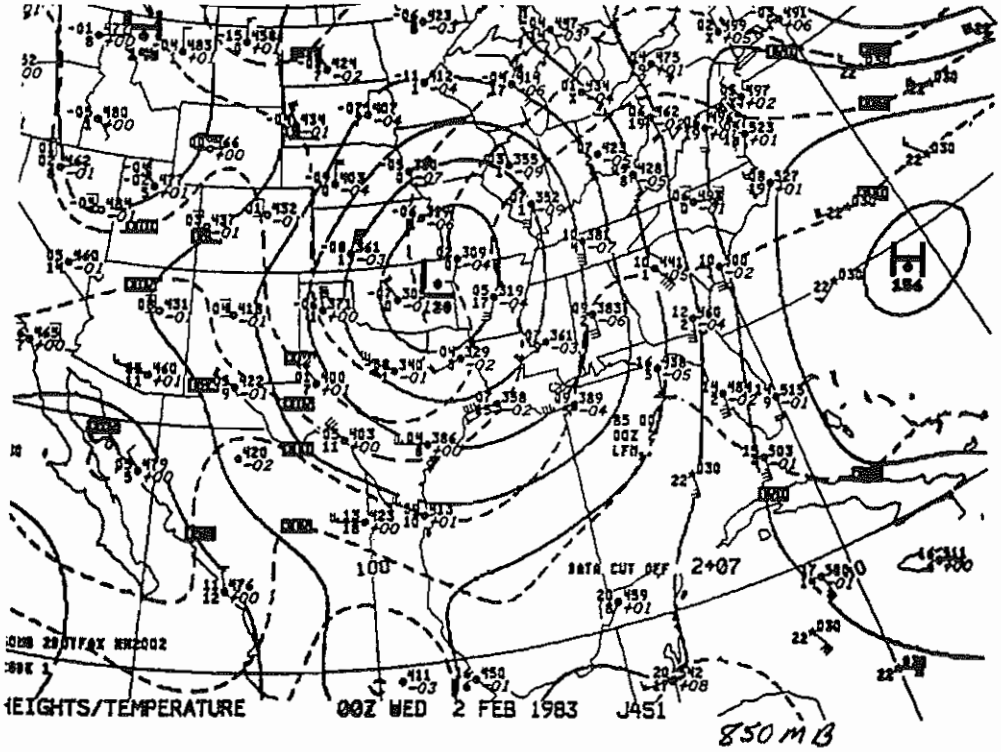
February 2, 1983

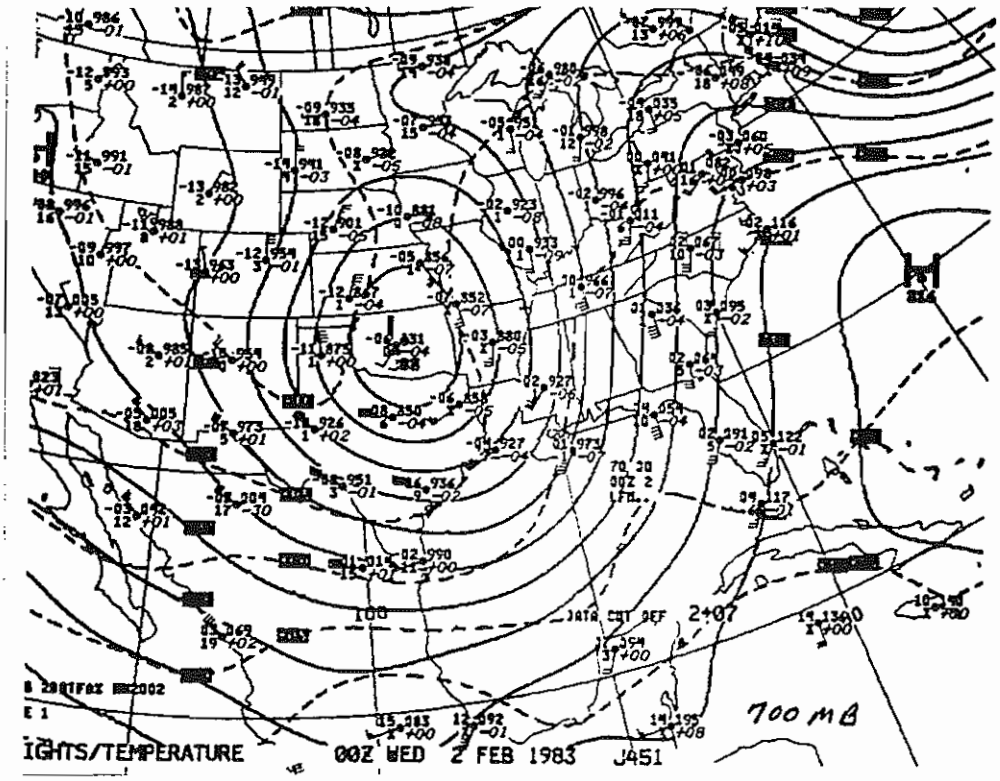




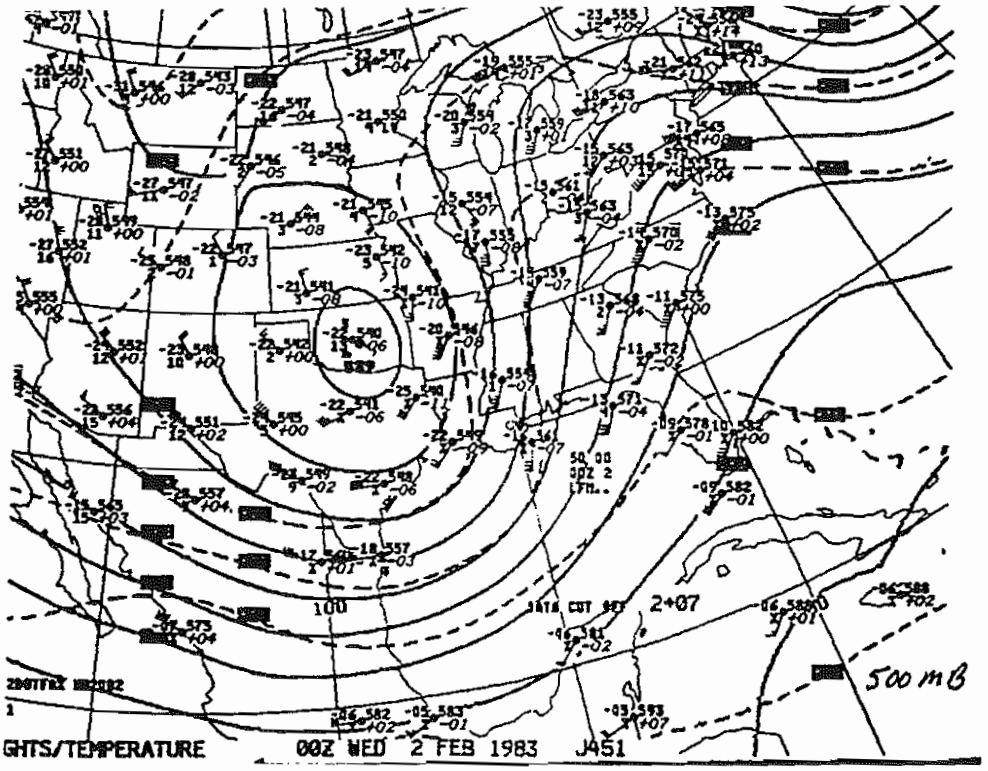


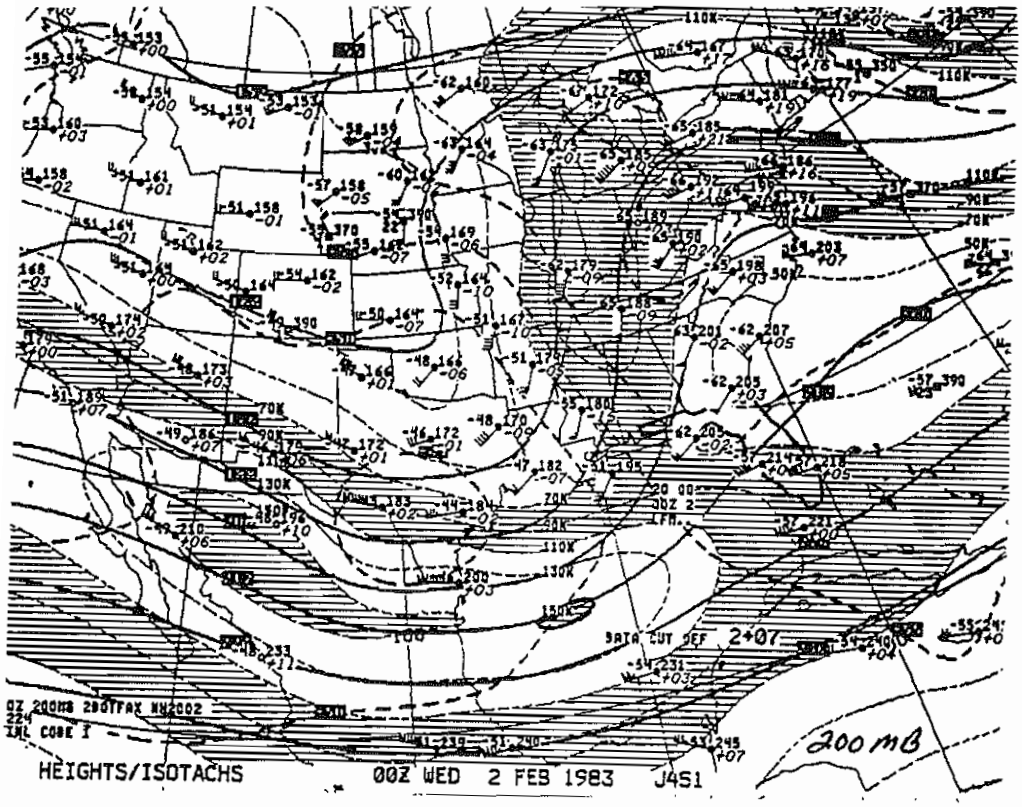


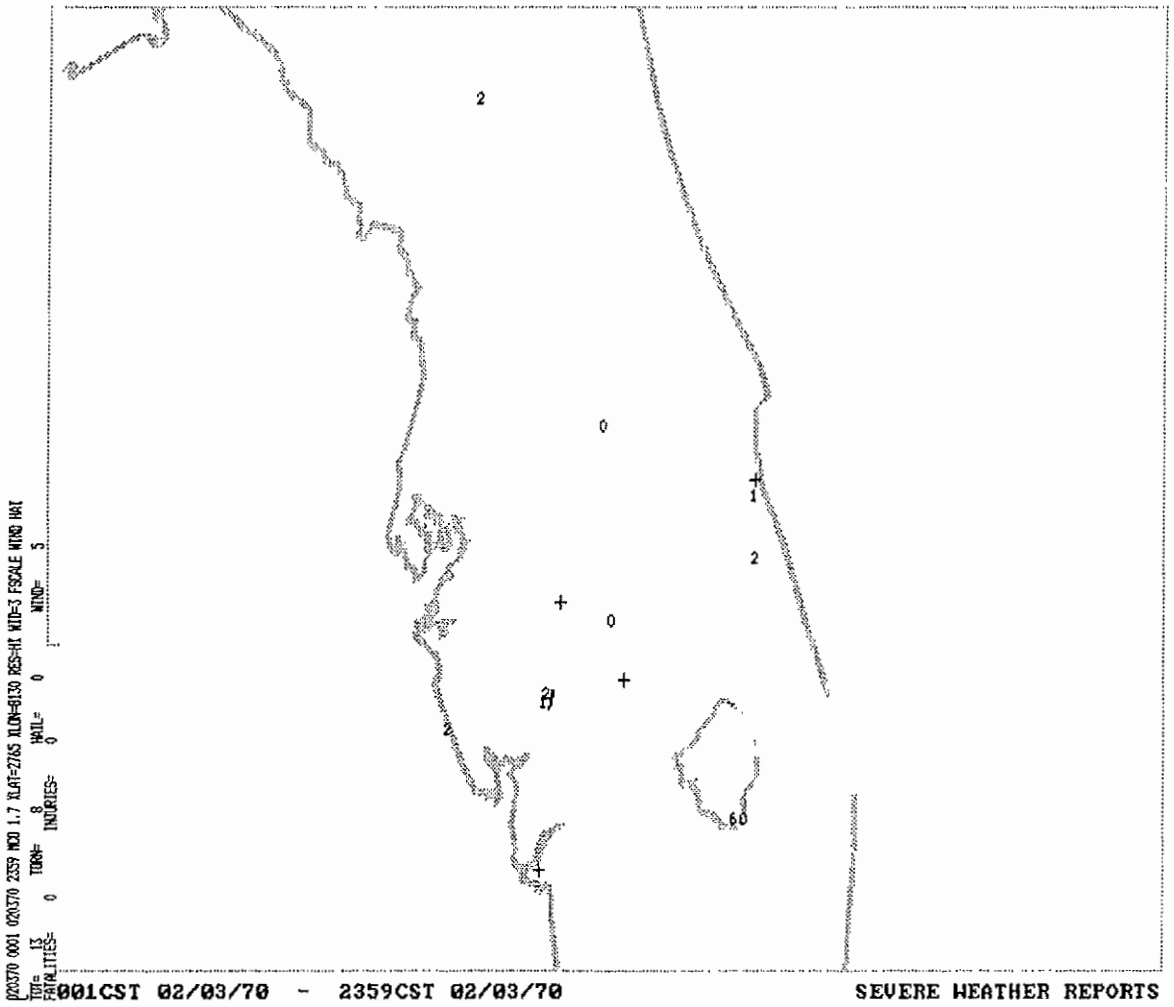

HEIGHTS/TEMPERATURE
00Z WED 2 FEB 1983 J451
850 MB

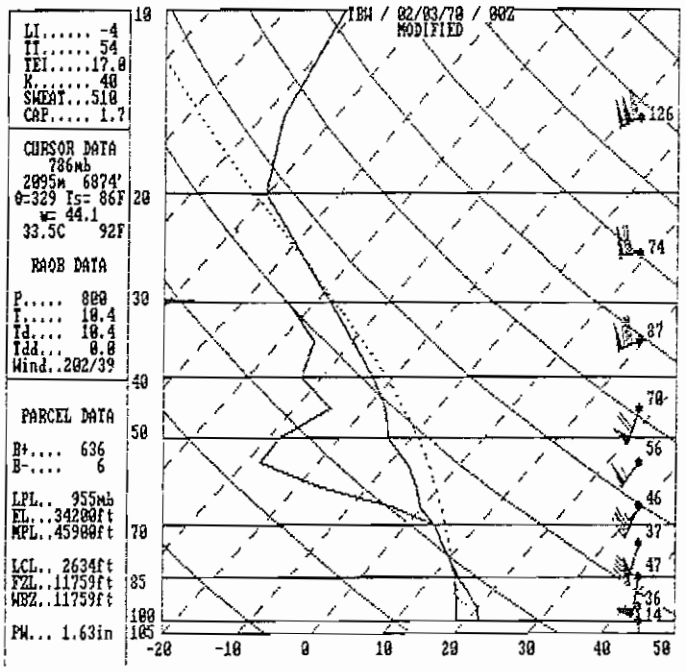

IGHTS/TEMPERATURE
00Z WED 2 FEB 1983 J451
700 MB

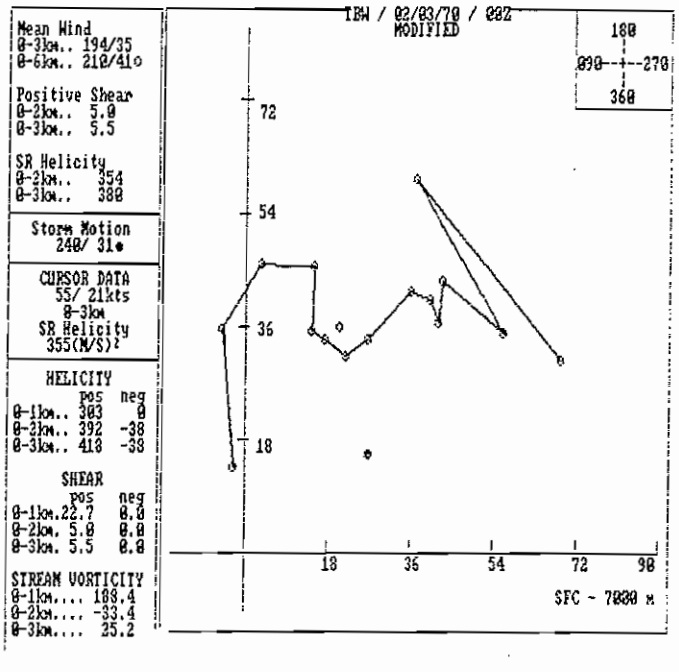
February 2, 1983



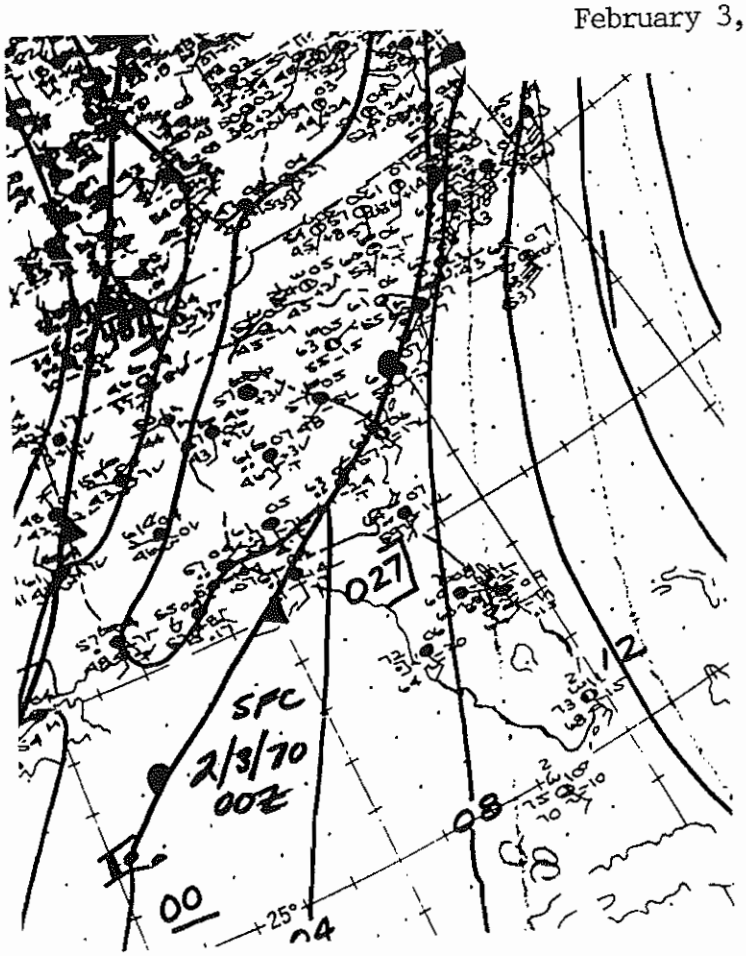


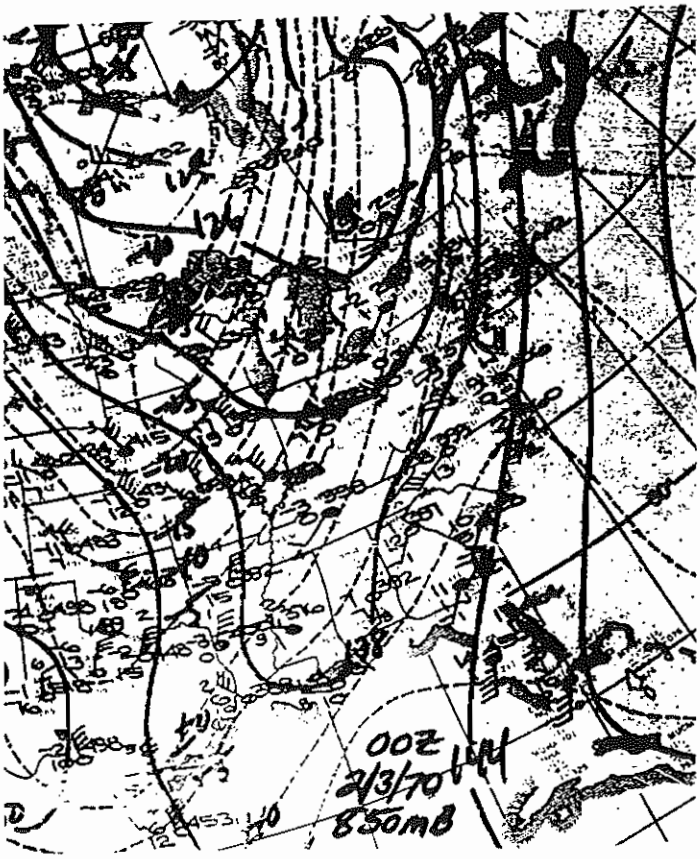

020370 0001 020370 2359 MOD 1.7 XLAT=2785 XLON=8130 RES=HI WID=3 FSCALE WIND HAI
TOR= 0 INJURIES= 8 HAIL= 0 WIND= 5
TOT= 13 FATALITIES= 0
0001CST 02/03/70 - 2359CST 02/03/70
SEVERE WEATHER REPORTS

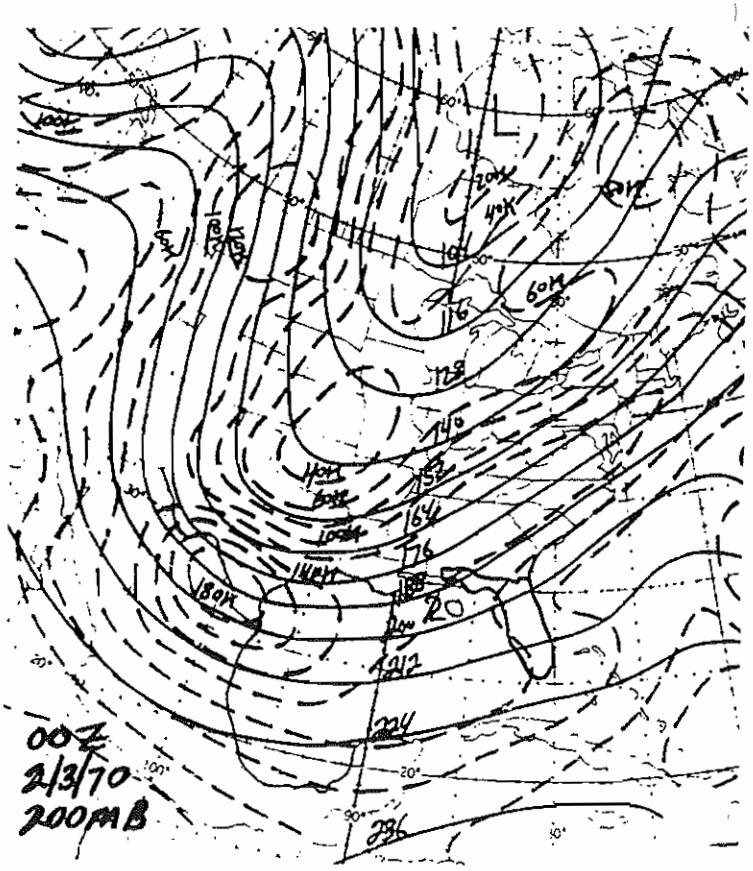

LI..... -4
TI..... 54
TEI.....17.0
K.....40
SWEAT...510
CAP..... 1.7
CURSOR DATA
786mb
2095m 6874'
θ=329 Is= 86F
W= 44.1
33.5C 92F
RAOB DATA
P..... 800
T..... 10.4
Td.... 10.4
Tdd... 0.0
Wind..202/39
PARCEL DATA
B+.... 636
B-.... 6
LPL.. 955mb
EL...34200ft
MPL..45900ft
LCL.. 2634ft
FZL..11759ft
WBZ..11759ft
PW... 1.63in
IBW / 02/03/70 / 00Z
MODIFIED
126
74
87
70
56
46
37
47
36
14
-20 -10 0 10 20 30 40 50

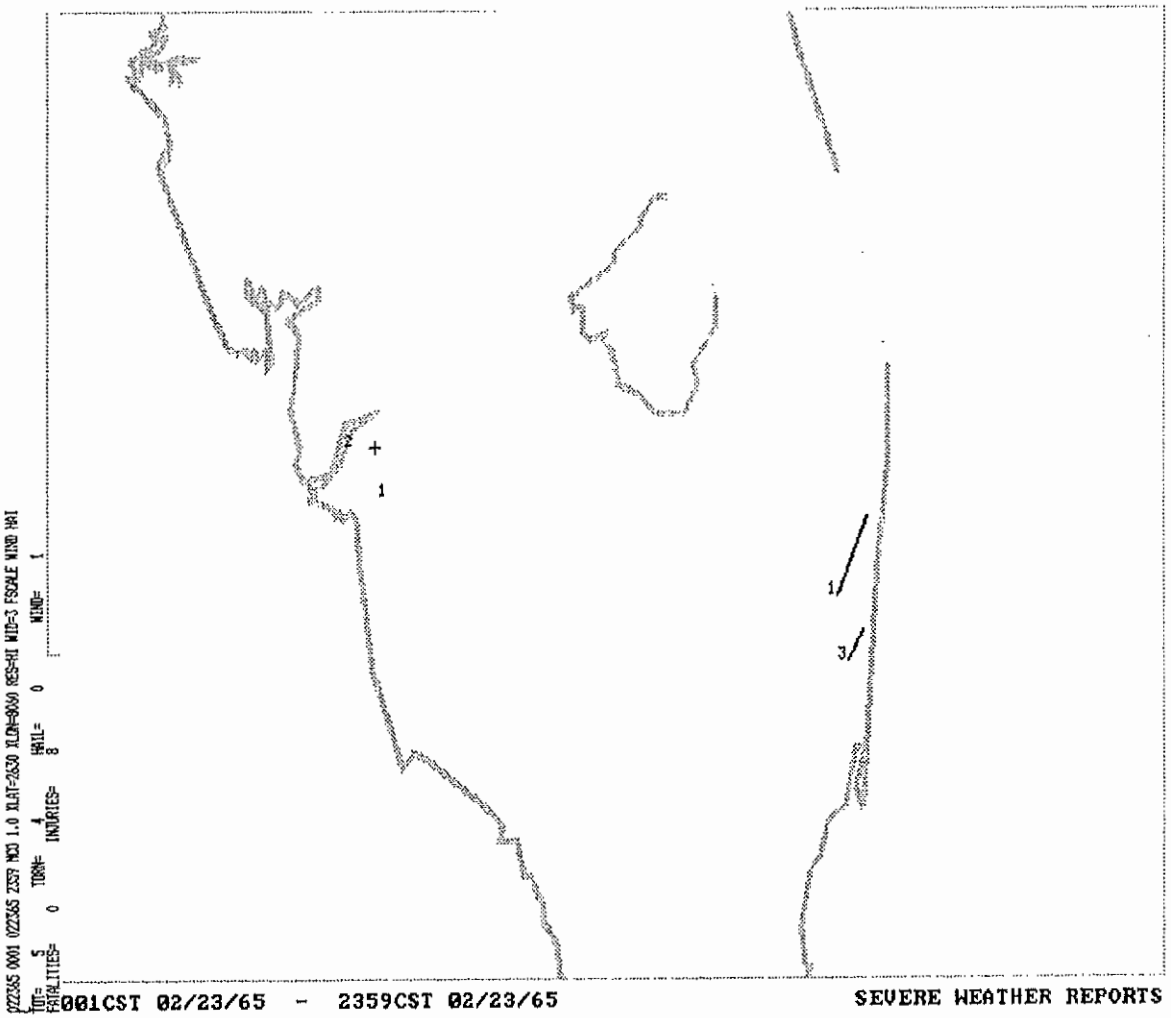

Mean Wind
0-3km.. 194/35
0-6km.. 210/41
Positive Shear
0-2km.. 5.0
0-3km.. 5.5
SR Helicity
0-2km.. 354
0-3km.. 388
Storm Motion
240/ 31
CURSOR DATA
55/ 21kts
0-3km
SR Helicity
355(M/S)²
HELICITY
pos neg
0-1km.. 303 0
0-2km.. 392 -38
0-3km.. 418 -38
SHEAR
pos neg
0-1km.. 22.7 0.0
0-2km.. 5.0 0.0
0-3km.. 5.5 0.0
STREAM VORTICITY
0-1km.... 188.4
0-2km.... -33.4
0-3km.... 25.2
IBW / 02/03/70 / 00Z
MODIFIED
180
090 270
360
72
54
36
18
18 36 54 72 90
SFC - 7000 m

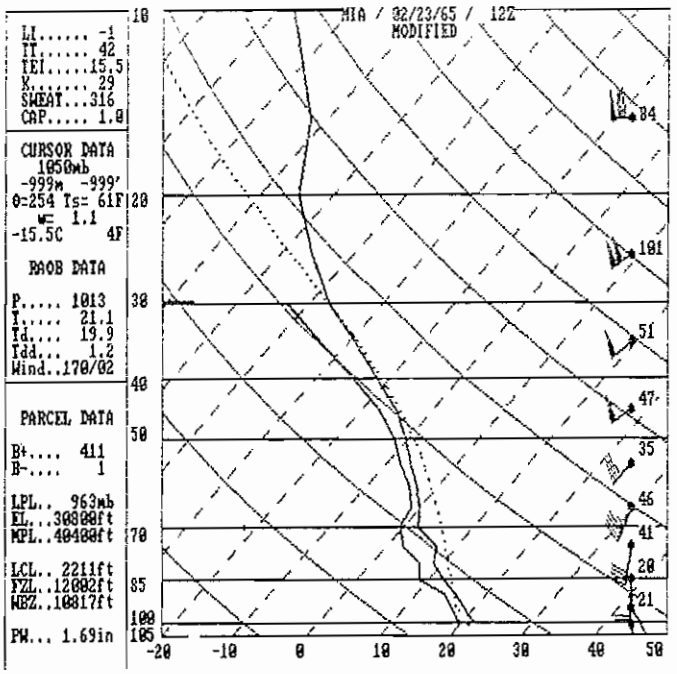
February 3, 1970

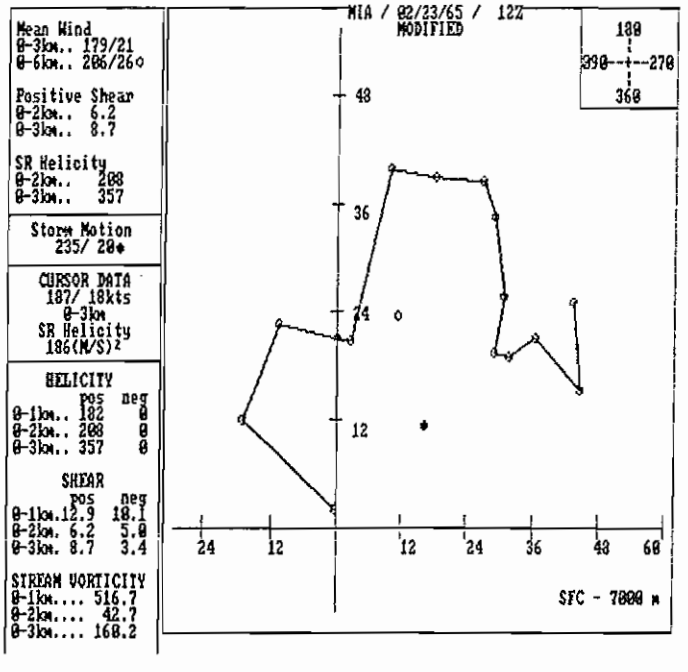


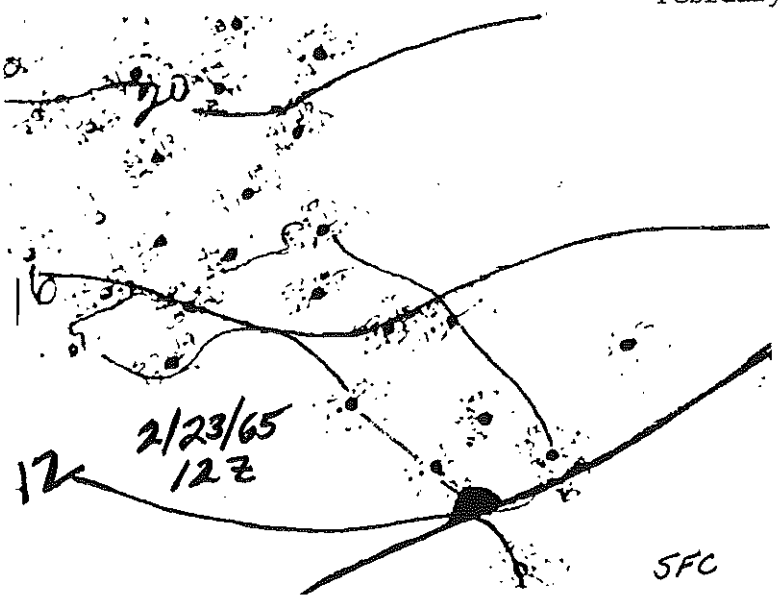


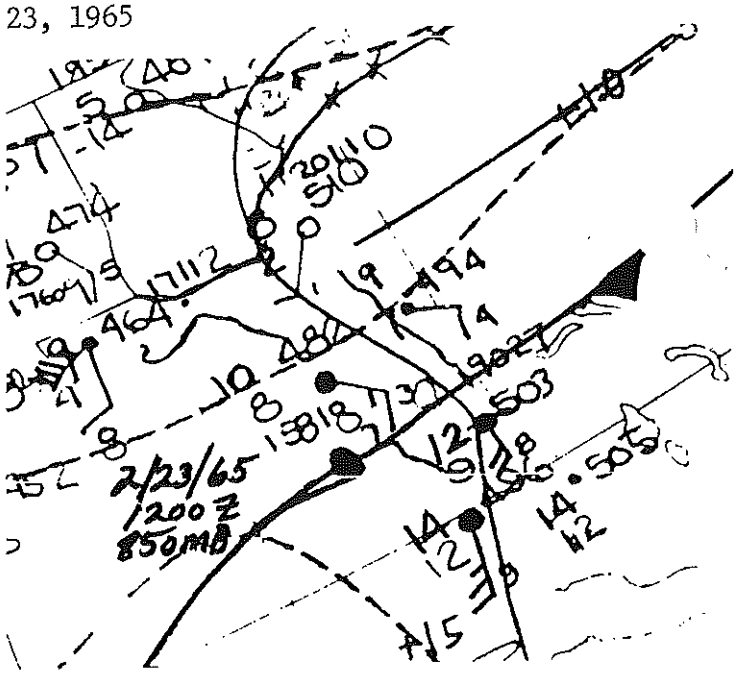


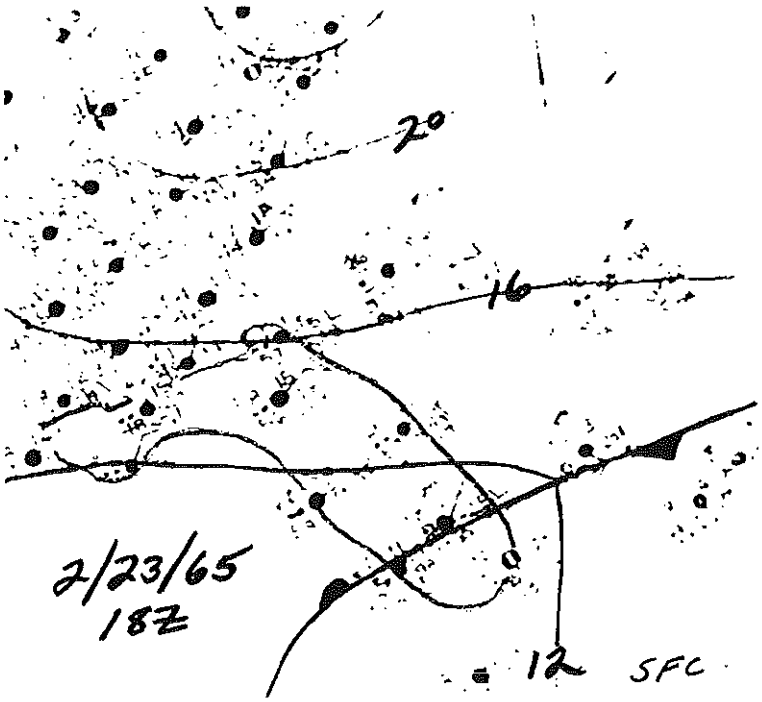

0001CST 02/23/65 - 2359CST 02/23/65
SEVERE WEATHER REPORTS

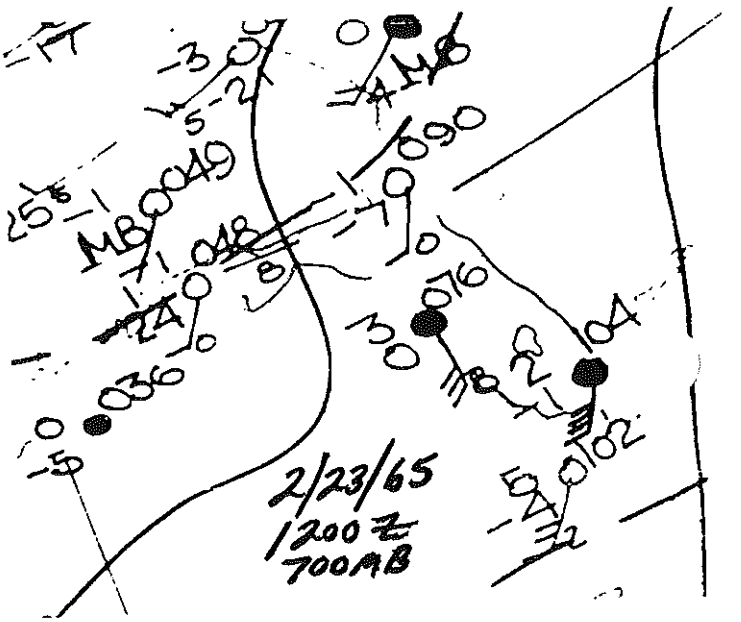

MIA / 02/23/65 / 12Z
MODIFIED
LI..... -1
TT..... 42
TEI.....15.5
K..... 29
SWEAT...316
CAP..... 1.0
CURSOR DATA
1050mb
-999m -999'
θ=254 Ts= 61F
WC 1.1
-15.5C 4F
RAOB DATA
P..... 1013
T..... 21.1
Td.... 19.9
Tdd... 1.2
Wind..170/02
PARCEL DATA
B+.... 411
B-.... 1
LPL.. 963mb
EL...30800ft
MPL..40400ft
LCL.. 2211ft
FZL..12002ft
WBZ..10817ft
PW... 1.69in
84
181
51
47
35
46
41
20
21

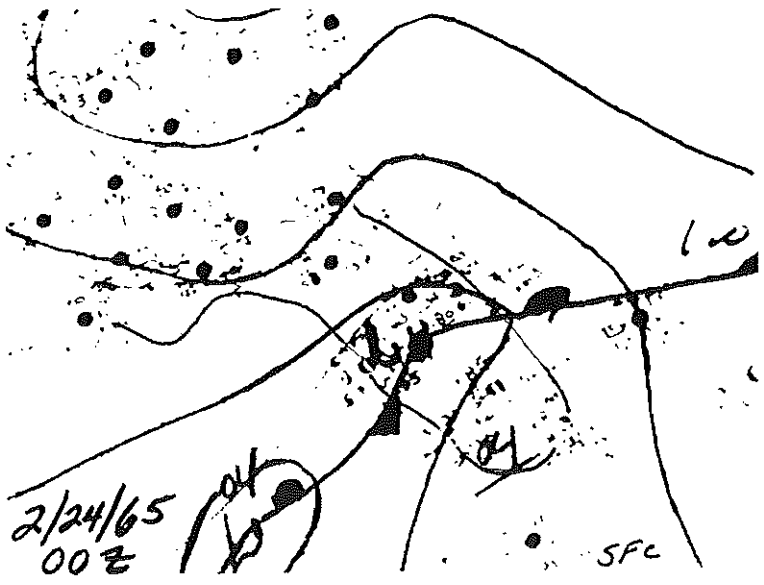

Mean Wind
0-3km.. 179/21
0-6km.. 206/26
Positive Shear
0-2km.. 6.2
0-3km.. 8.7
SR Helicity
0-2km.. 208
0-3km.. 357
Storm Motion
235/ 20
CURSOR DATA
187/ 18kts
0-3km
SR Helicity
186(M/S)²
HELICITY
pos neg
0-1km.. 182 0
0-2km.. 208 0
0-3km.. 357 0
SHEAR
pos neg
0-1km.12.9 10.1
0-2km. 6.2 5.0
0-3km. 8.7 3.4
STREAM VORTICITY
0-1km.... 516.7
0-2km.... 42.7
0-3km.... 168.2
MIA / 02/23/65 / 12Z
MODIFIED
SFC - 7000 m

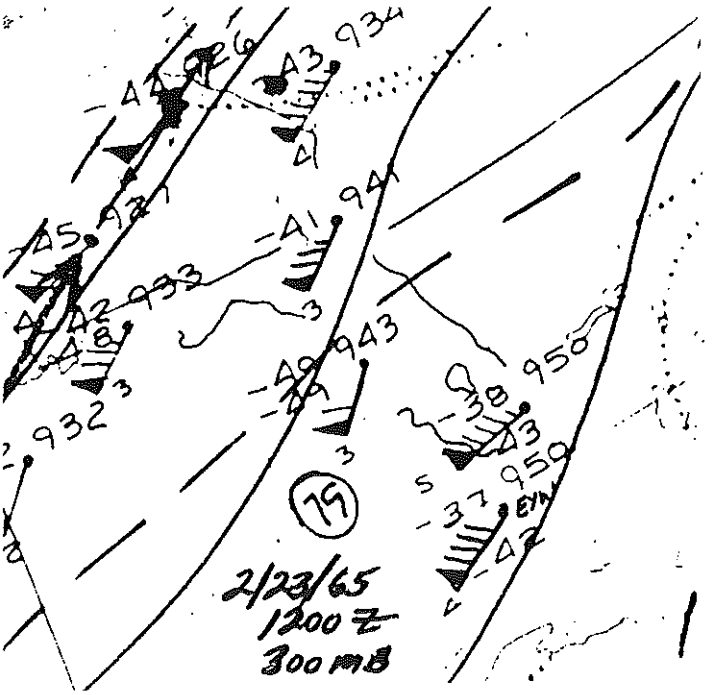

2/23/65
12Z
SFC


2/23/65
1200Z
850MB

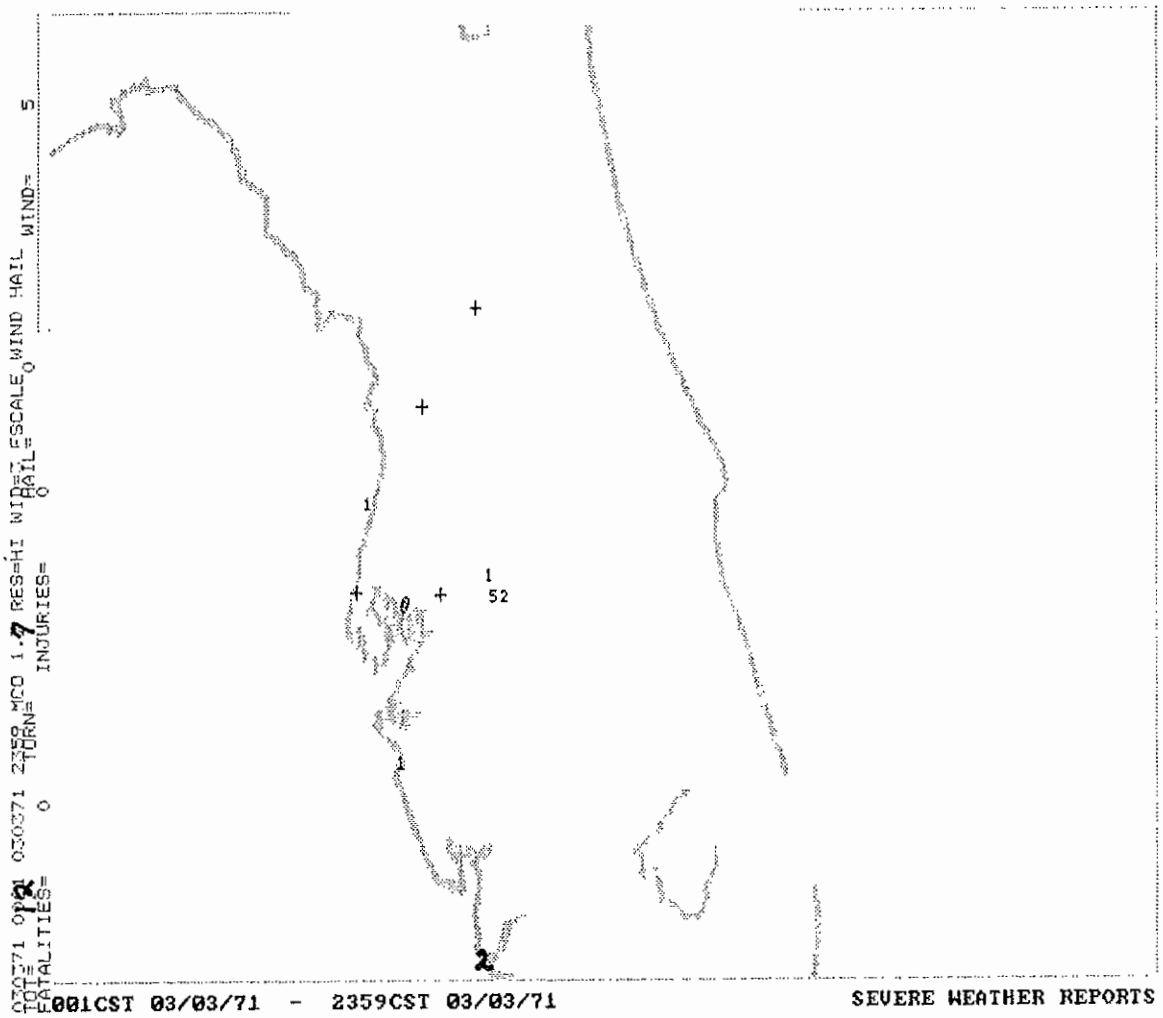

2/23/65
18Z
SFC


2/23/65
1200Z
700MB

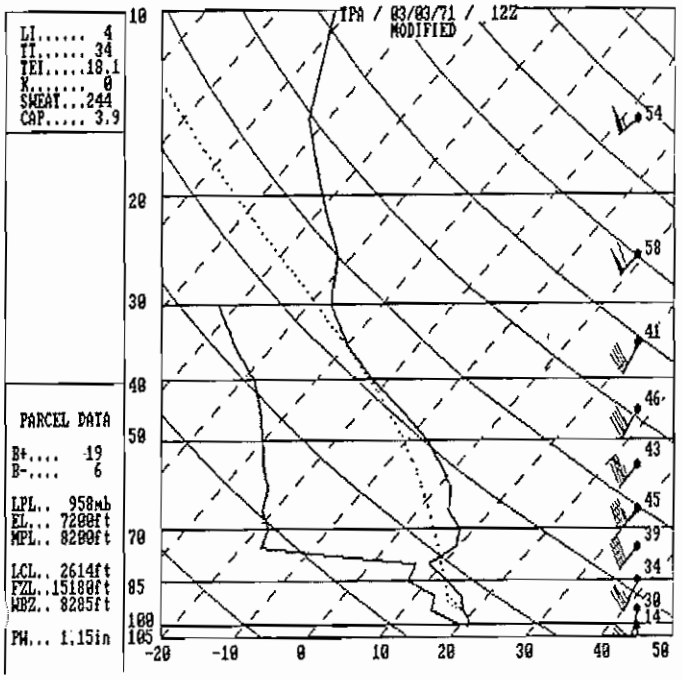

2/24/65
00Z
SFC


2/23/65
1200Z
300MB

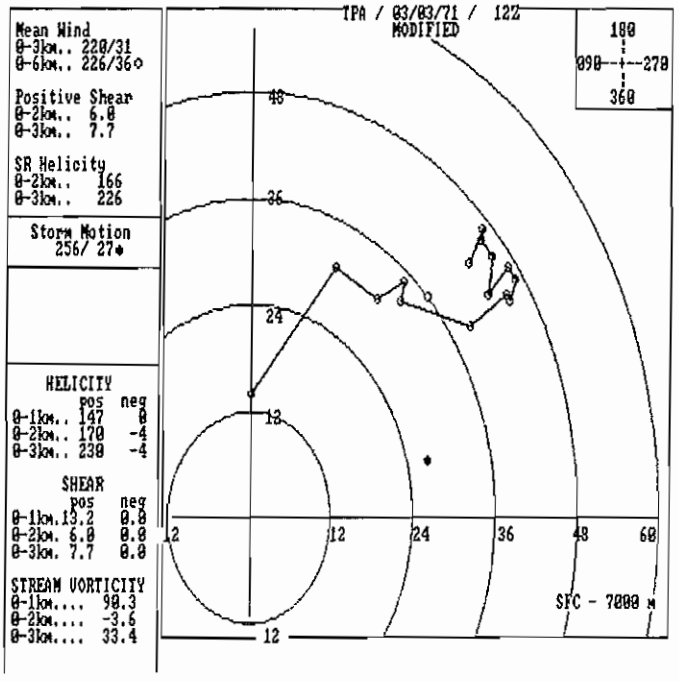
March 3, 1971



001CST 03/03/71 - 2359CST 03/03/71
SEVERE WEATHER REPORTS

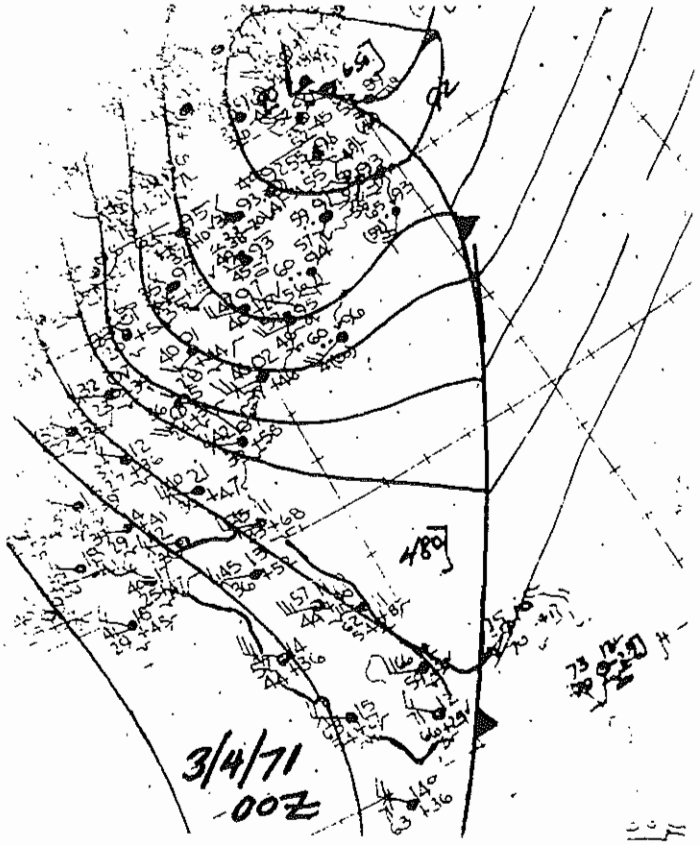


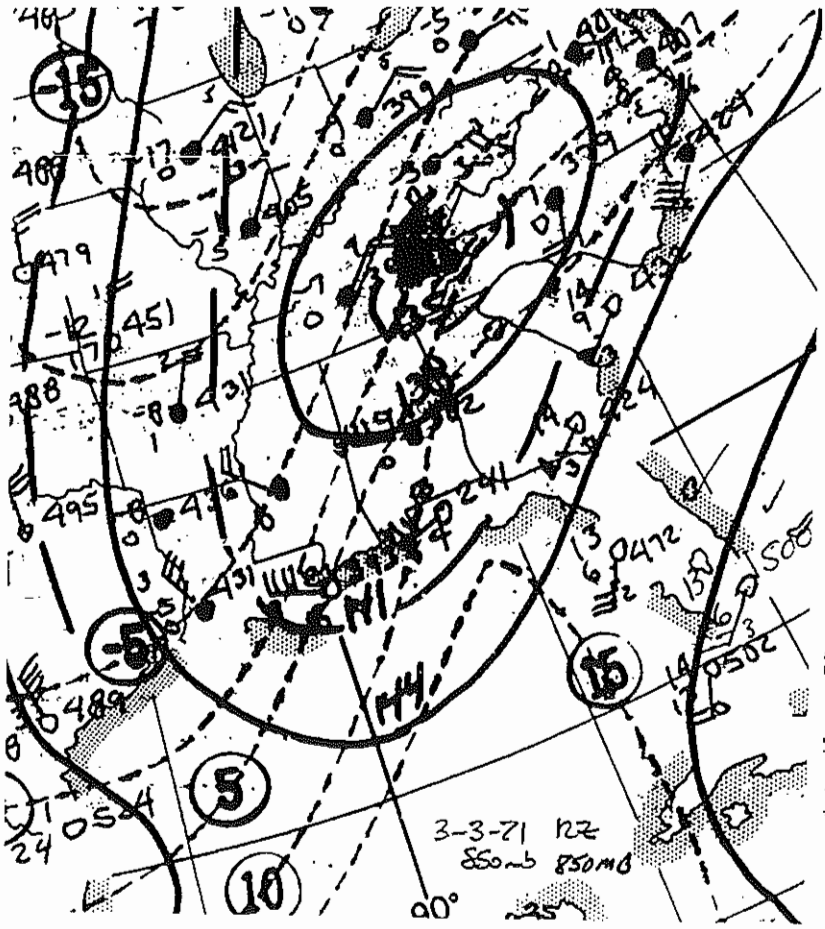
TPA / 03/03/71 / 12Z
MODIFIED
LI..... 4
TT..... 34
TEI.....18.1
K..... 0
SWEAT...244
CAP..... 3.9
PARCEL DATA
B+.... 19
B-.... 6
LPL.. 958mb
EL... 7200ft
MPL.. 8200ft
LCL.. 2614ft
FZL..15180ft
WBZ.. 8285ft
PW... 1.15in

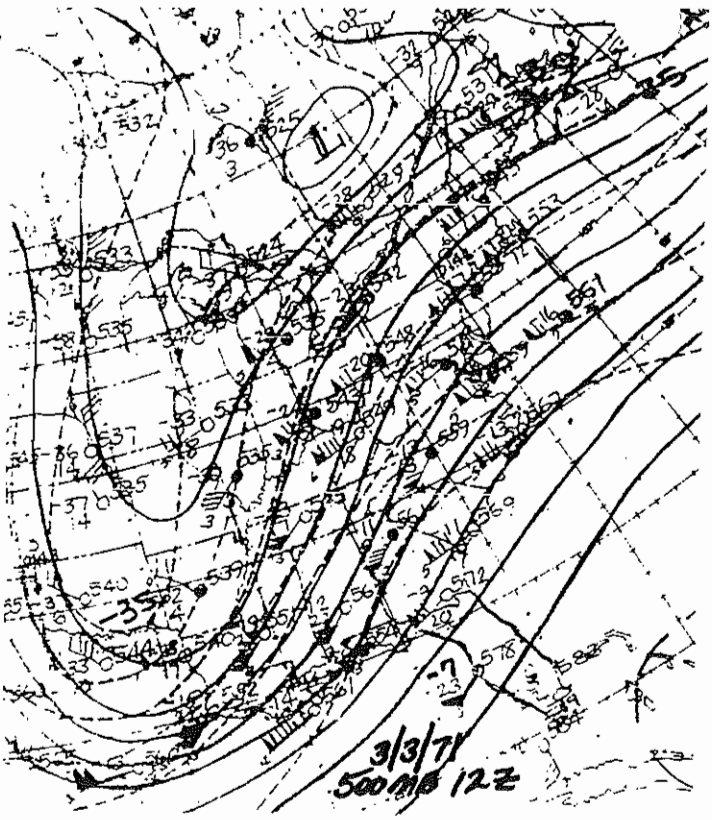


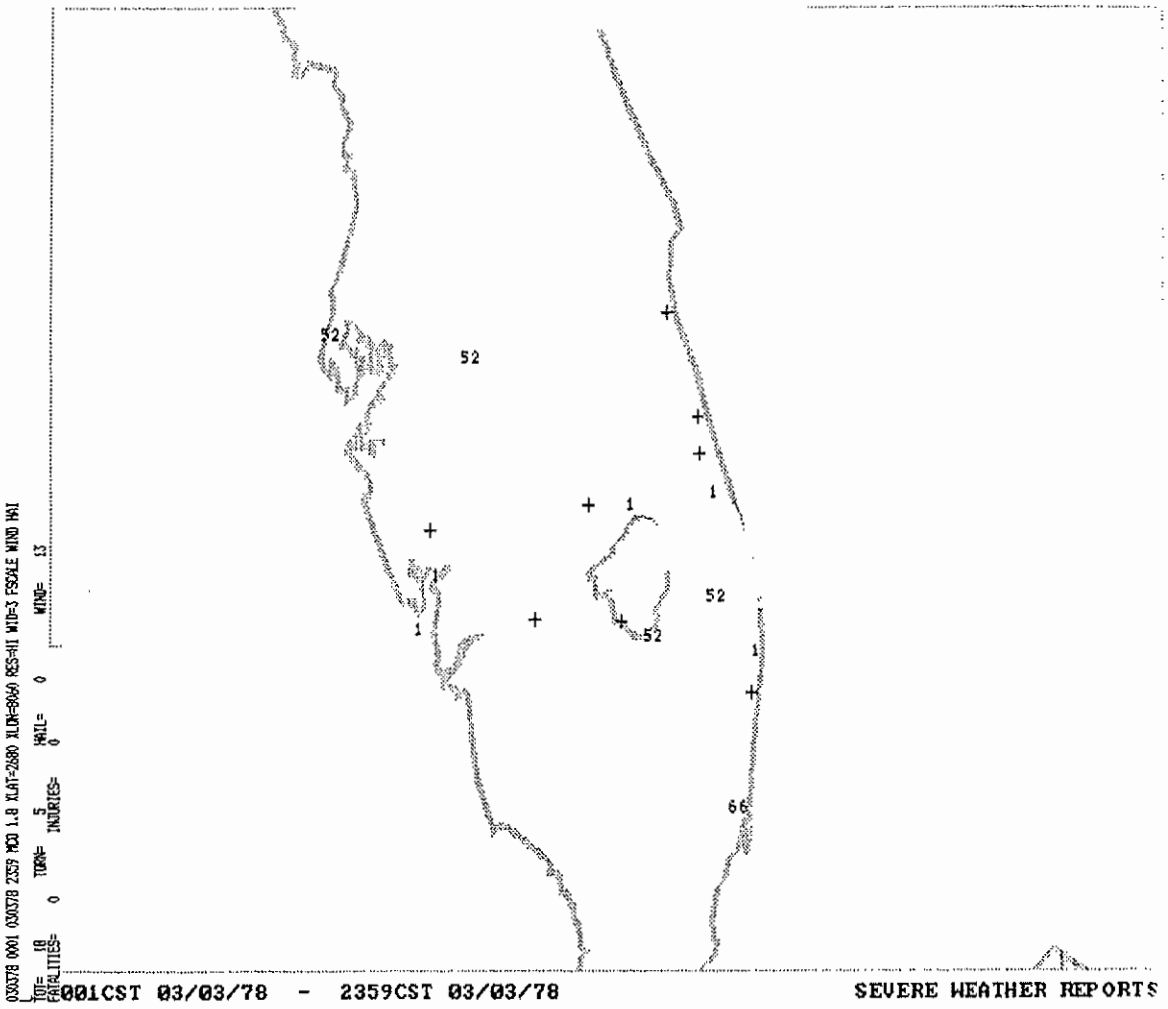
TPA / 03/03/71 / 12Z
MODIFIED
Mean Wind
0-3km.. 220/31
0-6km.. 226/36
Positive Shear
0-2km.. 6.0
0-3km.. 7.7
SR Helicity
0-2km.. 166
0-3km.. 226
Storm Motion
256/ 27
HELICITY
pos neg
0-1km.. 147 0
0-2km.. 170 -4
0-3km.. 230 -4
SHEAR
pos neg
0-1km.13.2 0.0
0-2km. 6.0 0.0
0-3km. 7.7 0.0
STREAM VORTICITY
0-1km.... 90.3
0-2km.... -3.6
0-3km.... 33.4
SFC - 7000 m

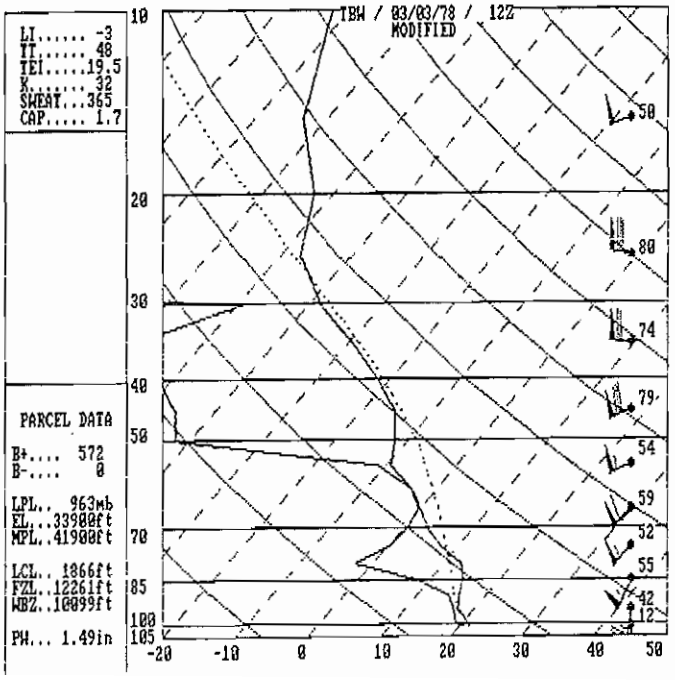
March 3, 1971

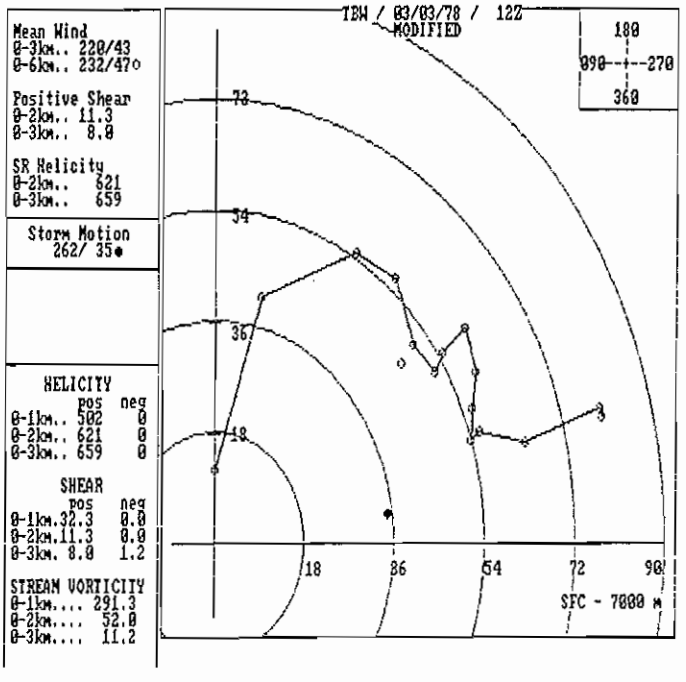


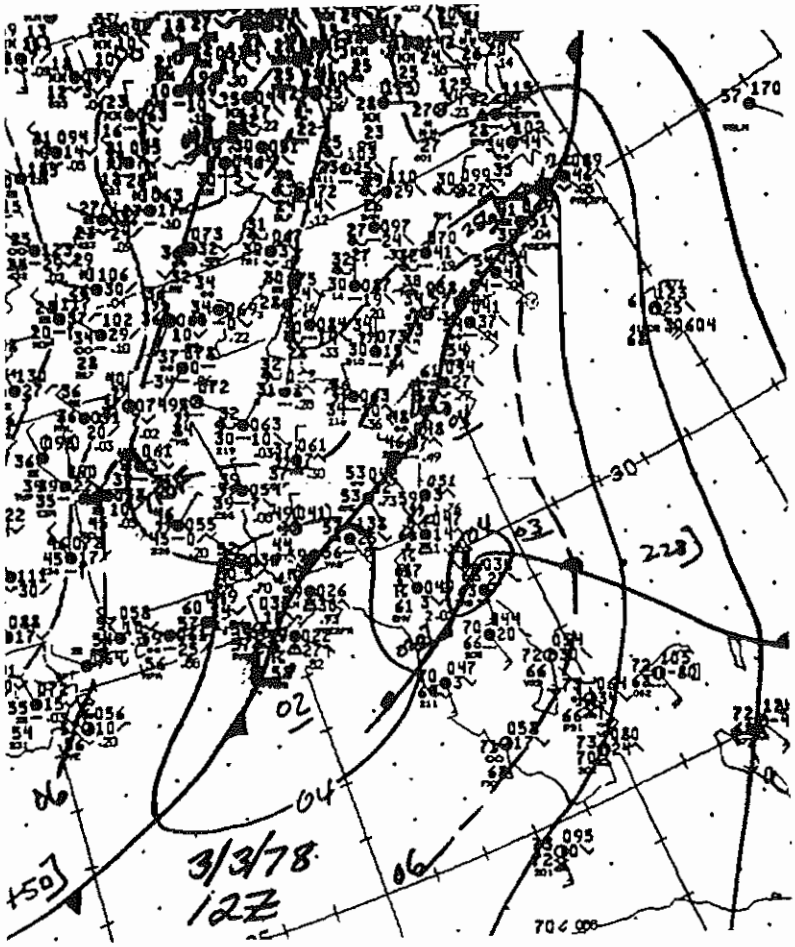


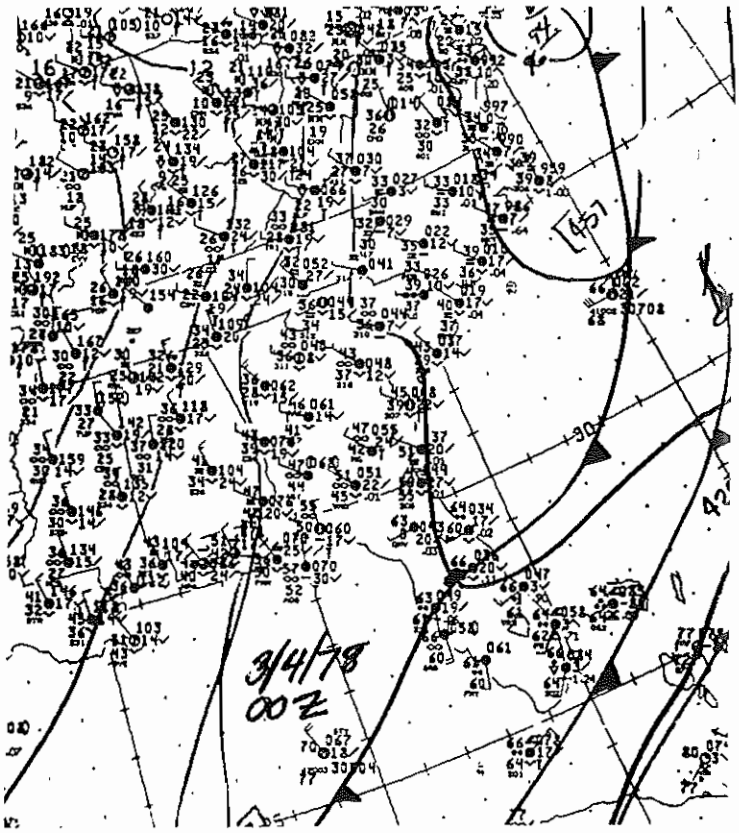


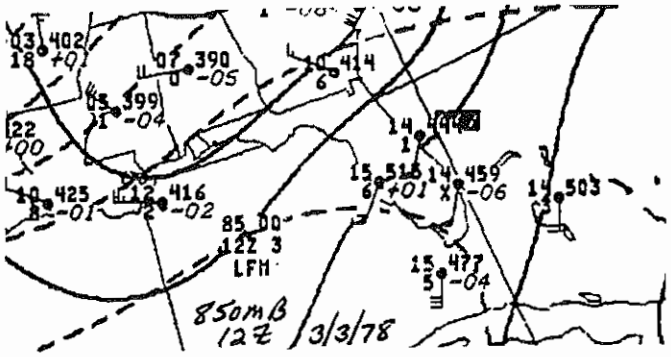

0001CST 03/03/78 - 2359CST 03/03/78
SEVERE WEATHER REPORTS

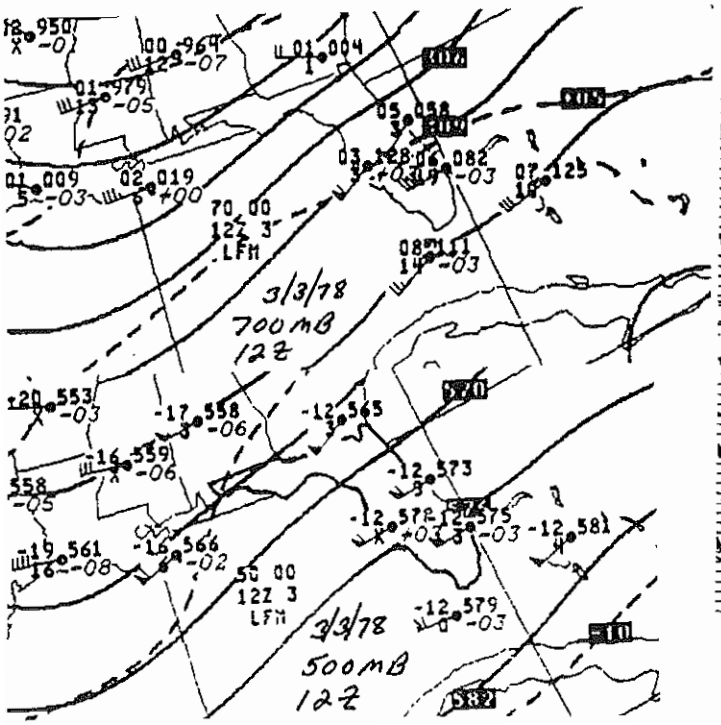

TBW / 03/03/78 / 122
MODIFIED
LI..... -3
TT..... 48
TEI.....19.5
K..... 32
SWEAT...365
CAP..... 1.7
PARCEL DATA
B+.... 572
B-.... 0
LPL.. 963mb
EL...33900ft
MPL..41900ft
LCL.. 1866ft
FZL..12261ft
WBZ..10099ft
PW... 1.49in

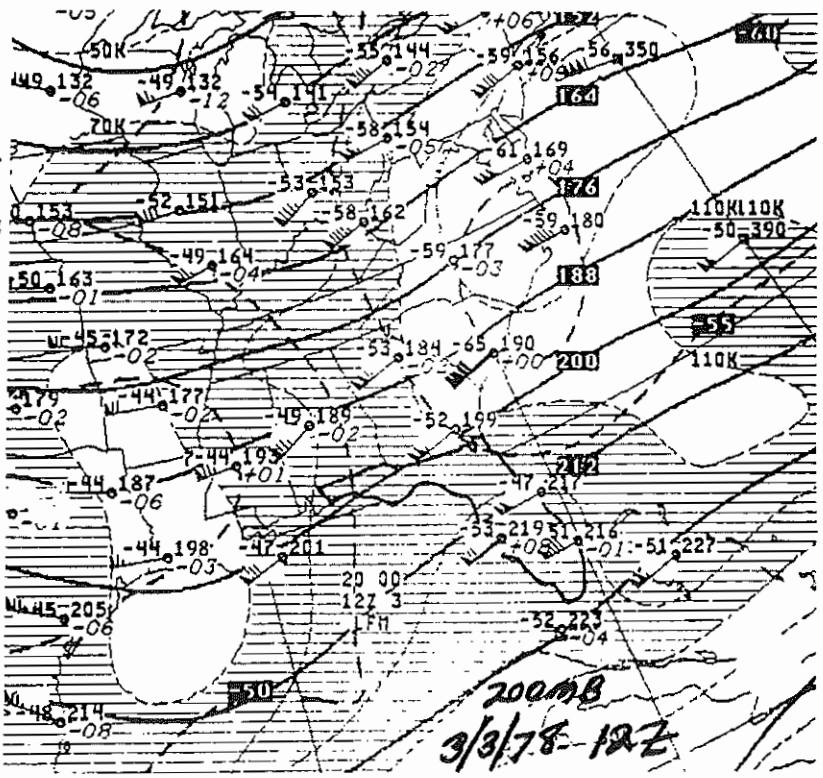

TBW / 03/03/78 / 122
MODIFIED
Mean Wind
0-3km.. 220/43
0-6km.. 232/47
Positive Shear
0-2km.. 11.3
0-3km.. 8.0
SR Helicity
0-2km.. 621
0-3km.. 659
Storm Motion
262/ 35
HELICITY
pos neg
0-1km.. 502 0
0-2km.. 621 0
0-3km.. 659 0
SHEAR
pos neg
0-1km.32.3 0.0
0-2km.11.3 0.0
0-3km. 8.0 1.2
STREAM VORTICITY
0-1km.... 291.3
0-2km.... 52.0
0-3km.... 11.2
SFC - 7000 m

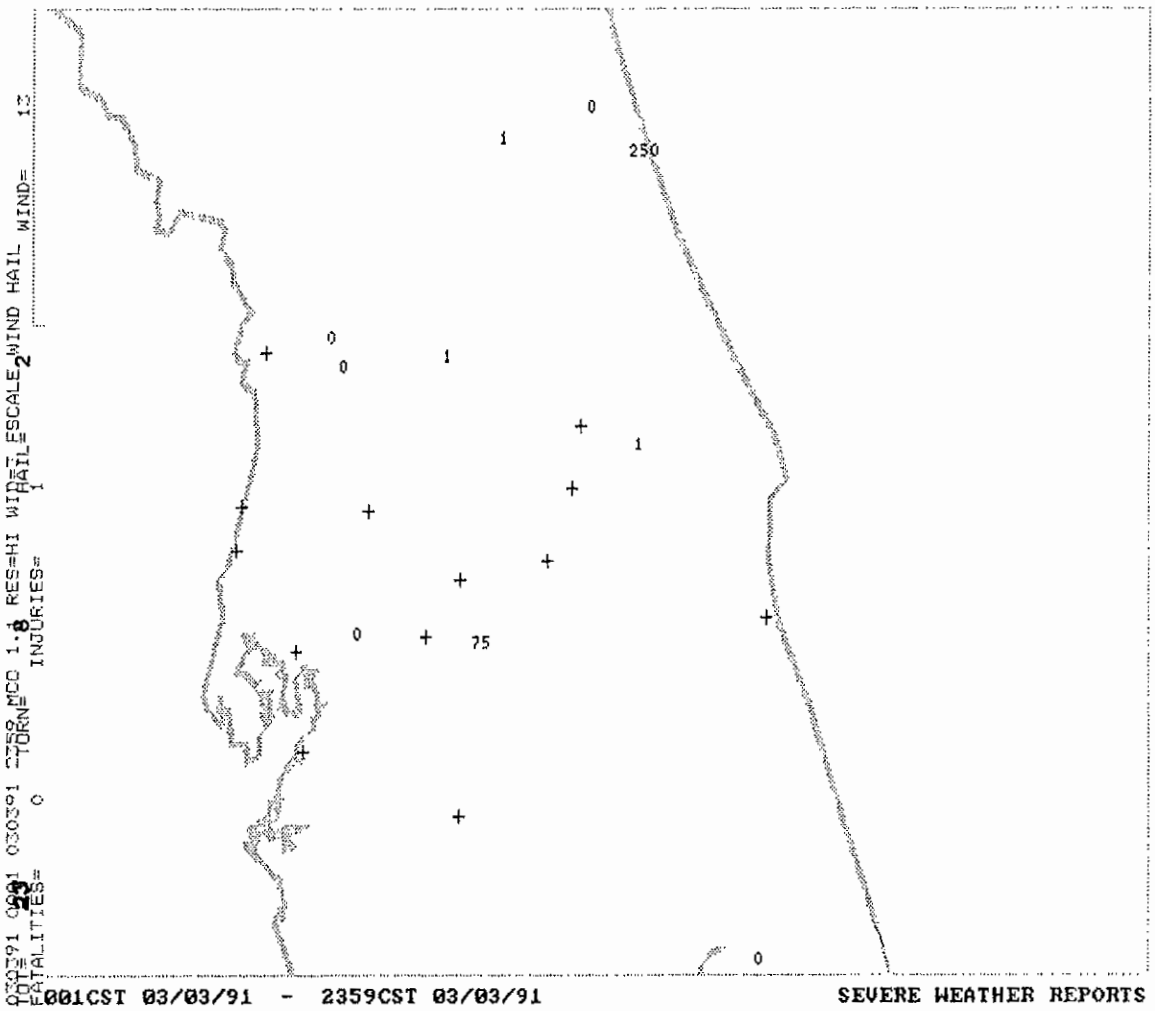

3/3/78
12Z

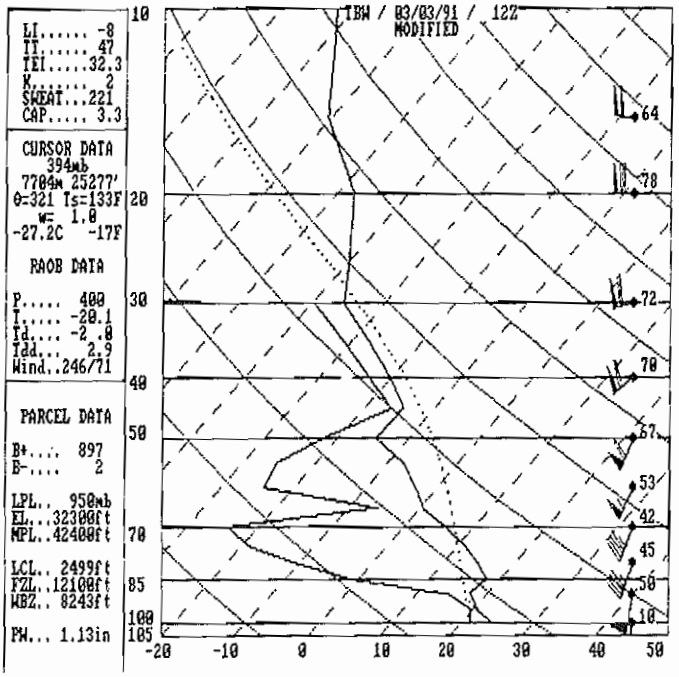

3/4/78
00Z

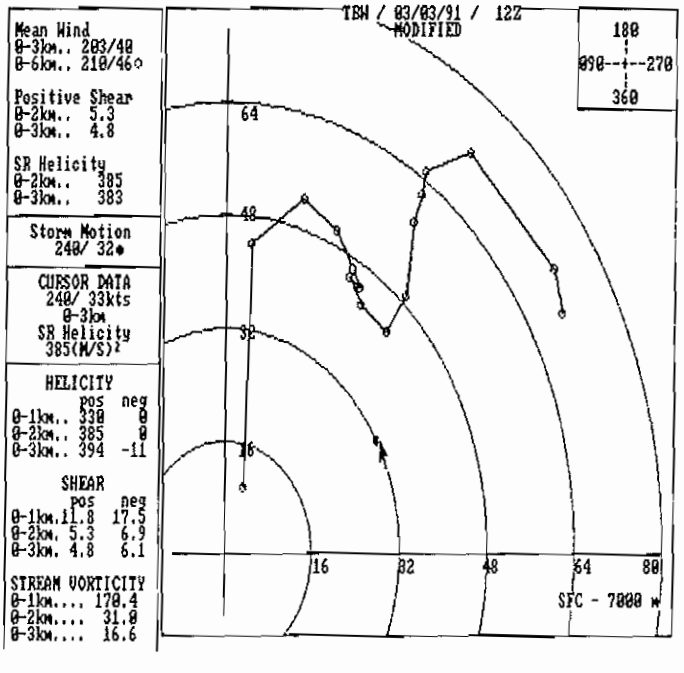

850mB
12Z 3/3/78


3/3/78
700mB
12Z
3/3/78
500mB
12Z

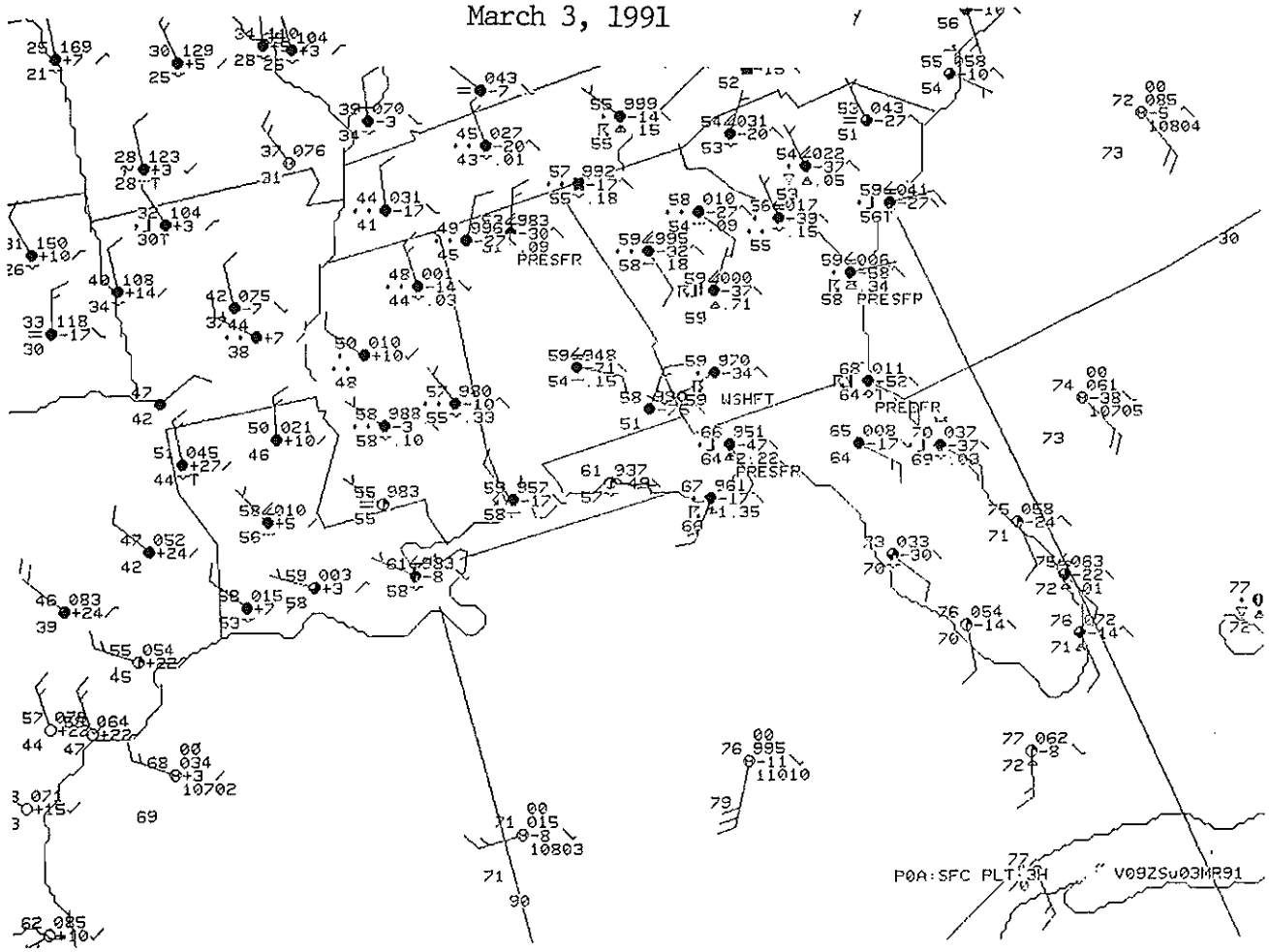

200mB
3/3/78-12Z

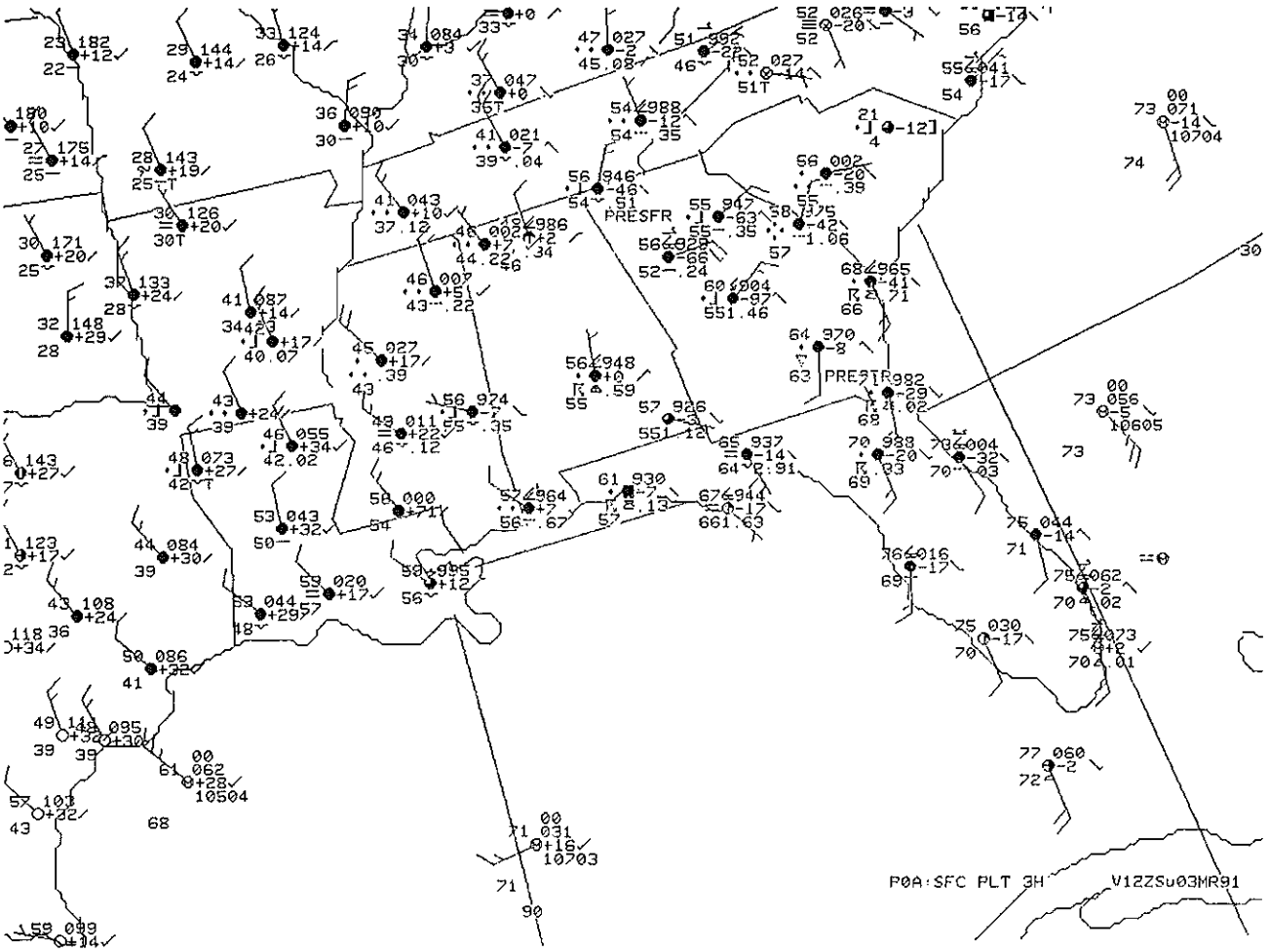

TOT= 23 TORN= 1 HAIL= 2 WIND HAIL WIND= 13
FATALITIES= 0 INJURIES= 1
0
1
250
0
0
1
1
0
75
0
001CST 03/03/91 - 2359CST 03/03/91
SEVERE WEATHER REPORTS


TBW / 03/03/91 / 12Z
MODIFIED
LI..... -8
TT..... 47
TEI.....32.3
K..... 2
SWEAT...221
CAP..... 3.3
CURSOR DATA
394mb
7704m 25277'
θ=321 Ts=133F
w= 1.0
-27.2C -17F
RAOB DATA
P..... 400
T..... -20.1
Td.... -2 .0
Tdd... 2.9
Wind..246/71
PARCEL DATA
B+.... 897
B-.... 2
LPL.. 950mb
EL...32300ft
MPL..42400ft
LCL.. 2499ft
FZL..12100ft
WBZ.. 8243ft
PW... 1.13in
10
20
30
40
50
70
85
100
105
-20
-10
0
10
20
30
40
50
64
78
72
70
67
53
42
45
50
10

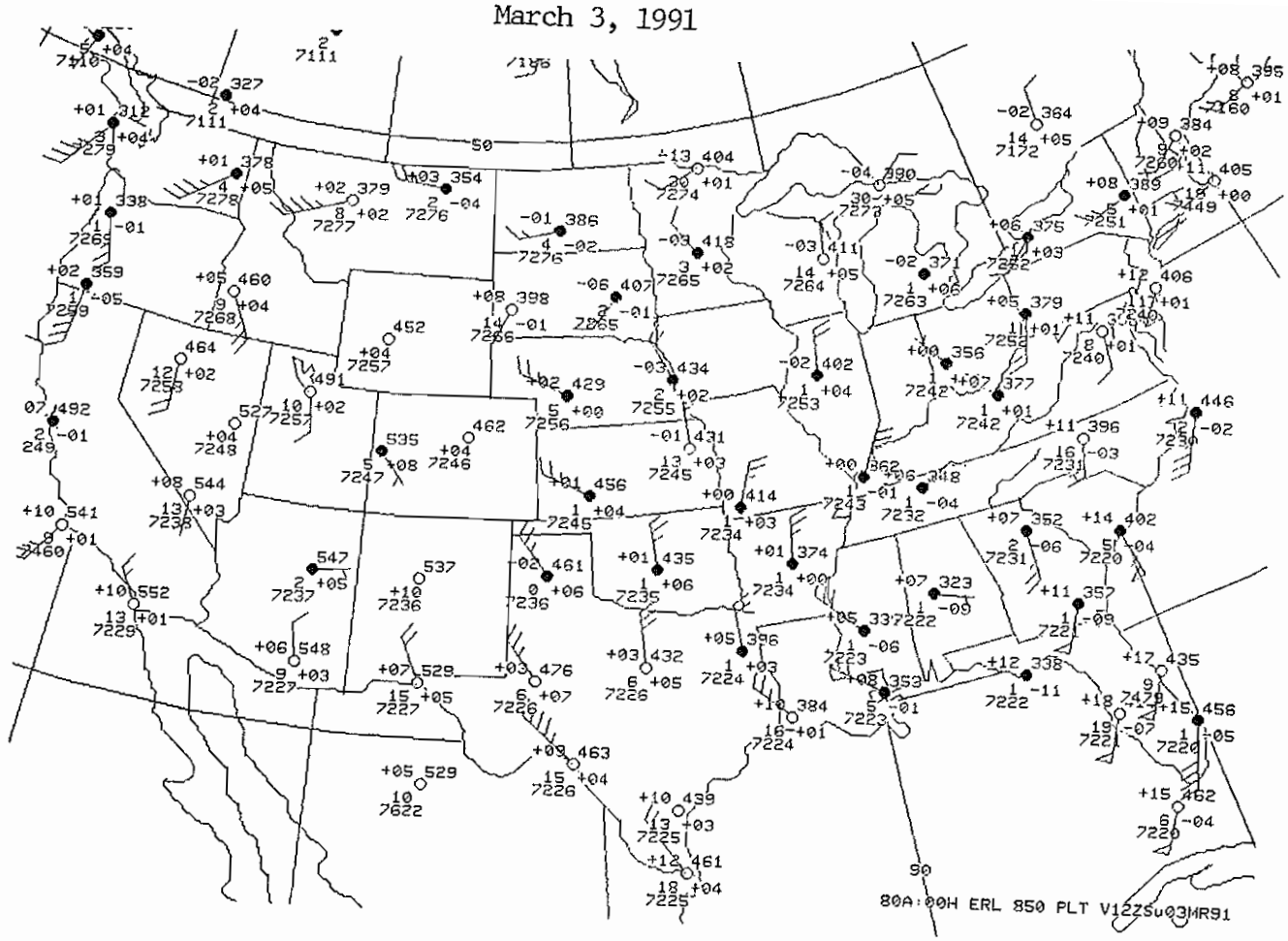

TBW / 03/03/91 / 12Z
MODIFIED
Mean Wind
0-3km.. 203/40
0-6km.. 210/46
Positive Shear
0-2km.. 5.3
0-3km.. 4.8
SR Helicity
0-2km.. 385
0-3km.. 383
Storm Motion
240/ 32
CURSOR DATA
240/ 33kts
0-3km
SR Helicity
385(M/S)²
HELICITY
pos neg
0-1km.. 330 0
0-2km.. 385 0
0-3km.. 394 -11
SHEAR
pos neg
0-1km.11.8 17.5
0-2km. 5.3 6.9
0-3km. 4.8 6.1
STREAM VORTICITY
0-1km.... 170.4
0-2km.... 31.0
0-3km.... 16.6
180
090
270
360
64
48
32
16
16
32
48
64
80
SFC - 7000 m

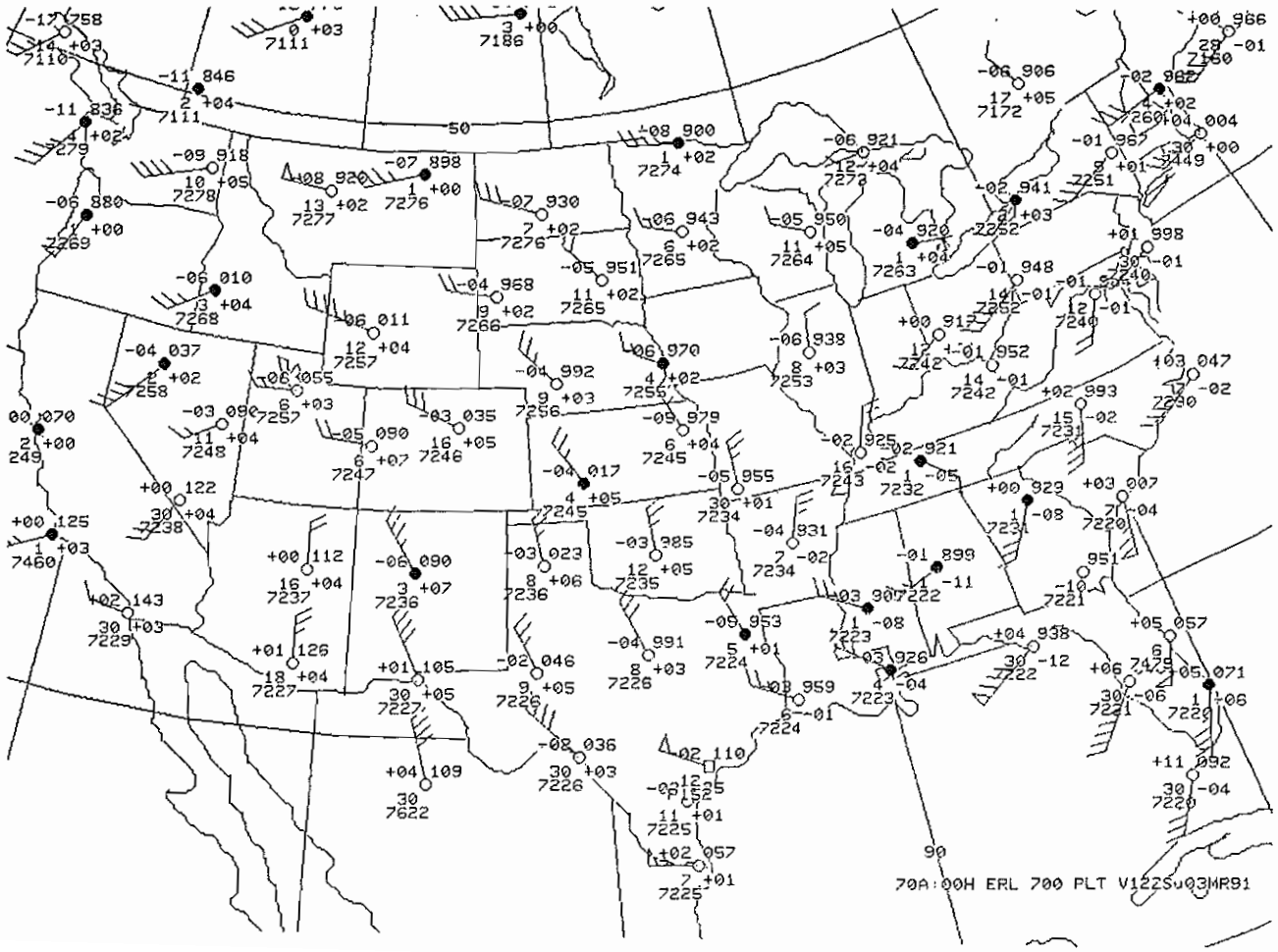
March 3, 1991

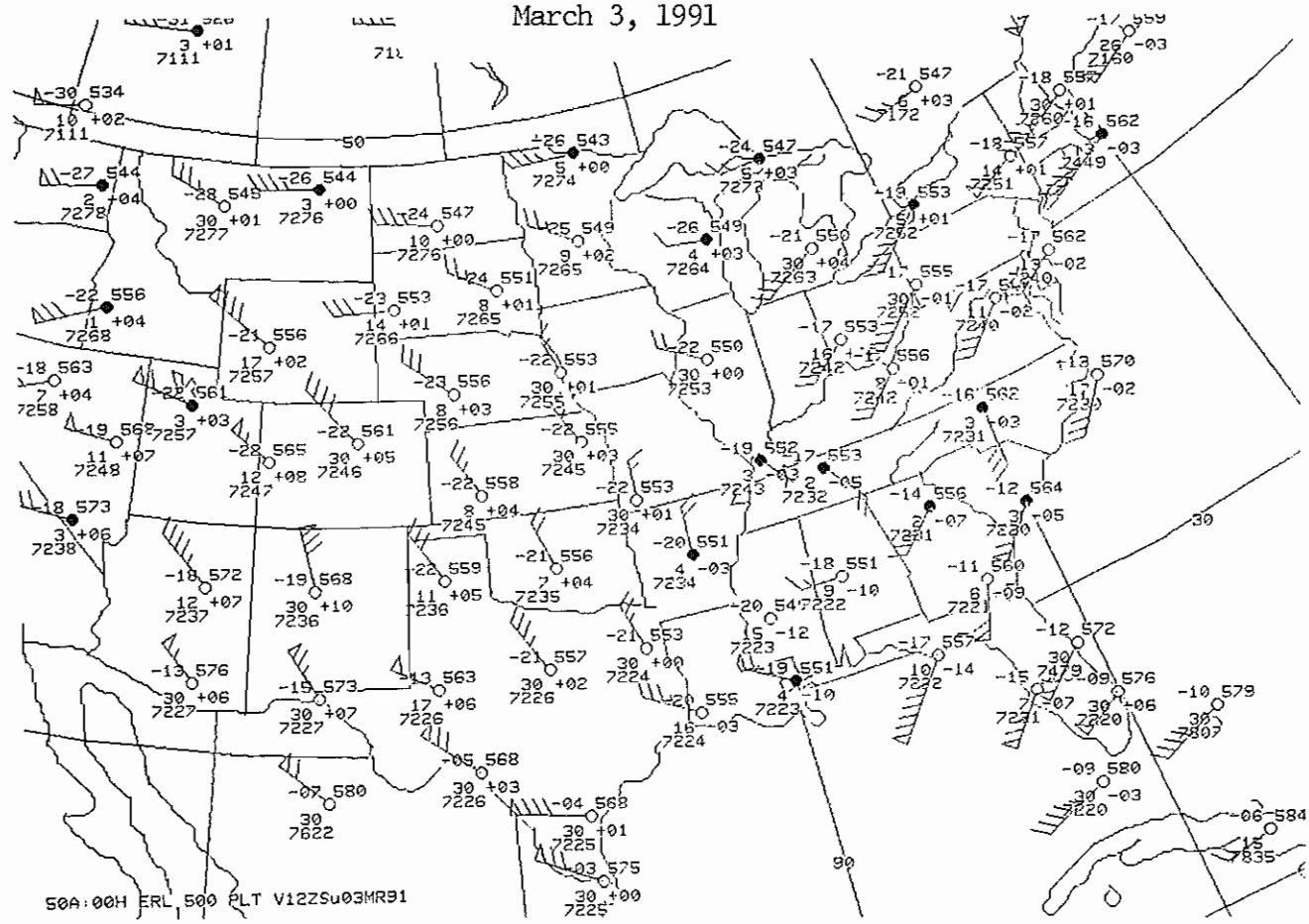

PRESFR
W3HFT
P0A:SFC PLT 3H V09ZSu03MR91

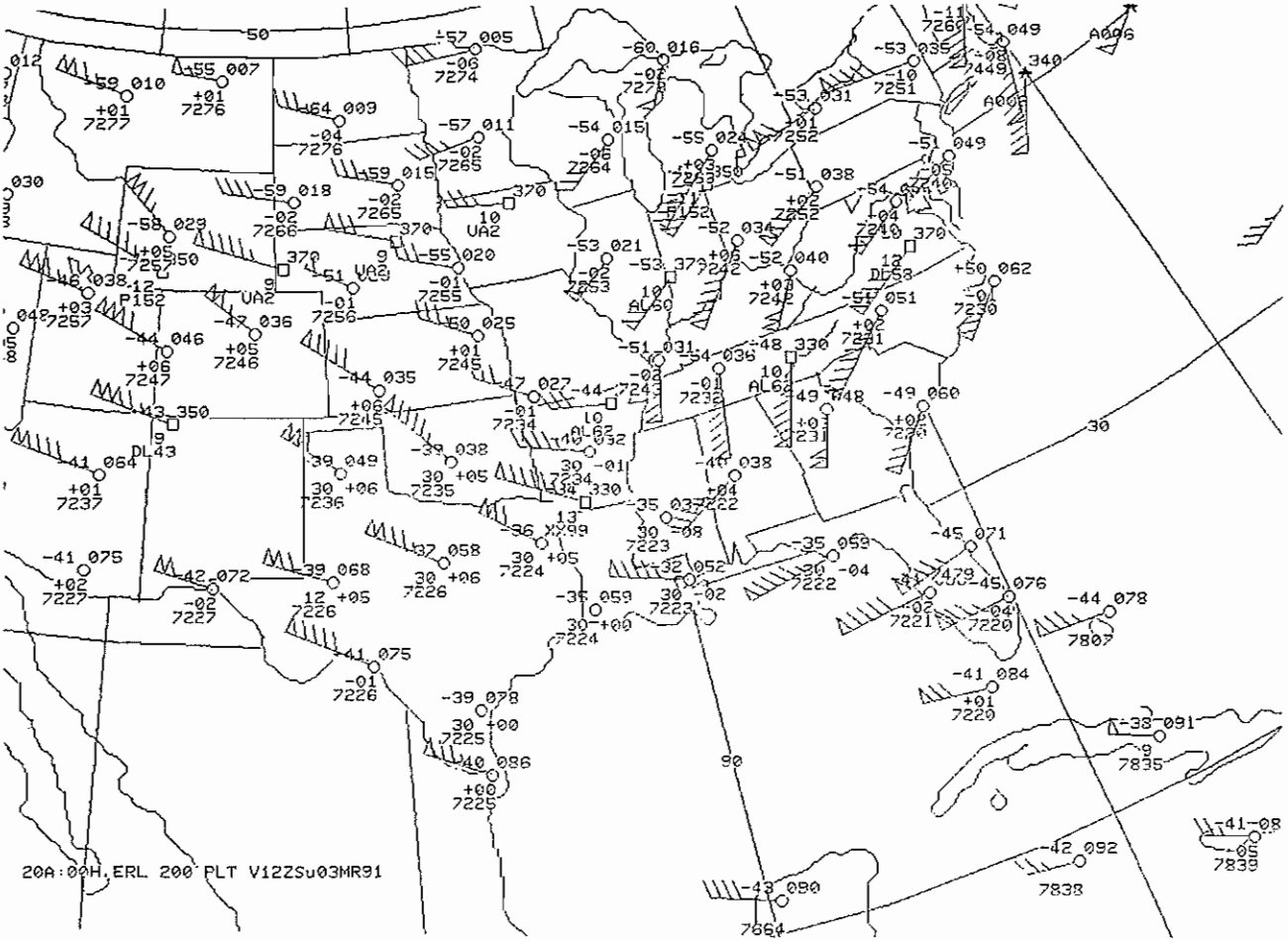

PRESFR
P0A:SFC PLT 3H V12ZSu03MR91

March 3, 1991

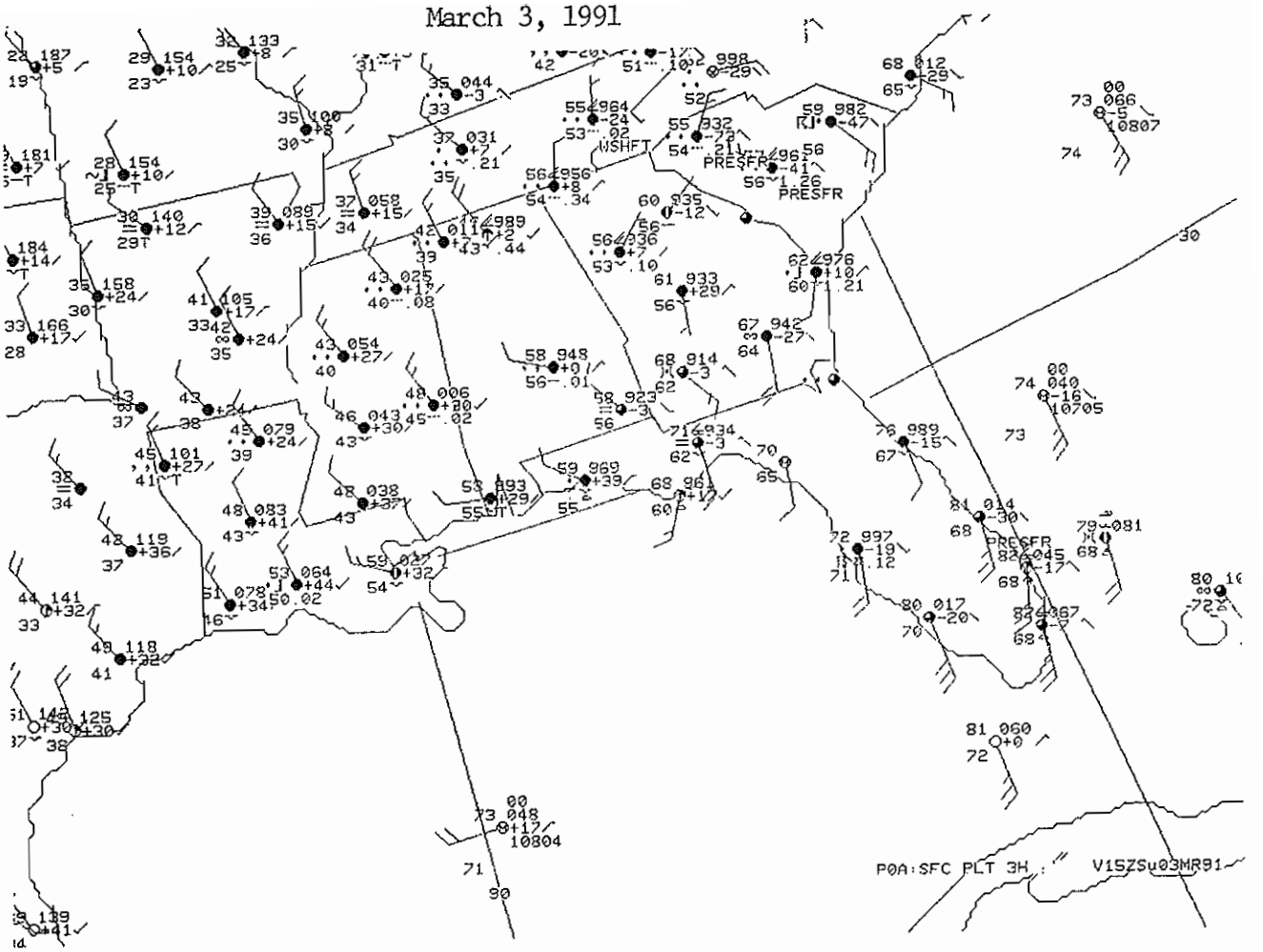

80A:00H ERL 850 PLT V12ZSu03MR91

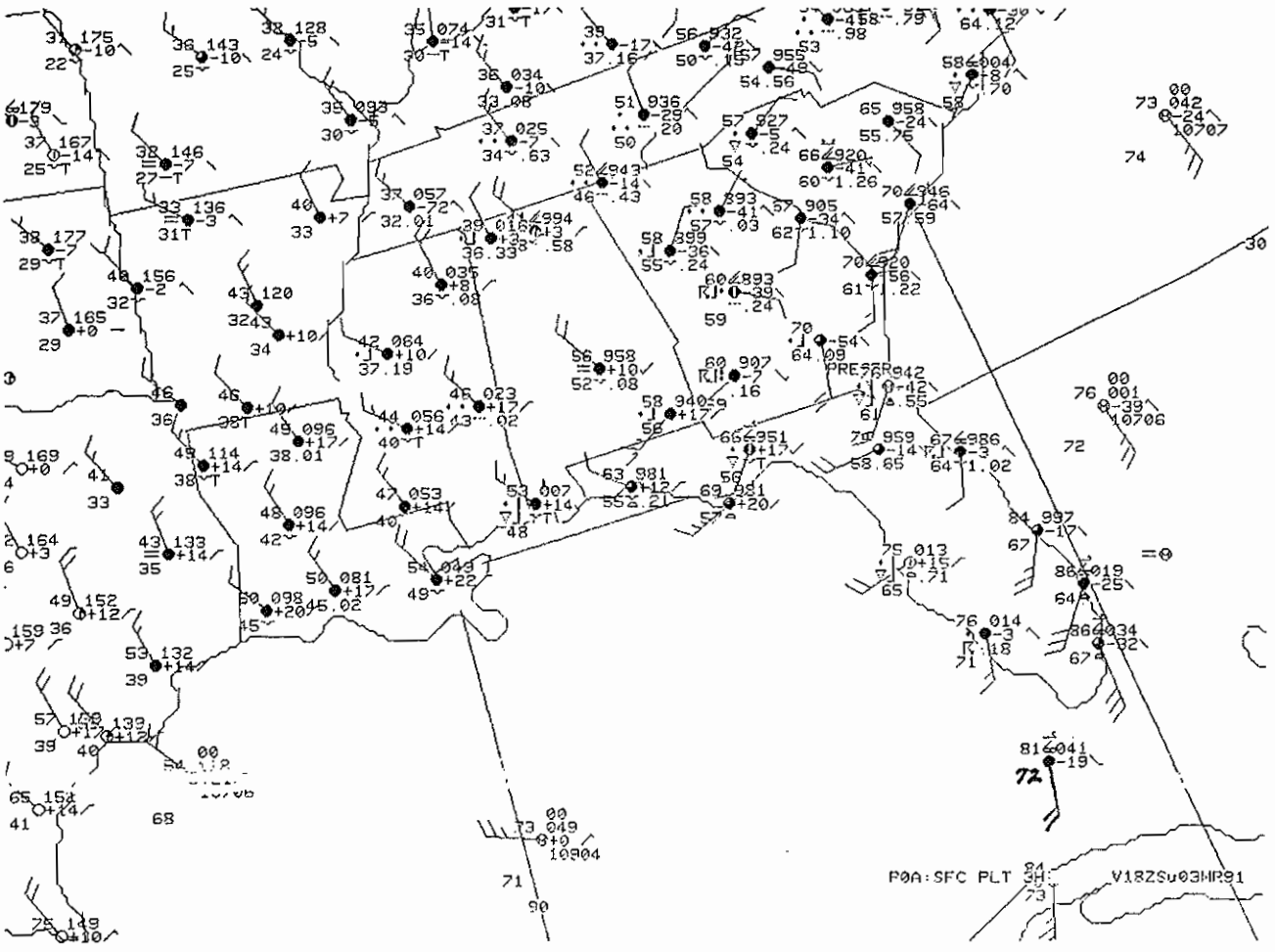

70A:00H ERL 700 PLT V12ZSu03MR91


50A:00H ERL 500 PLT V12ZSu03MR91


20A:00H ERL 200 PLT V12ZSu03MR91

March 3, 1991


WSHFT
PRESFR
PRESFR
P0A:SFC PLT 3H: V15ZSu03MR91


PRESFR
P0A:SFC PLT 3H: V18ZSu03MR91

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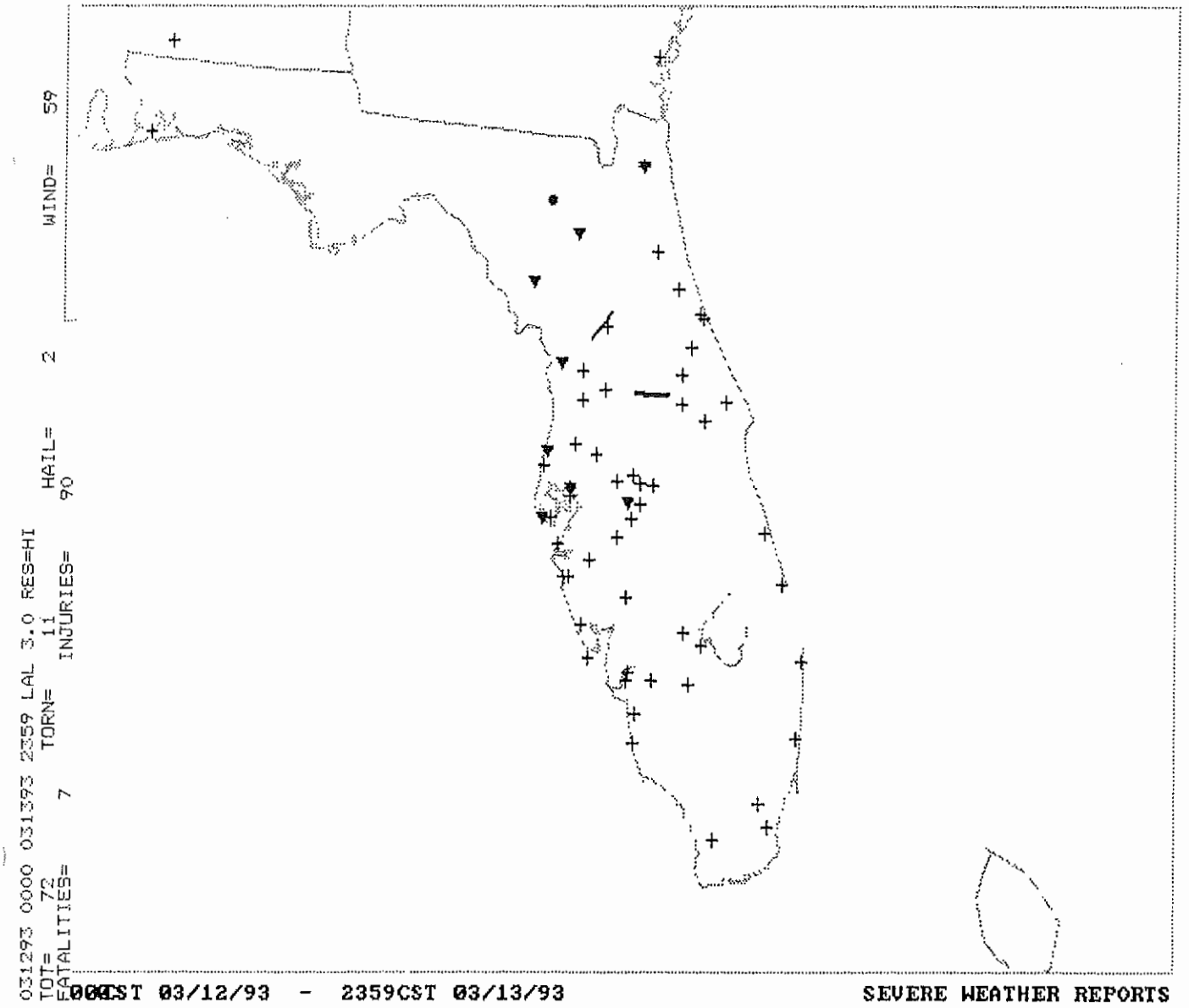
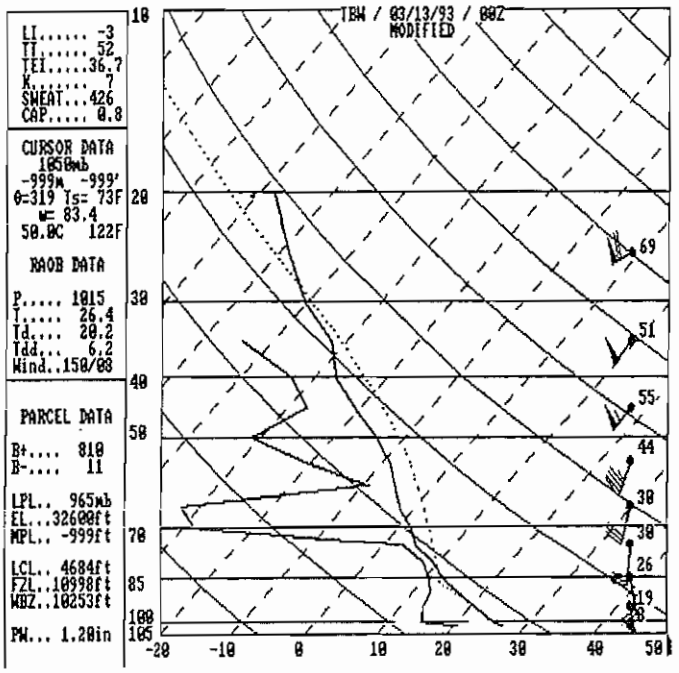
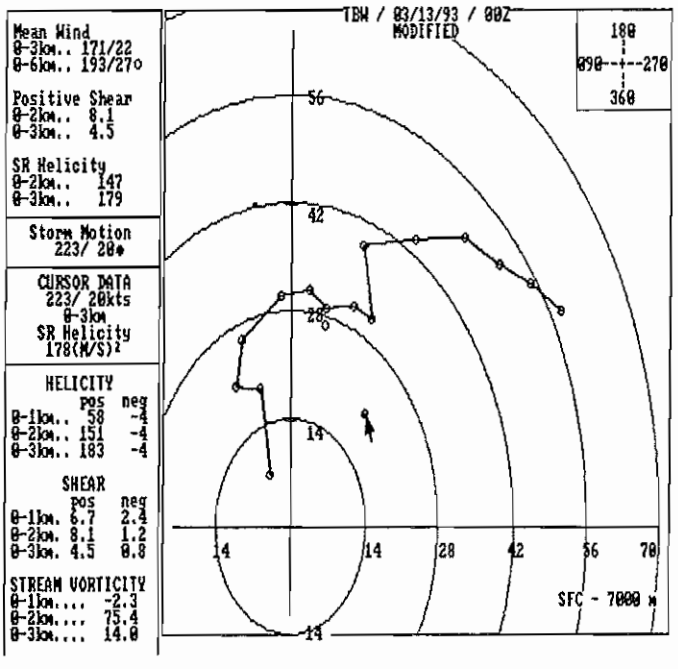
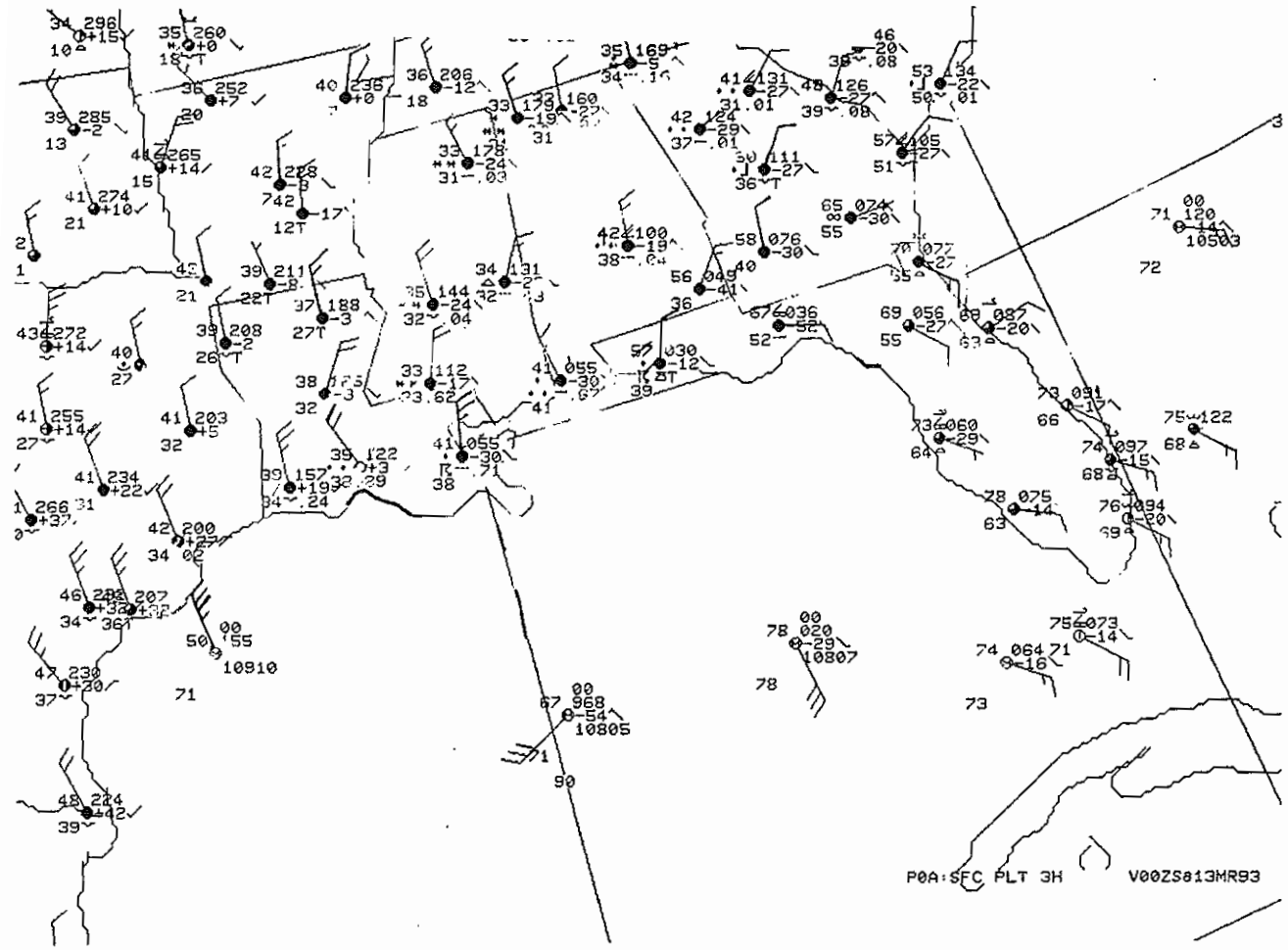

031293 0000 031393 2359 LAL 3.0 RES=HI
TOT= 72
FATALITIES= 7
TORN= 11
INJURIES= 90
HAIL= 2
WIND= 59
0000CST 03/12/93 - 2359CST 03/13/93
SEVERE WEATHER REPORTS


TBW / 03/13/93 / 00Z
MODIFIED
LI..... -3
TT..... 52
TEI.....36.7
K..... 7
SWEAT...426
CAP..... 0.8
CURSOR DATA
1050mb
-999m -999'
θ-319 Ts= 73F
W= 83.4
50.0C 122F
RAOB DATA
P..... 1015
T..... 26.4
Td.... 20.2
Tdd... 6.2
Wind..150/08
PARCEL DATA
B+.... 810
B-.... 11
LPL... 965mb
EL...32600ft
MPL.. -999ft
LCL.. 4684ft
FZL..10998ft
WBZ..10253ft
PW... 1.20in
-20 -10 0 10 20 30 40 50


TBW / 03/13/93 / 00Z
MODIFIED
Mean Wind
0-3km.. 171/22
0-6km.. 193/27
Positive Shear
0-2km.. 8.1
0-3km.. 4.5
SR Helicity
0-2km.. 147
0-3km.. 179
Storm Motion
223/ 28
CURSOR DATA
223/ 20kts
0-3km
SR Helicity
178(M/S)²
HELICITY
pos neg
0-1km.. 58 -4
0-2km.. 151 -4
0-3km.. 183 -4
SHEAR
pos neg
0-1km. 6.7 2.4
0-2km. 8.1 1.2
0-3km. 4.5 0.8
STREAM VORTICITY
0-1km.... -2.3
0-2km.... 75.4
0-3km.... 14.0
180
090 270
360
SFC - 7000 m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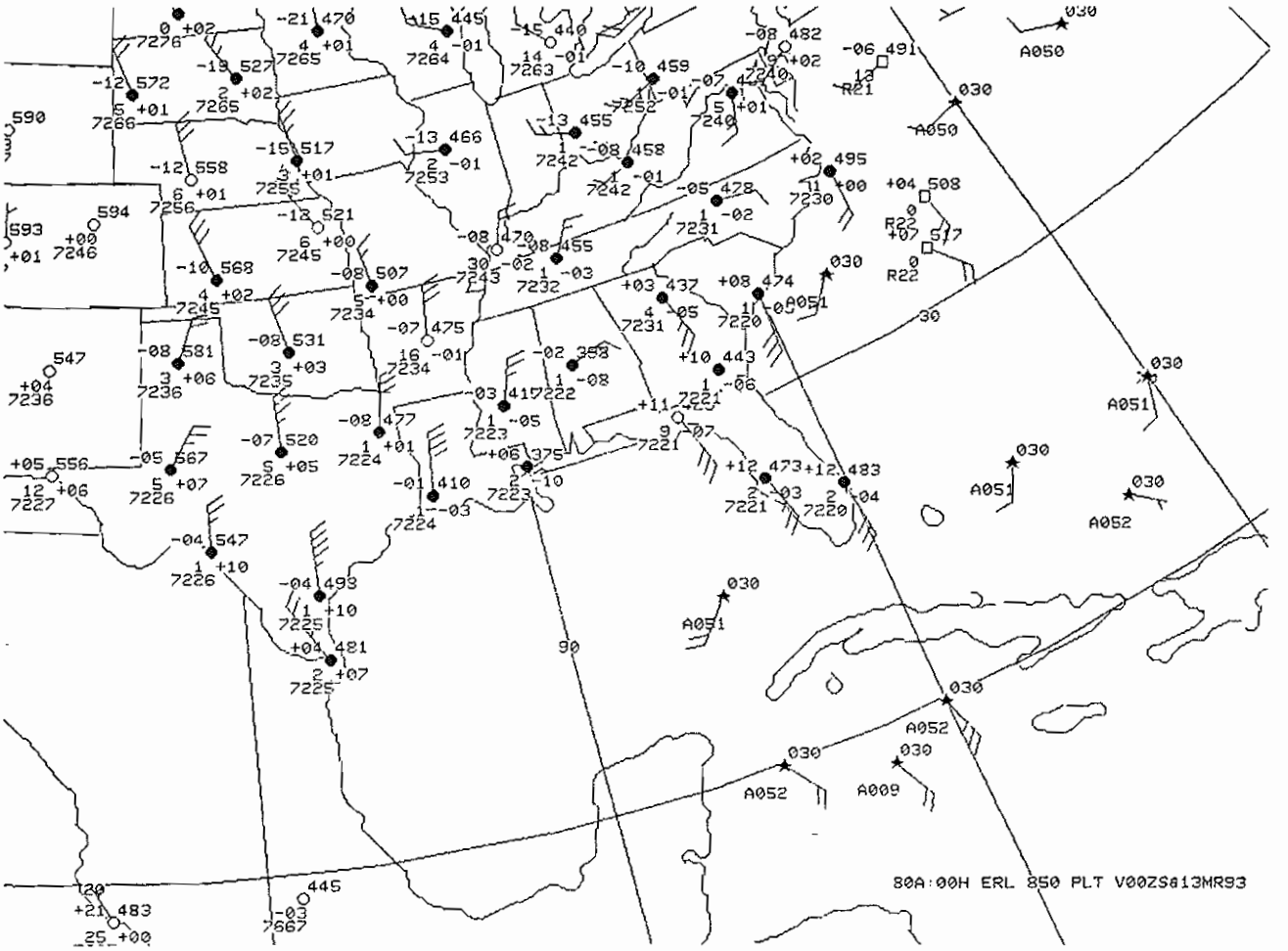
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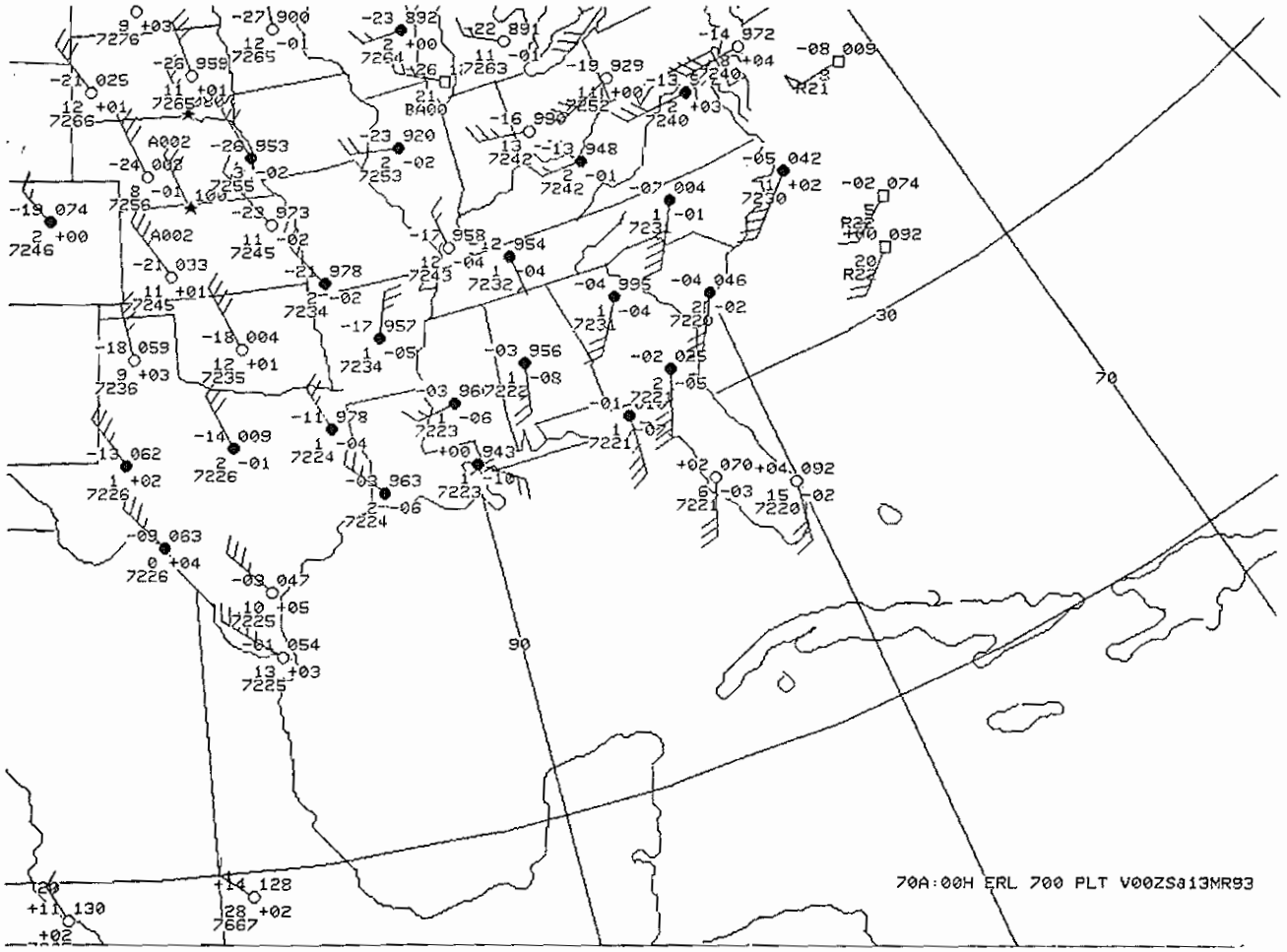
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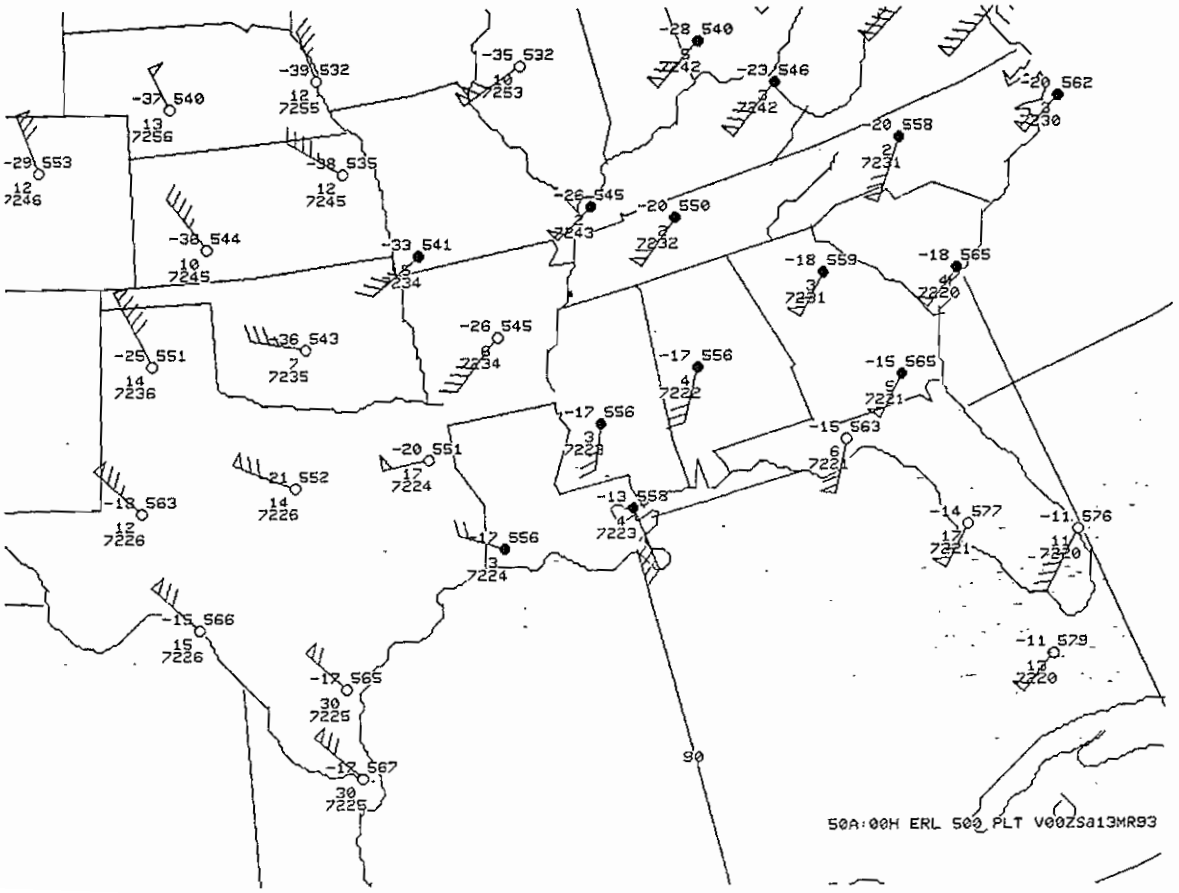
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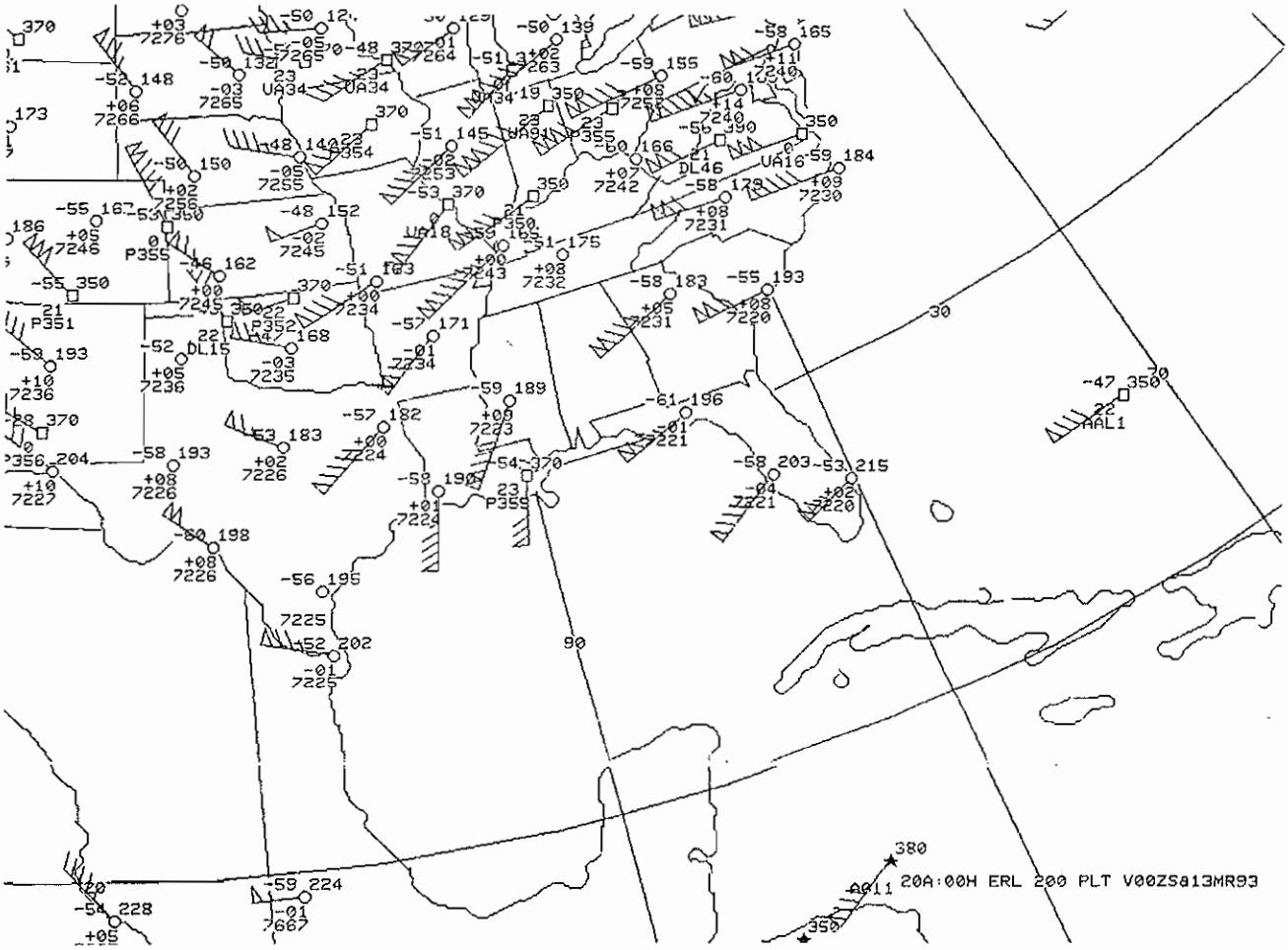
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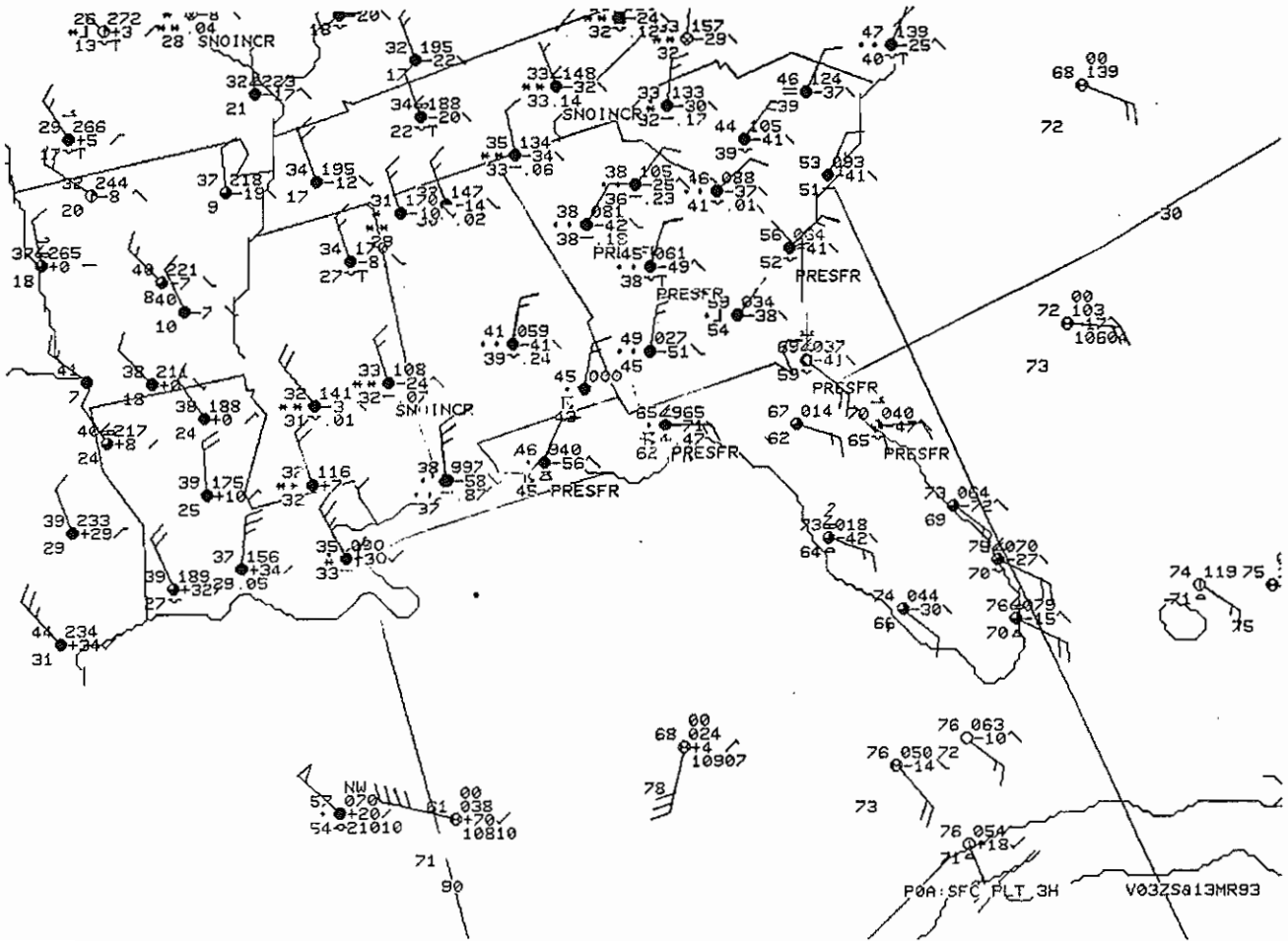
SNOINCR
PRESFR
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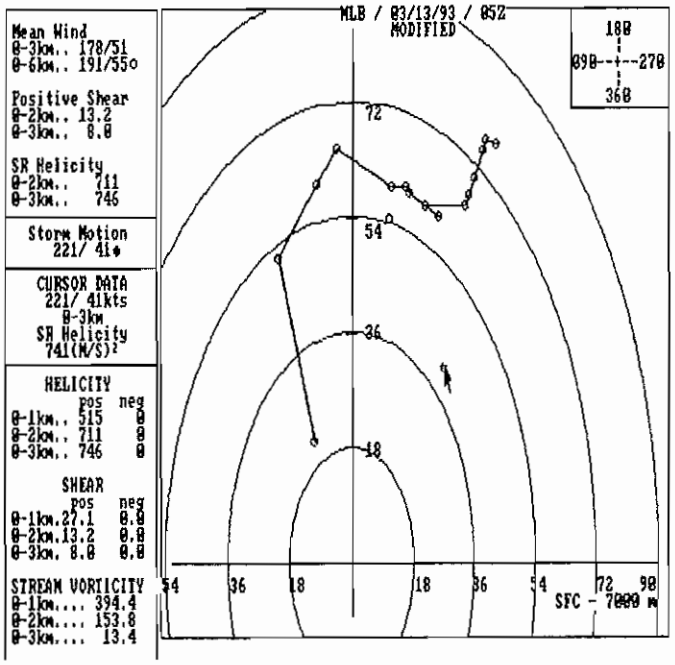
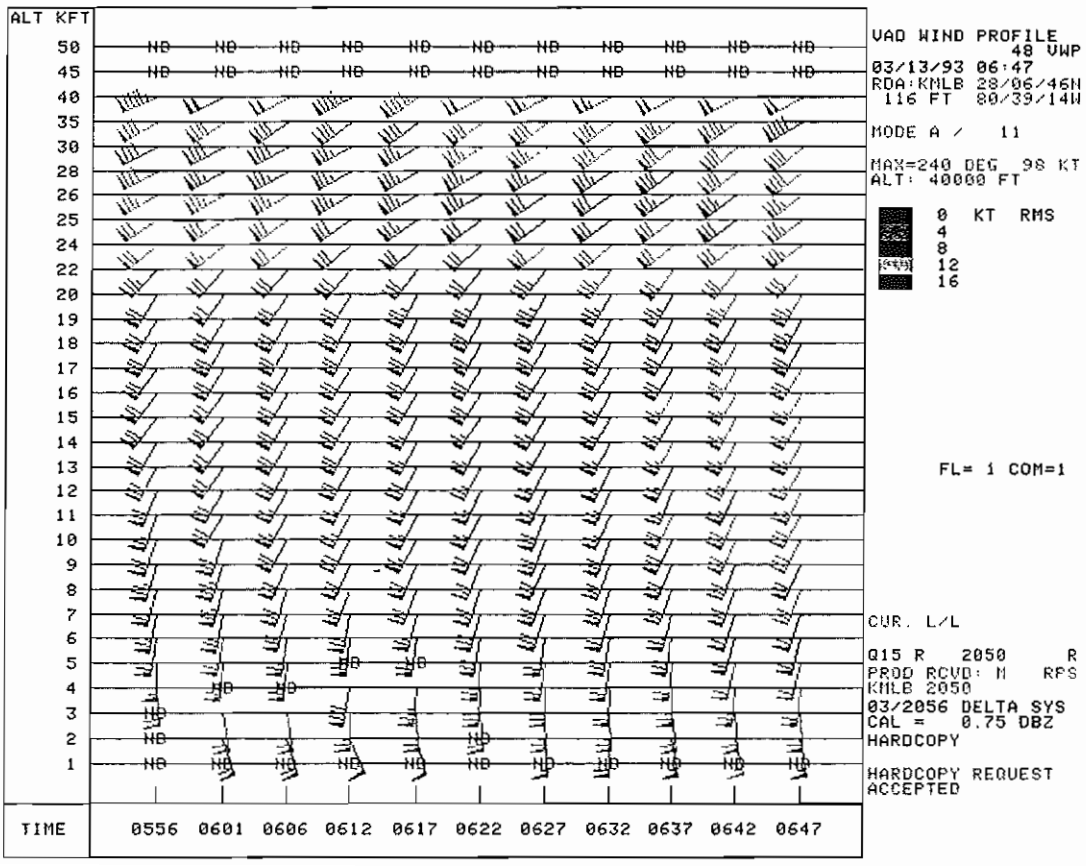
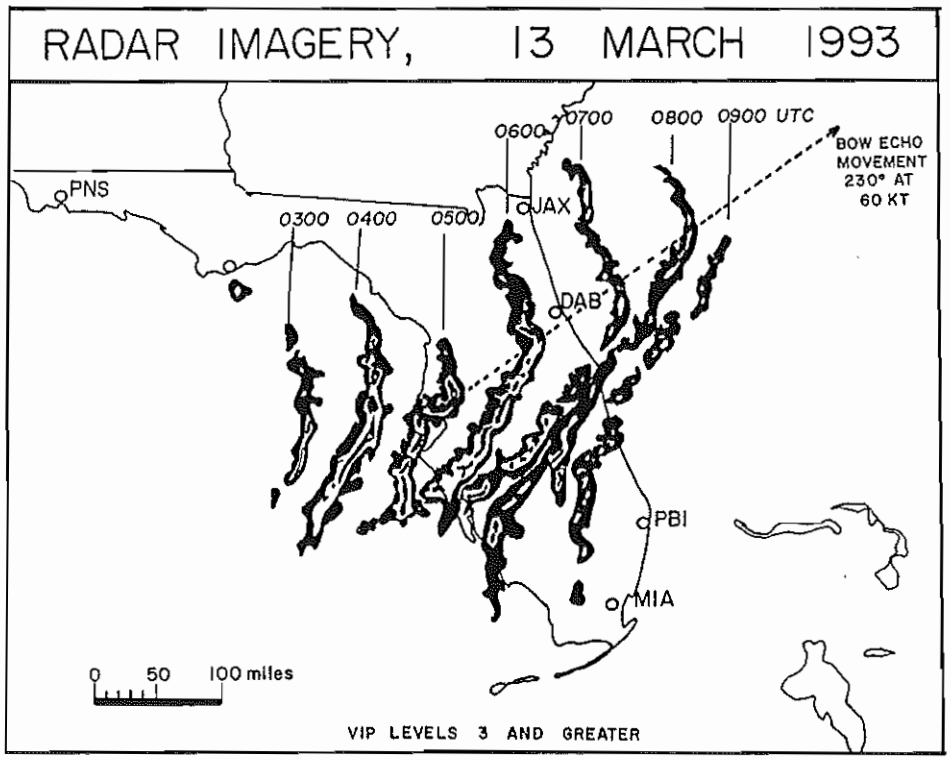
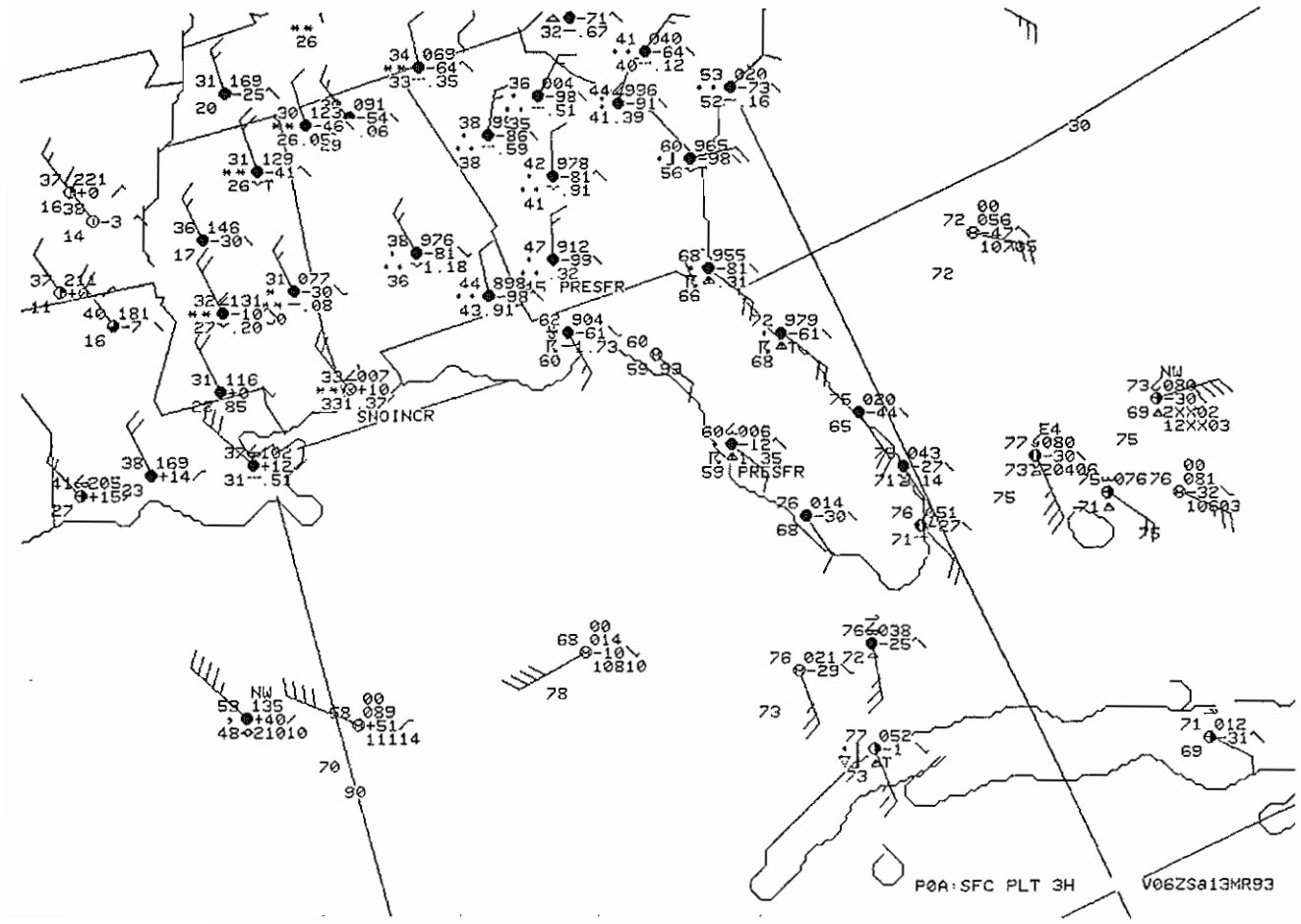


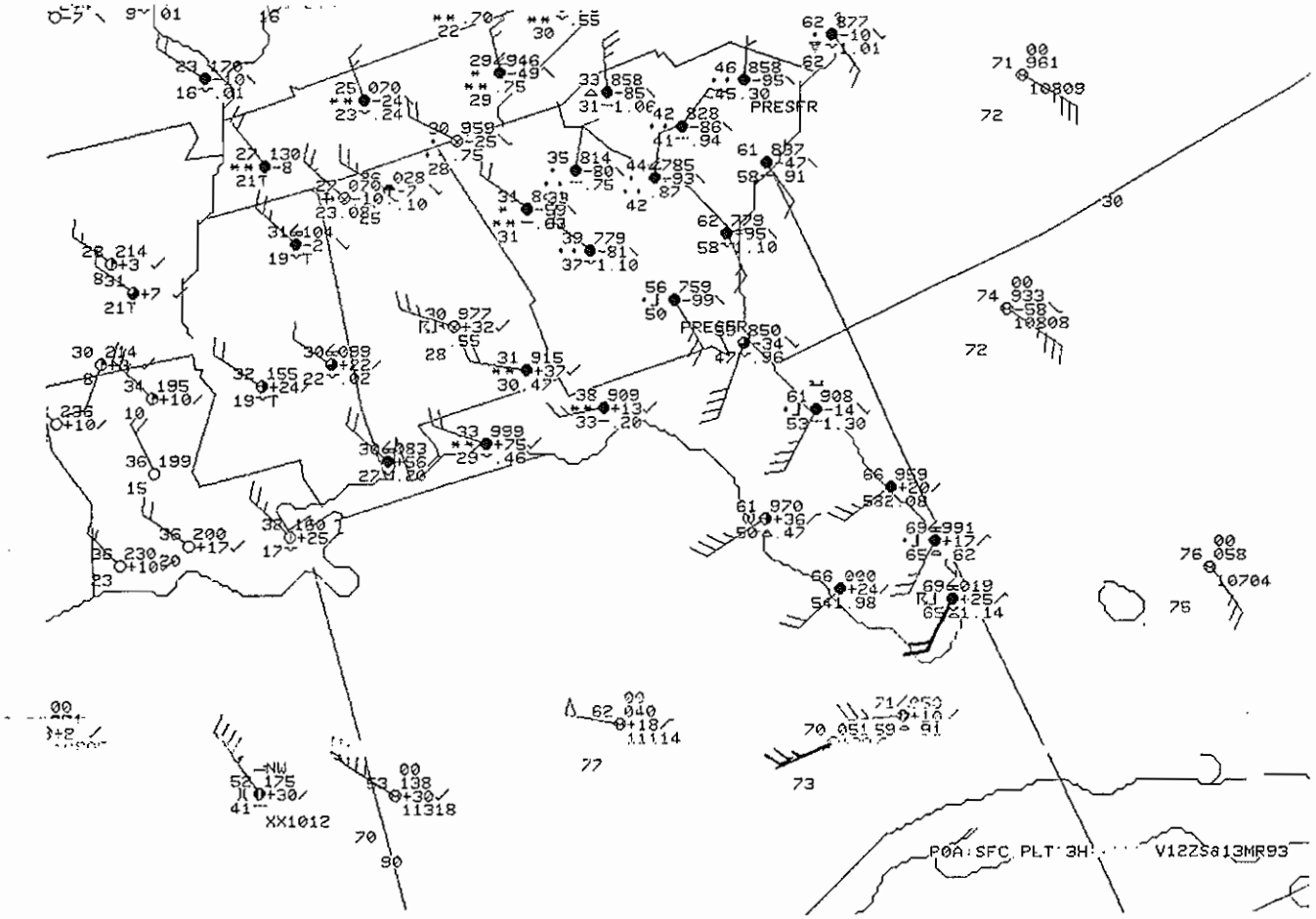
Hodograph produced using 0500 UTC Melbourne WSR-88D Velocity Azimuth Display (VAD) Wind Profile.

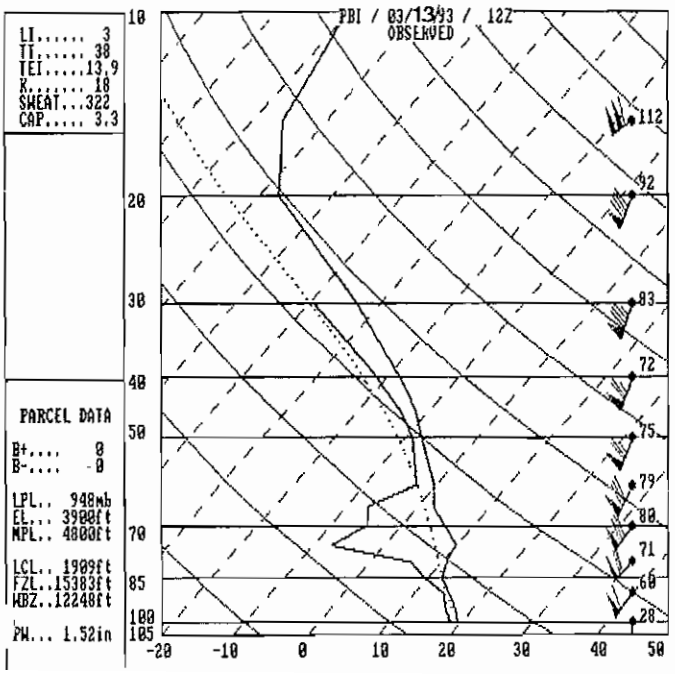


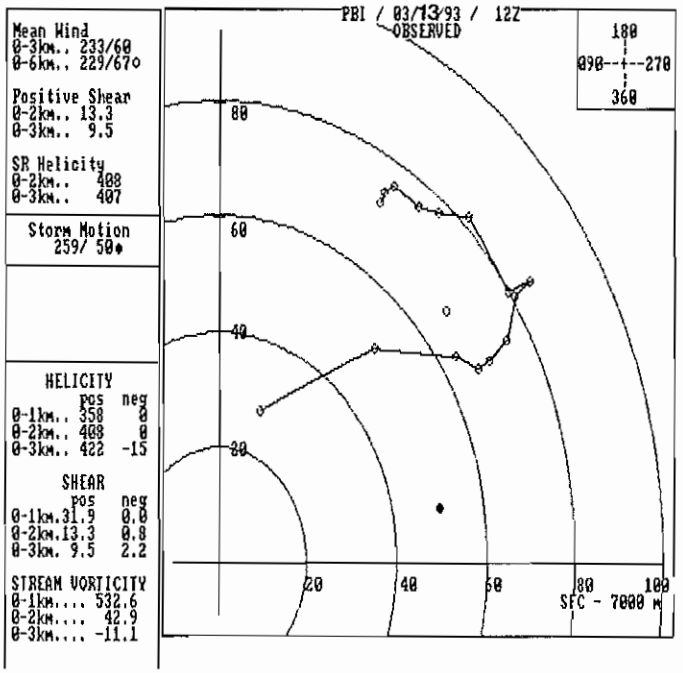


(From NOAA Disaster Survey)

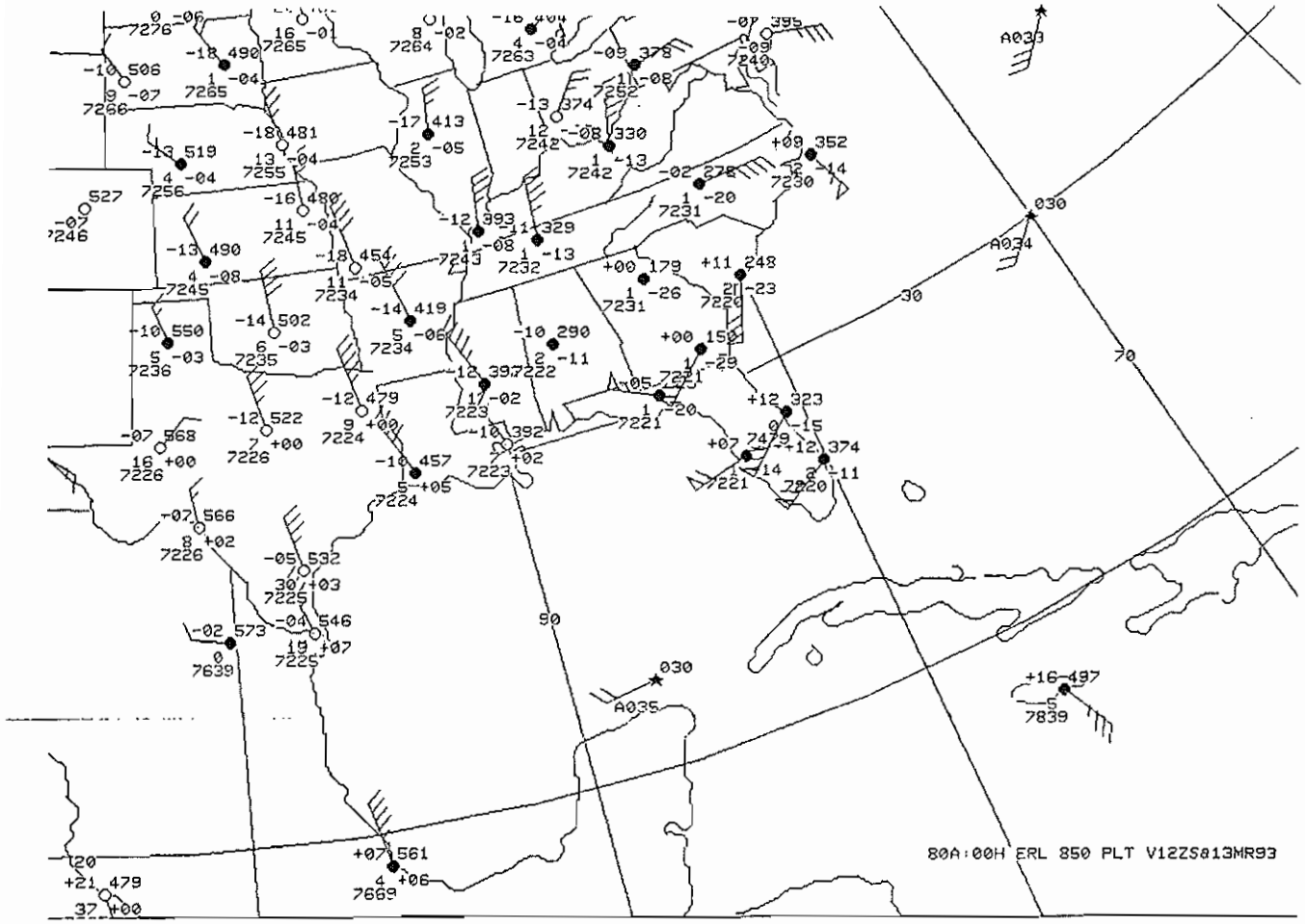


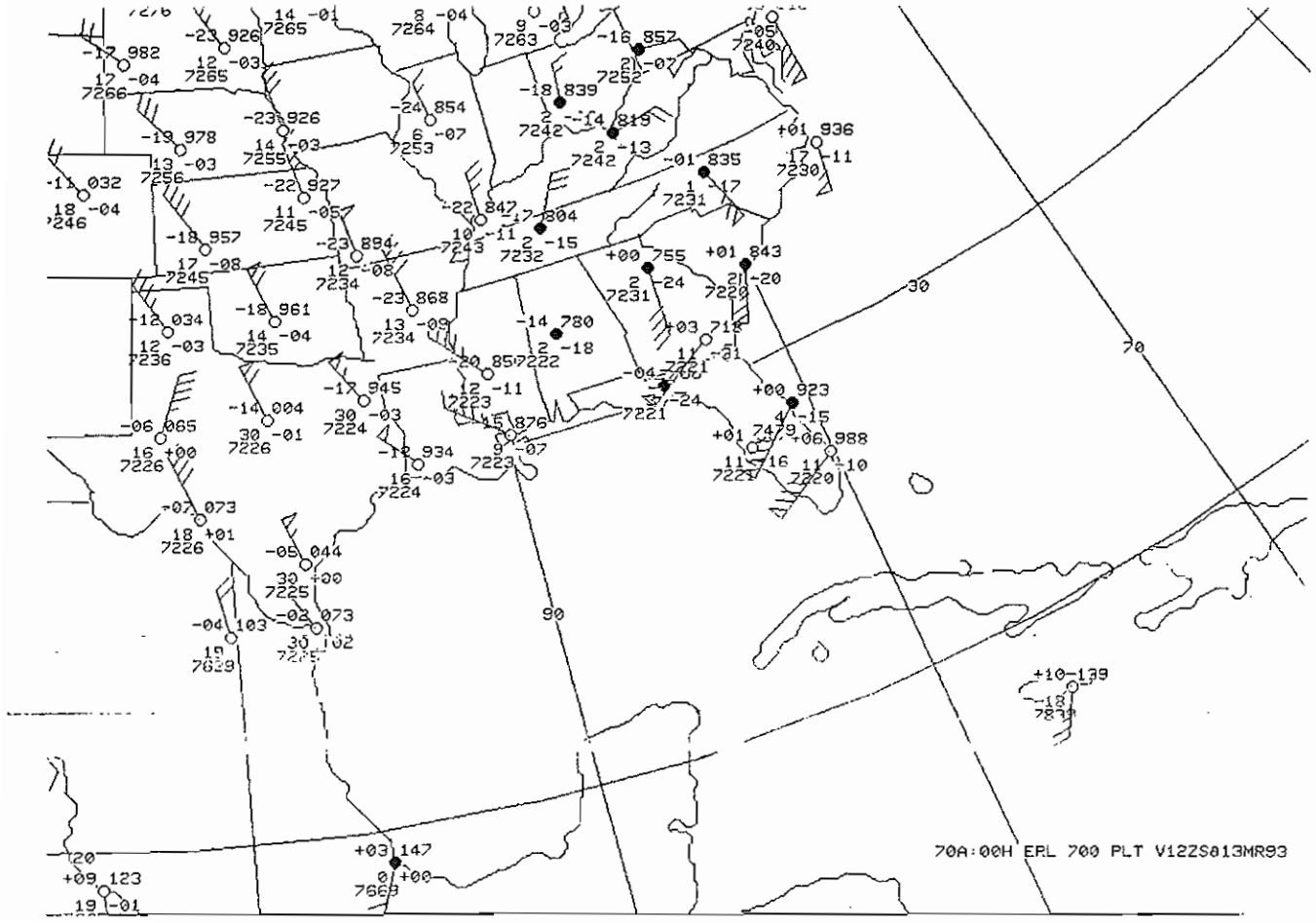

PRESFR
PRESFR
XX1012
P0A:SFC PLT 3H
V12ZSa13MR93

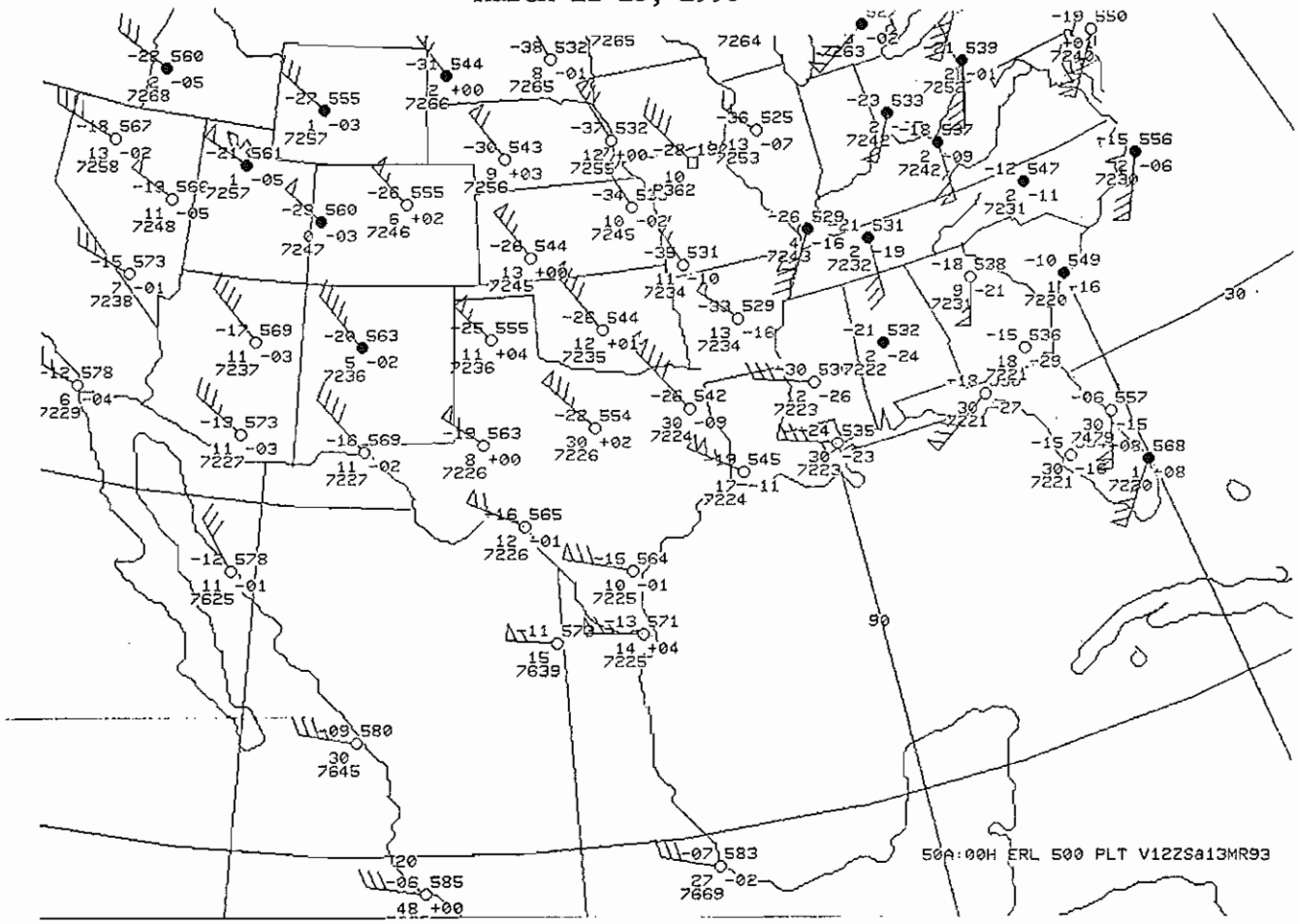

PBI / 03/13/93 / 12Z
OBSERVED
LI..... 3
TT..... 38
TEI.....13.9
K..... 18
SWEAT...322
CAP..... 3.3
PARCEL DATA
B+.... 0
B-.... -0
LPL.. 948mb
EL... 3900ft
MPL.. 4800ft
LCL.. 1909ft
FZL..15383ft
WBZ..12248ft
PW... 1.52in


Mean Wind
0-3km.. 233/60
0-6km.. 229/67
Positive Shear
0-2km.. 13.3
0-3km.. 9.5
SR Helicity
0-2km.. 408
0-3km.. 407
Storm Motion
259/ 50
HELICITY
pos neg
0-1km.. 358 0
0-2km.. 408 0
0-3km.. 422 -15
SHEAR
pos neg
0-1km.31.9 0.0
0-2km.13.3 0.8
0-3km. 9.5 2.2
STREAM VORTICITY
0-1km.... 532.6
0-2km.... 42.9
0-3km.... -11.1
PBI / 03/13/93 / 12Z
OBSERVED
SFC - 7000 M

March 12-13, 1993



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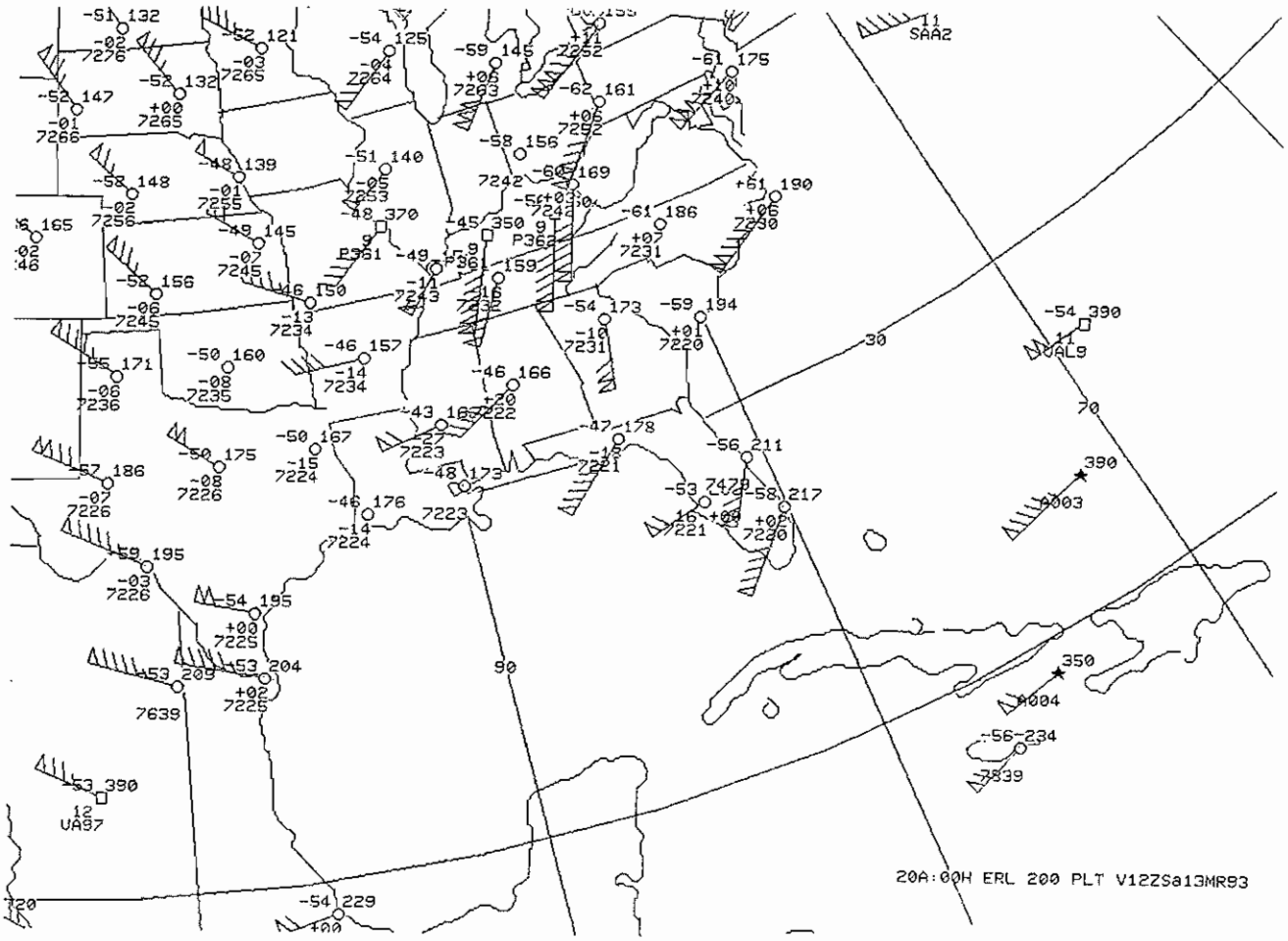
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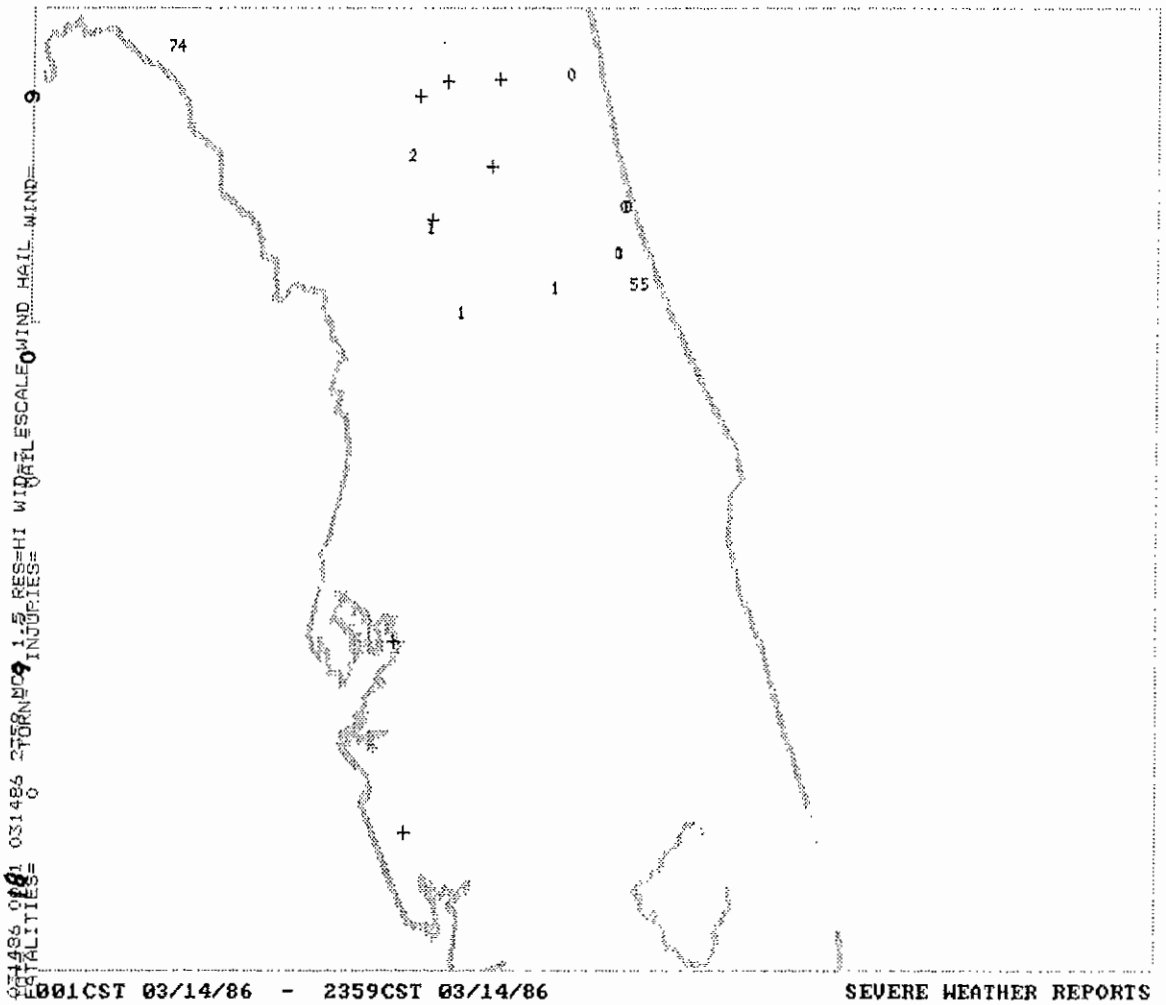
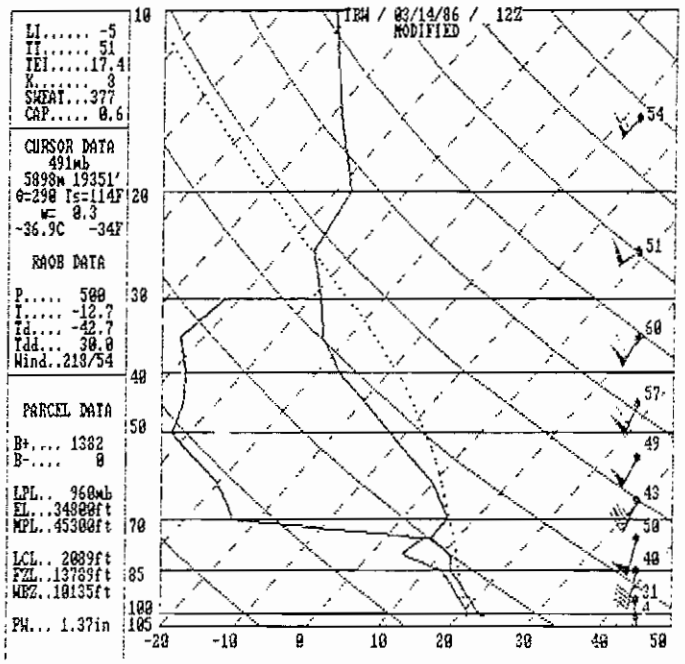
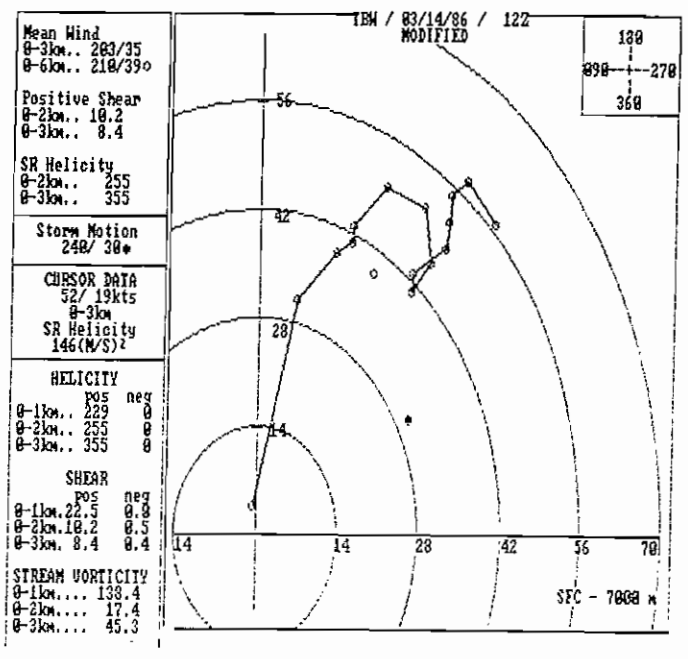
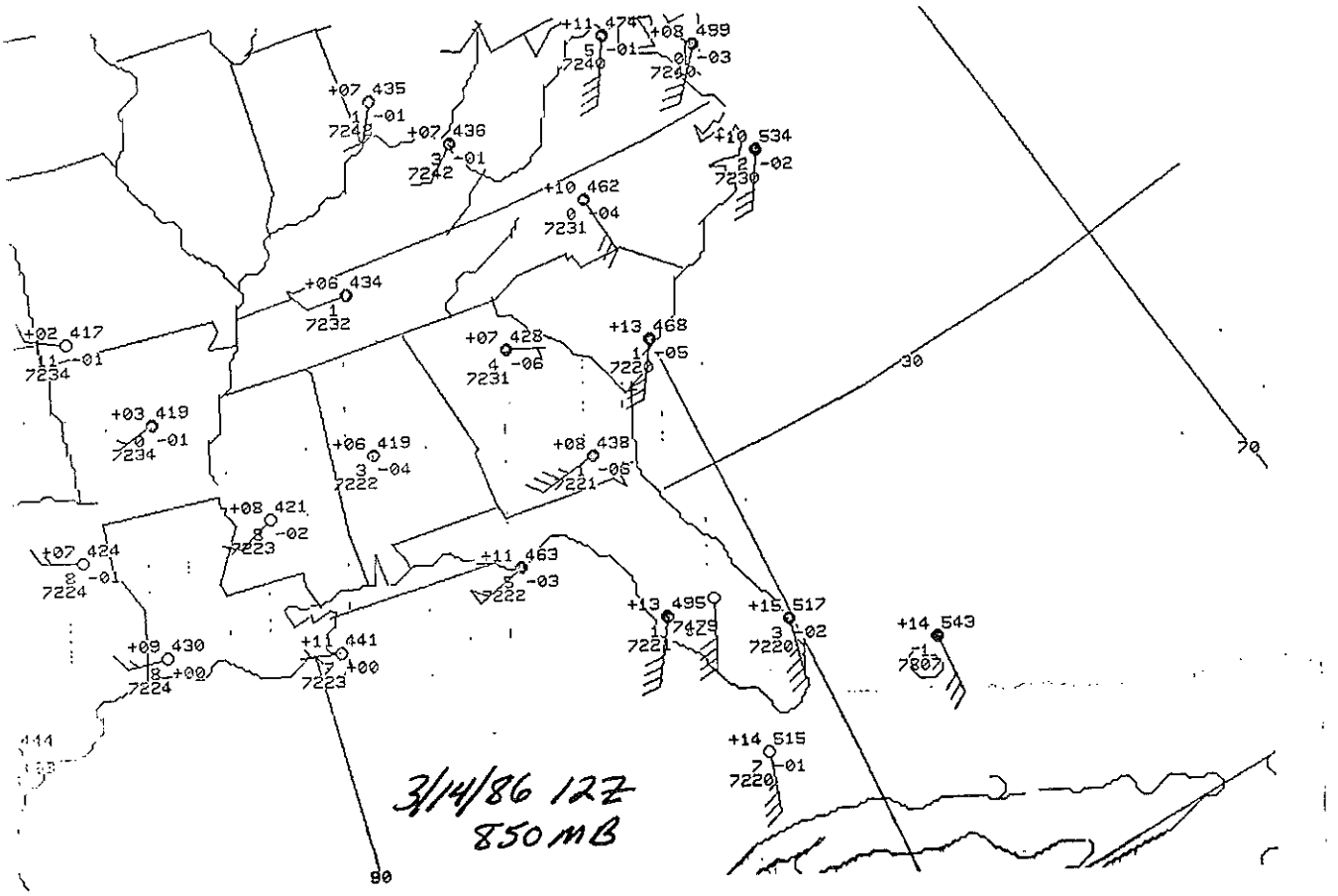
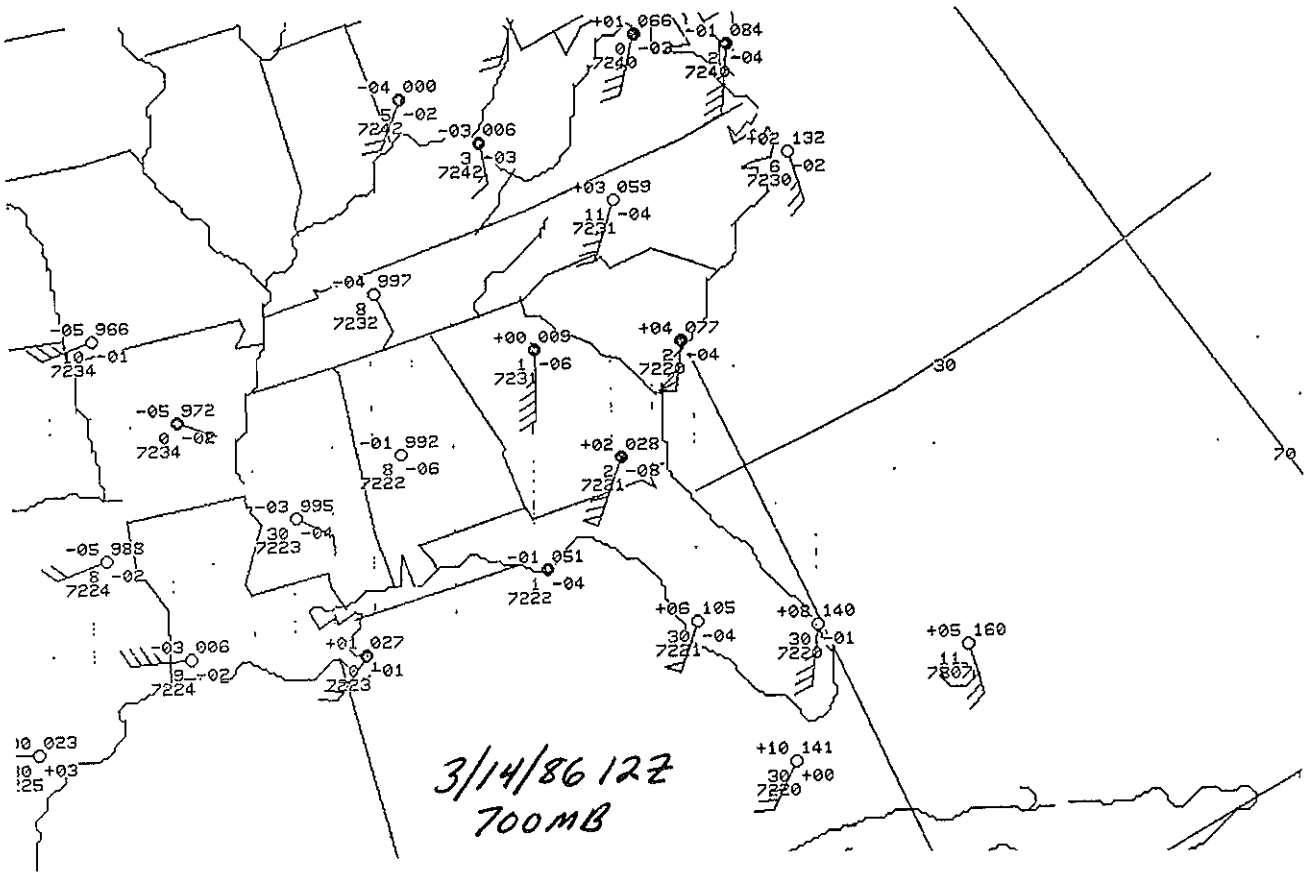
March 14, 1986



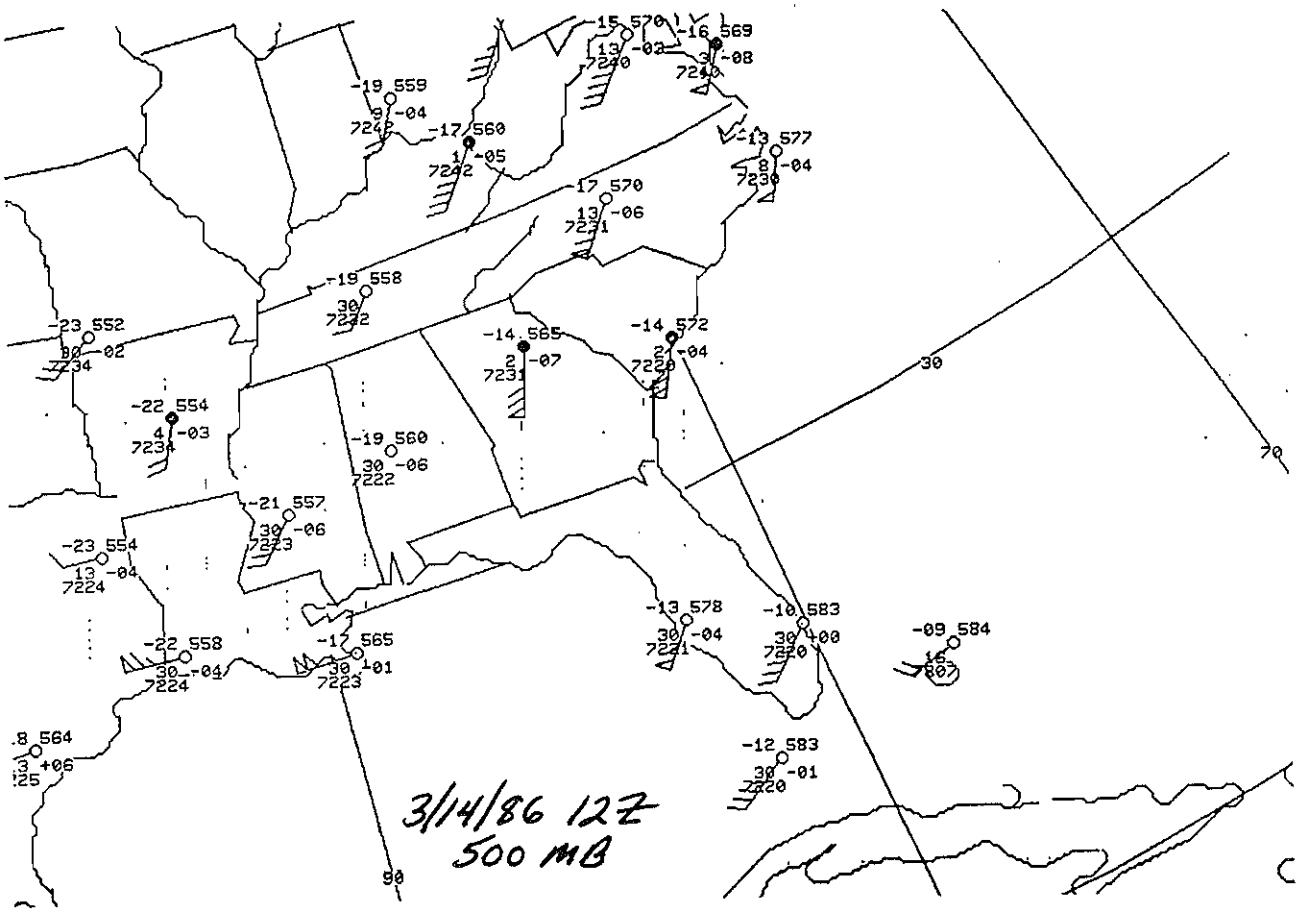


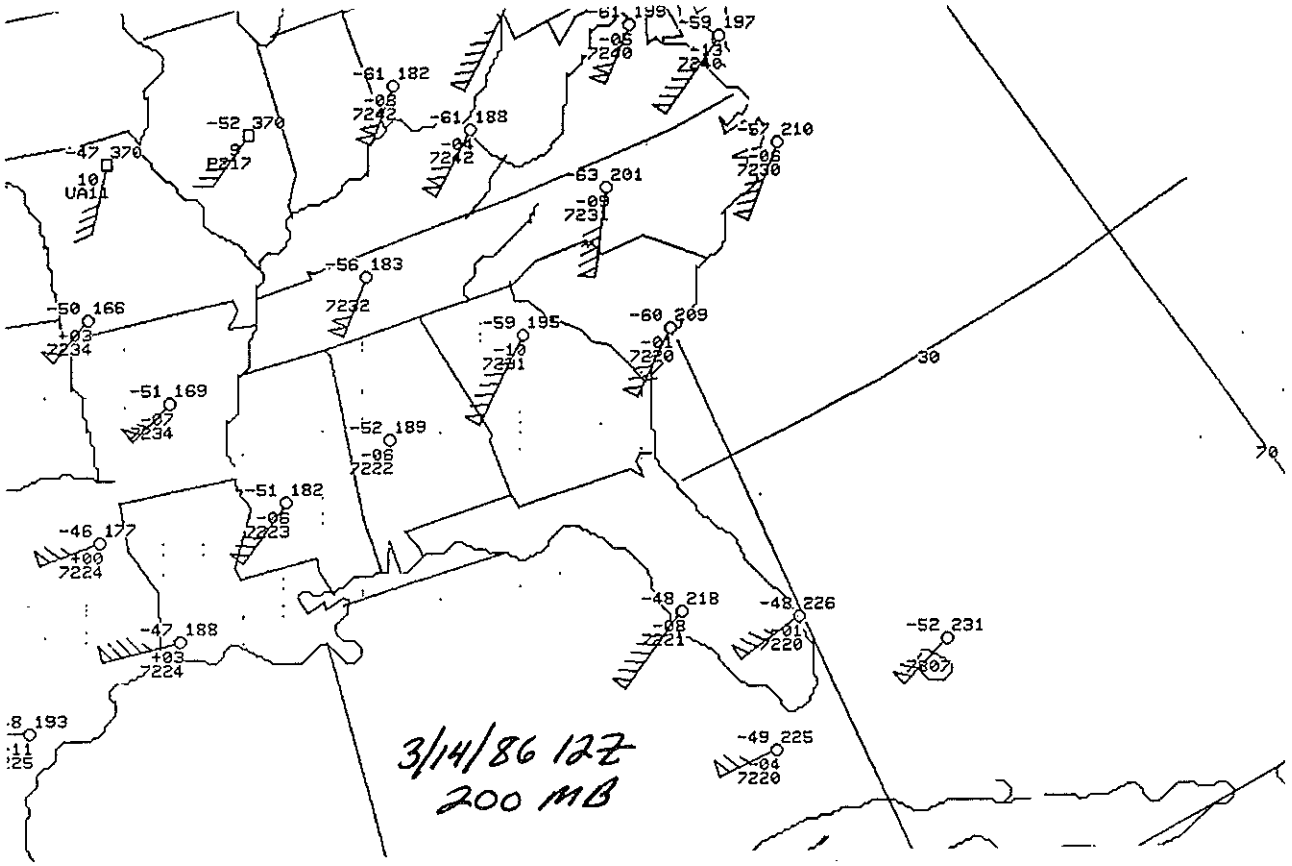


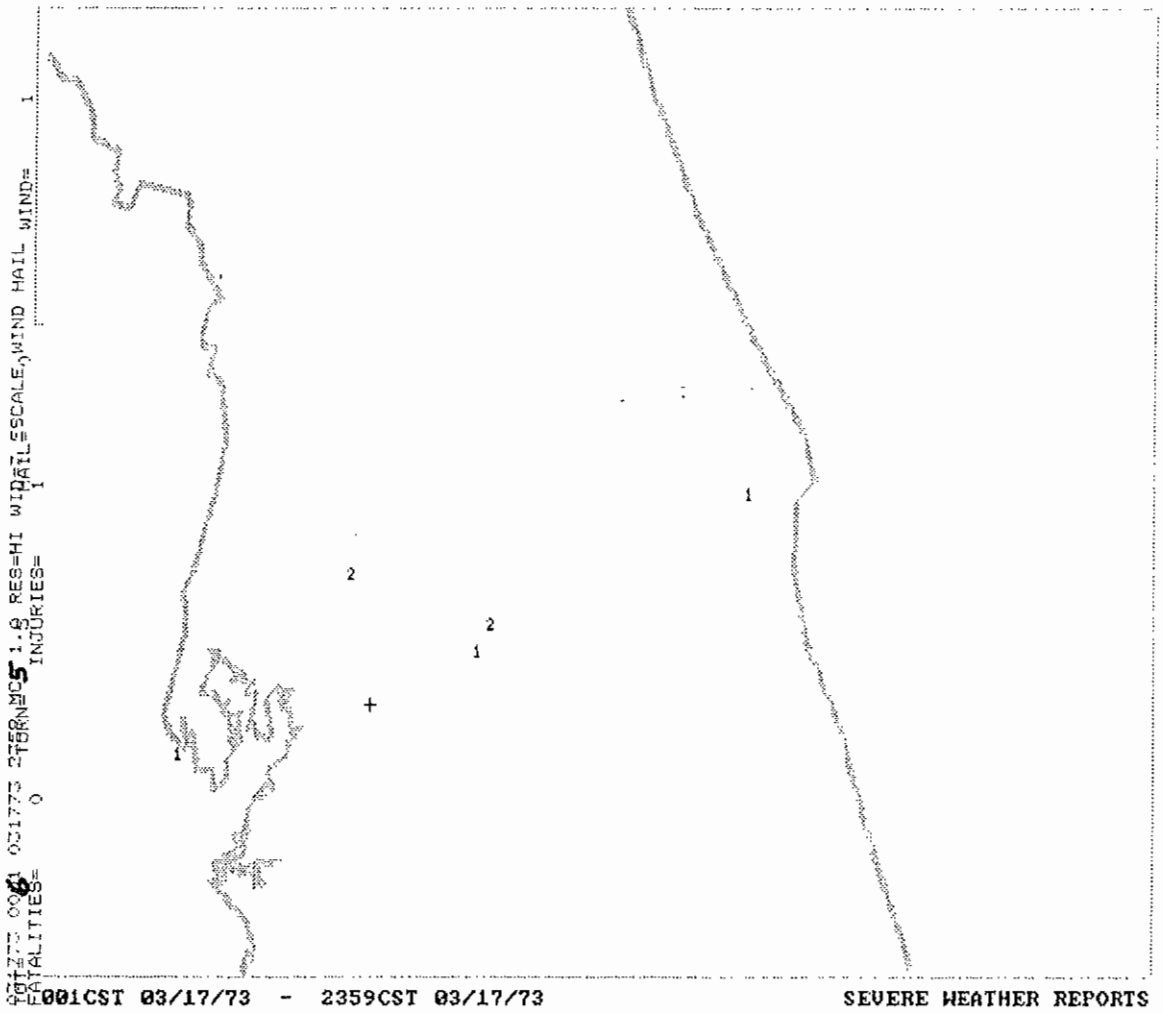

3/14/86 12Z
850MB

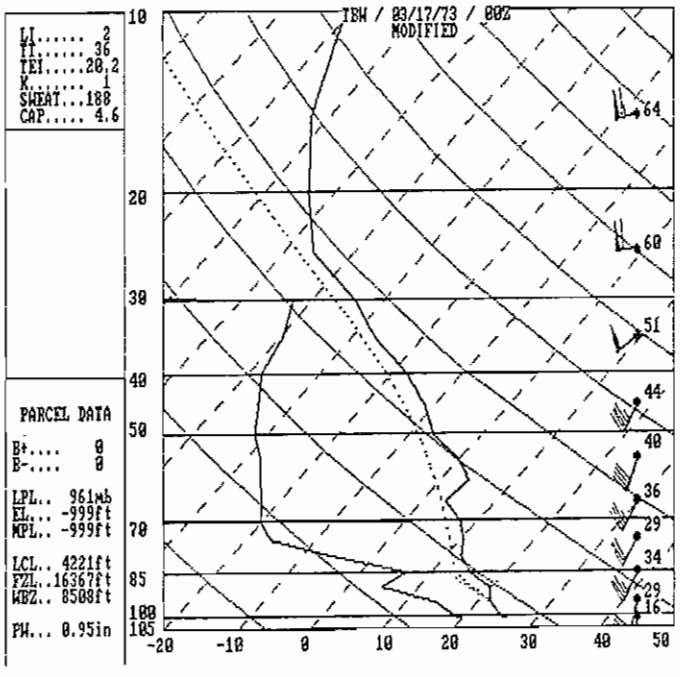

3/14/86 12Z
700MB

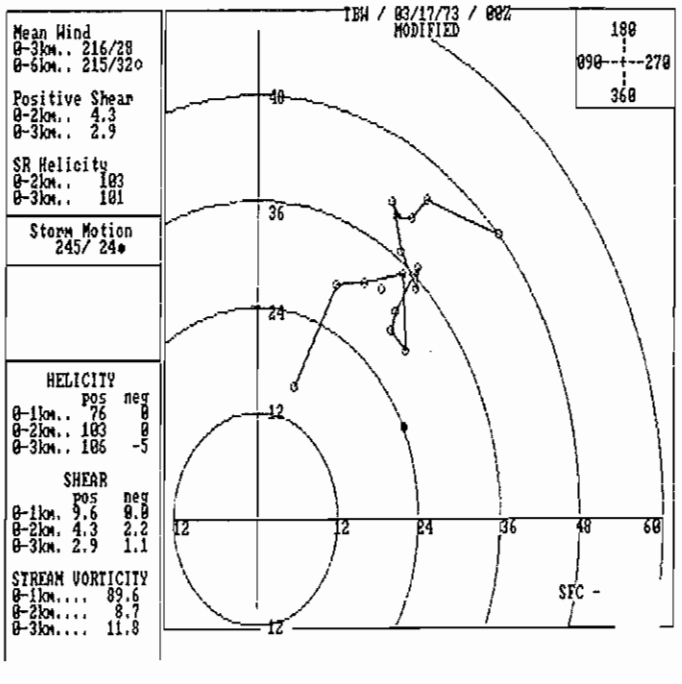
March 14, 1986



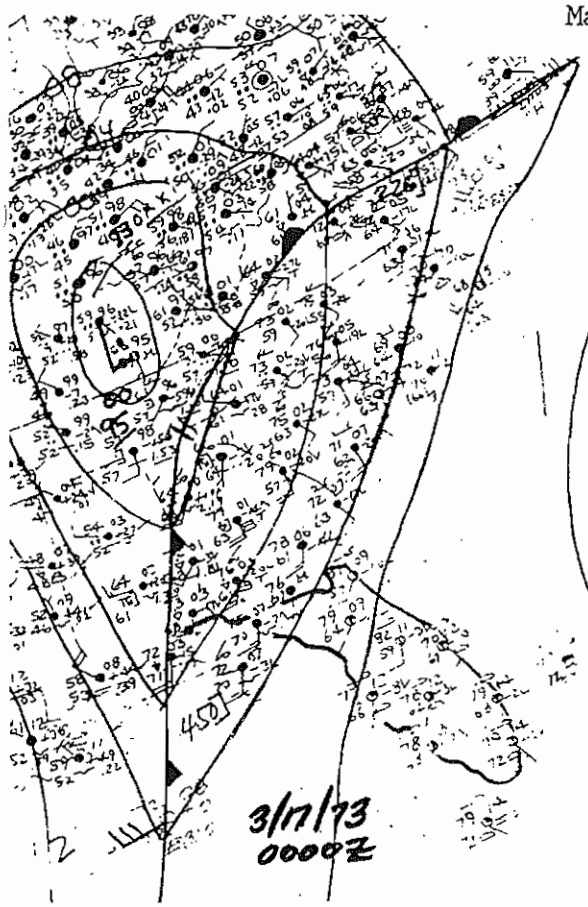


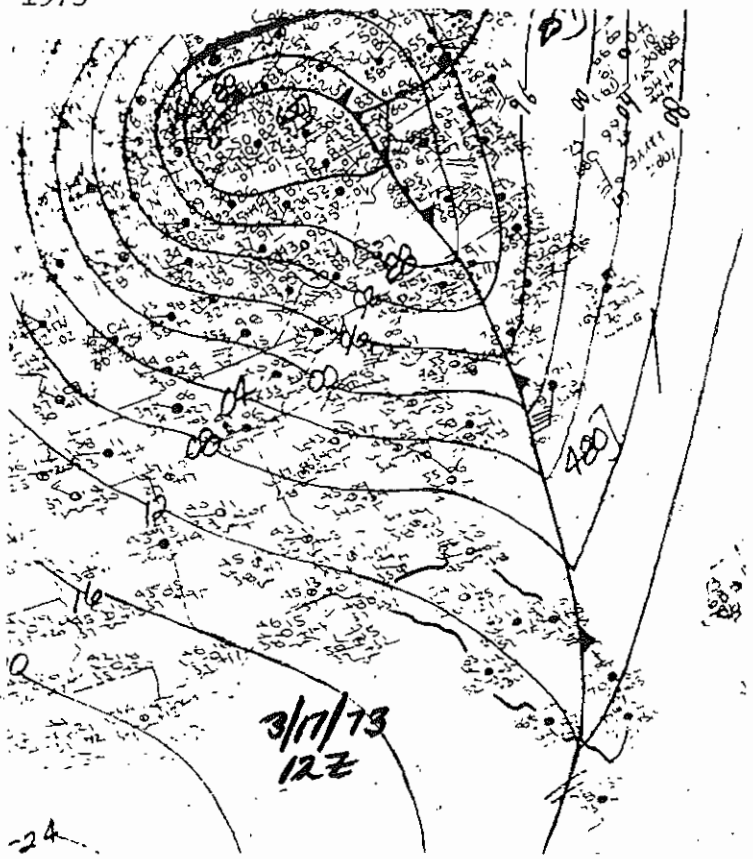

0001CST 03/17/73 - 2359CST 03/17/73
SEVERE WEATHER REPORTS

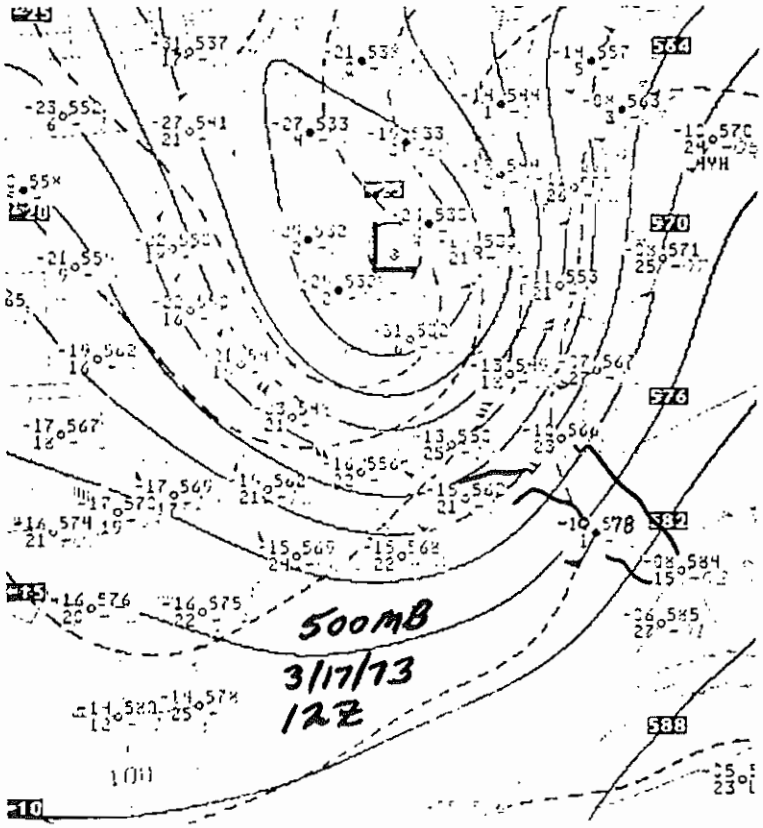

LI..... 2
TI..... 36
TEI.....20.2
K..... 1
SWEAT...188
CAP..... 4.6
PARCEL DATA
B+.... 0
B-.... 0
LPL.. 961mb
EL... -999ft
MPL.. -999ft
LCL.. 4221ft
FZL..16367ft
WBZ.. 8508ft
PW... 0.95in
TBW / 03/17/73 / 00Z
MODIFIED

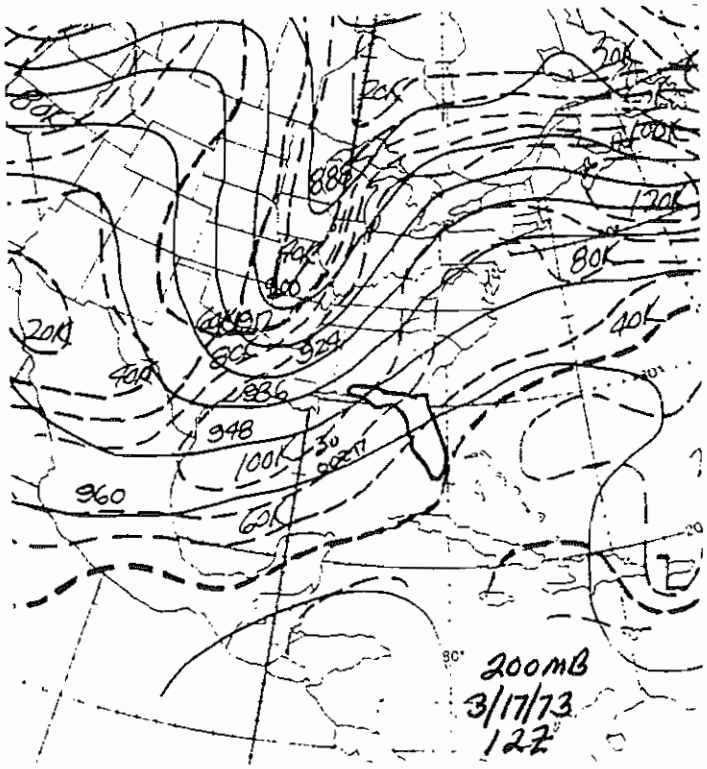

Mean Wind
0-3km.. 216/28
0-6km.. 215/32
Positive Shear
0-2km.. 4.3
0-3km.. 2.9
SR Helicity
0-2km.. 103
0-3km.. 101
Storm Motion
245/ 24
HELICITY
pos neg
0-1km.. 76 0
0-2km.. 103 0
0-3km.. 105 -5
SHEAR
pos neg
0-1km.. 9.6 0.0
0-2km.. 4.3 2.2
0-3km.. 2.9 1.1
STREAM VORTICITY
0-1km.... 89.6
0-2km.... 8.7
0-3km.... 11.8
TBW / 03/17/73 / 00Z
MODIFIED
SFC -

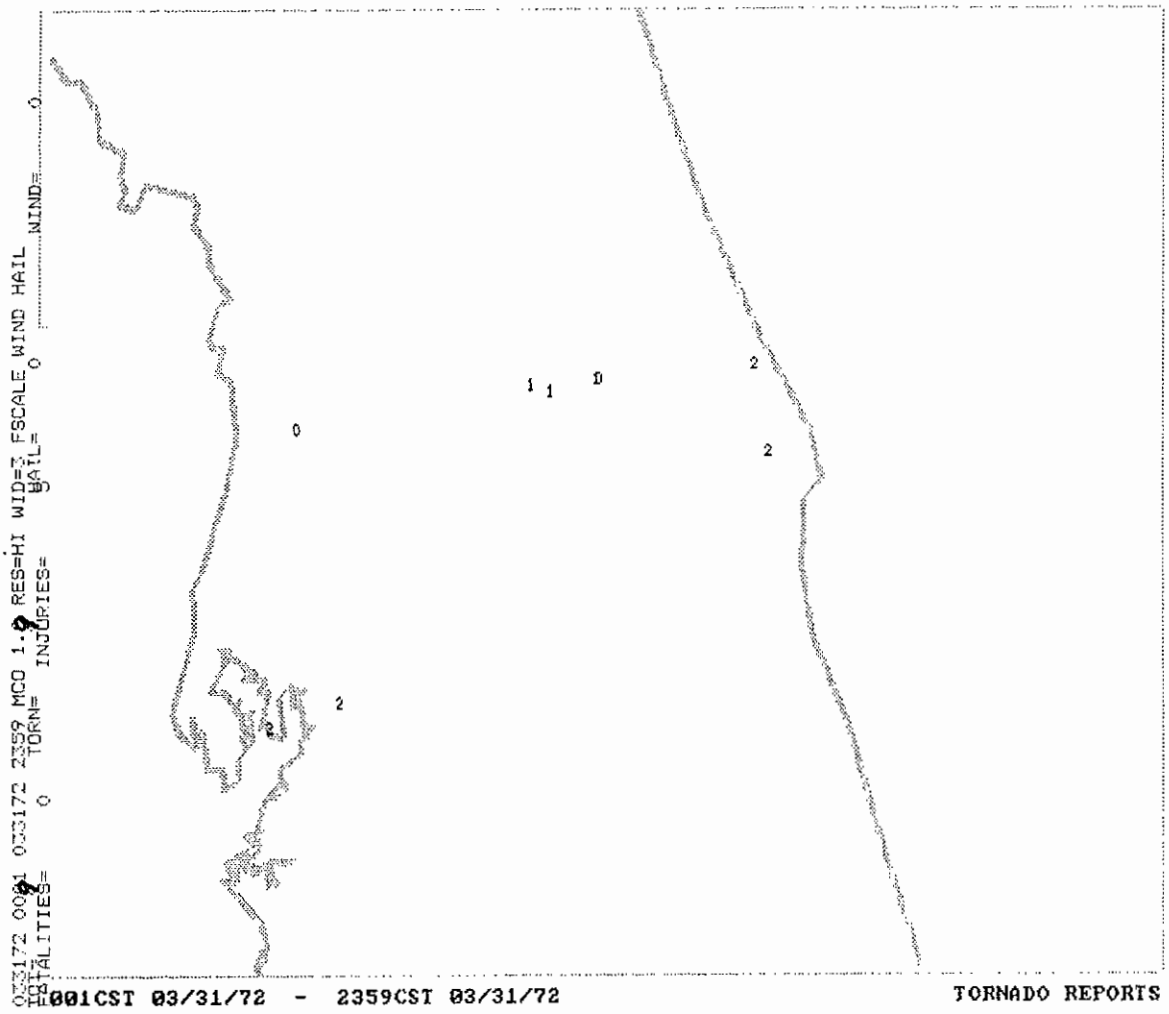
March 17, 1973



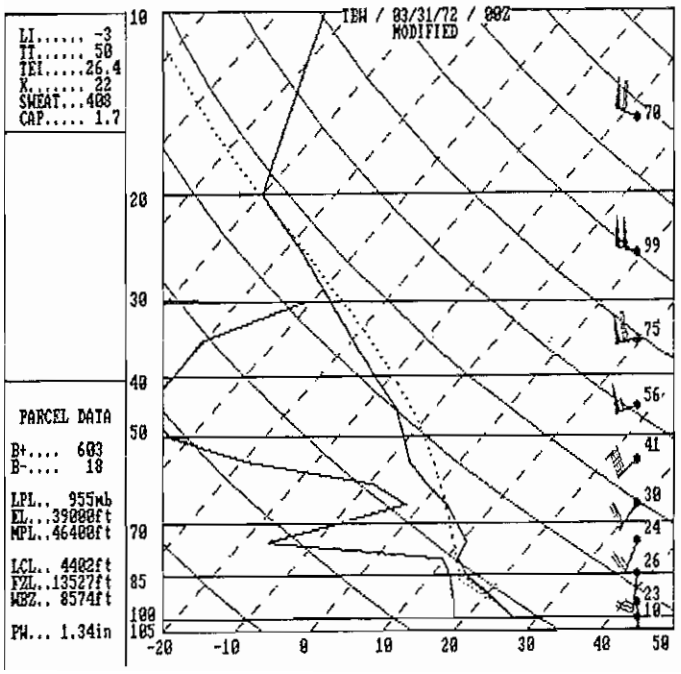


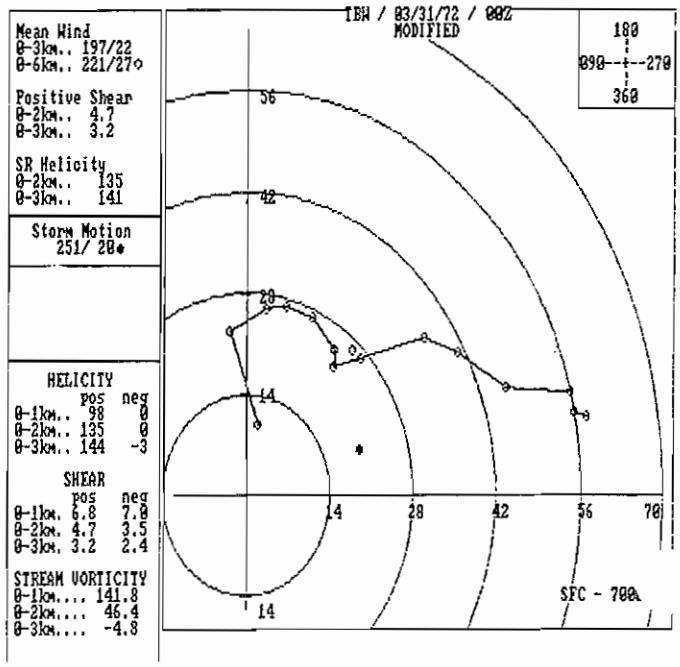




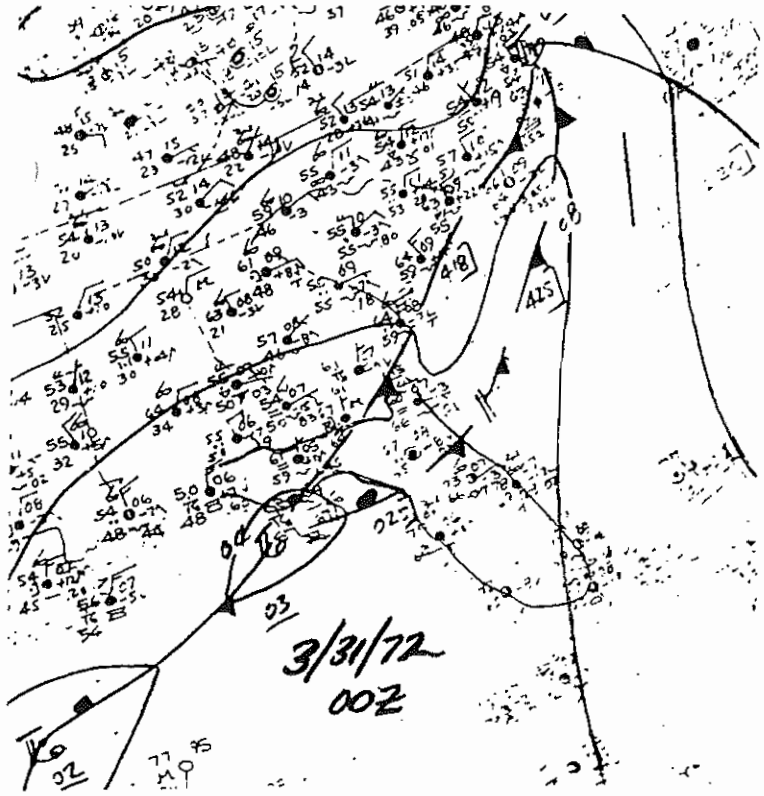


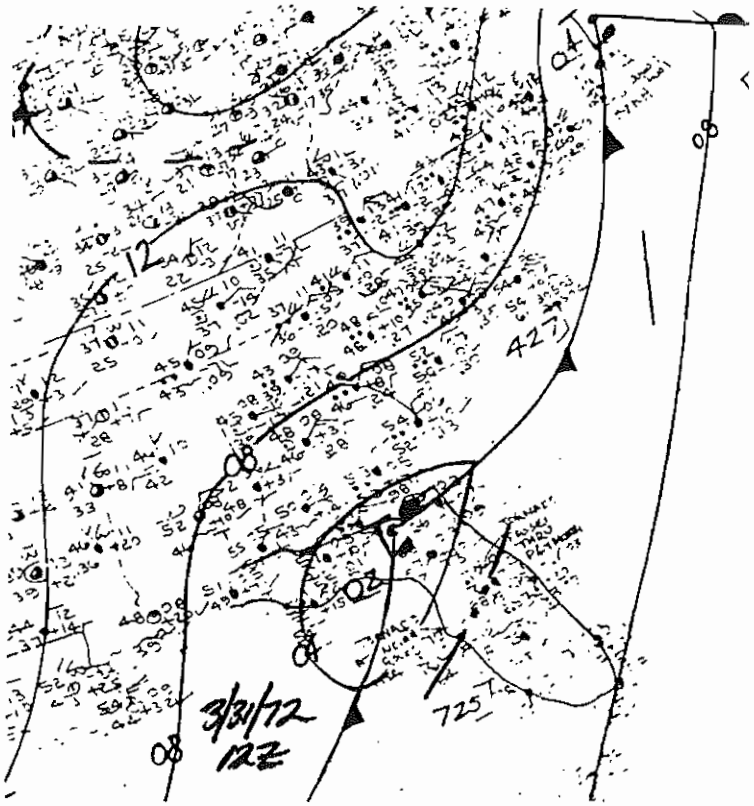
(3/31/72 12 UTC Sounding Not Available)

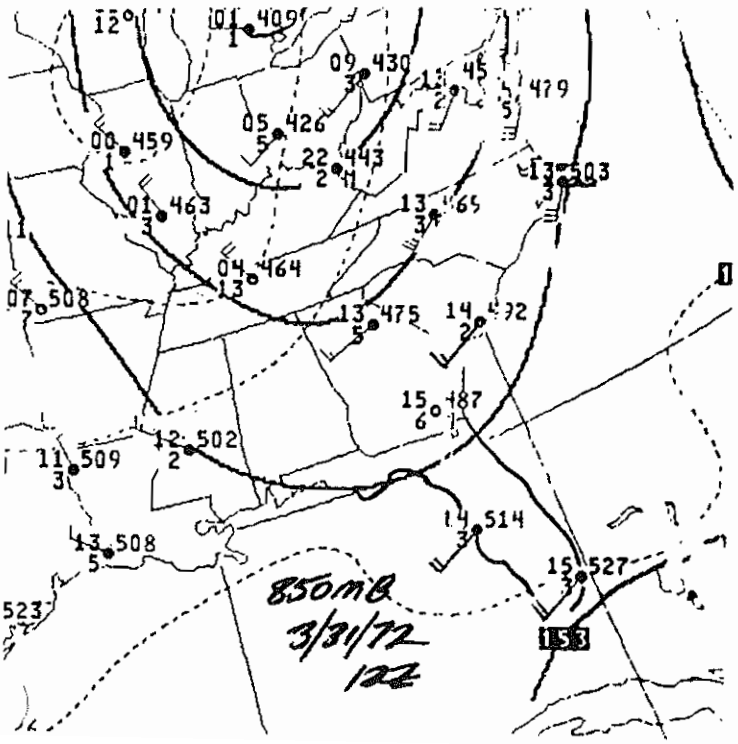


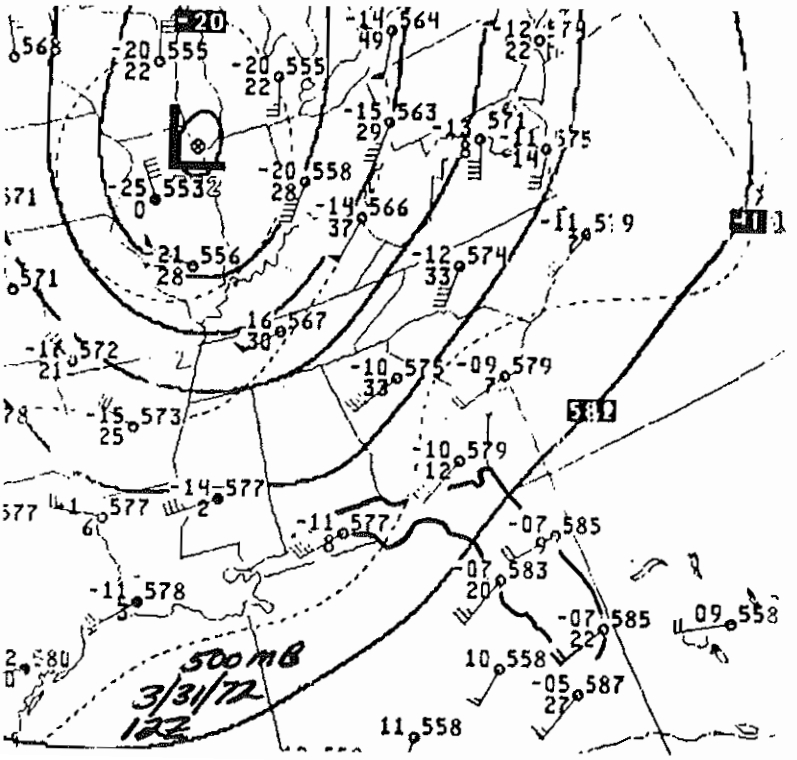


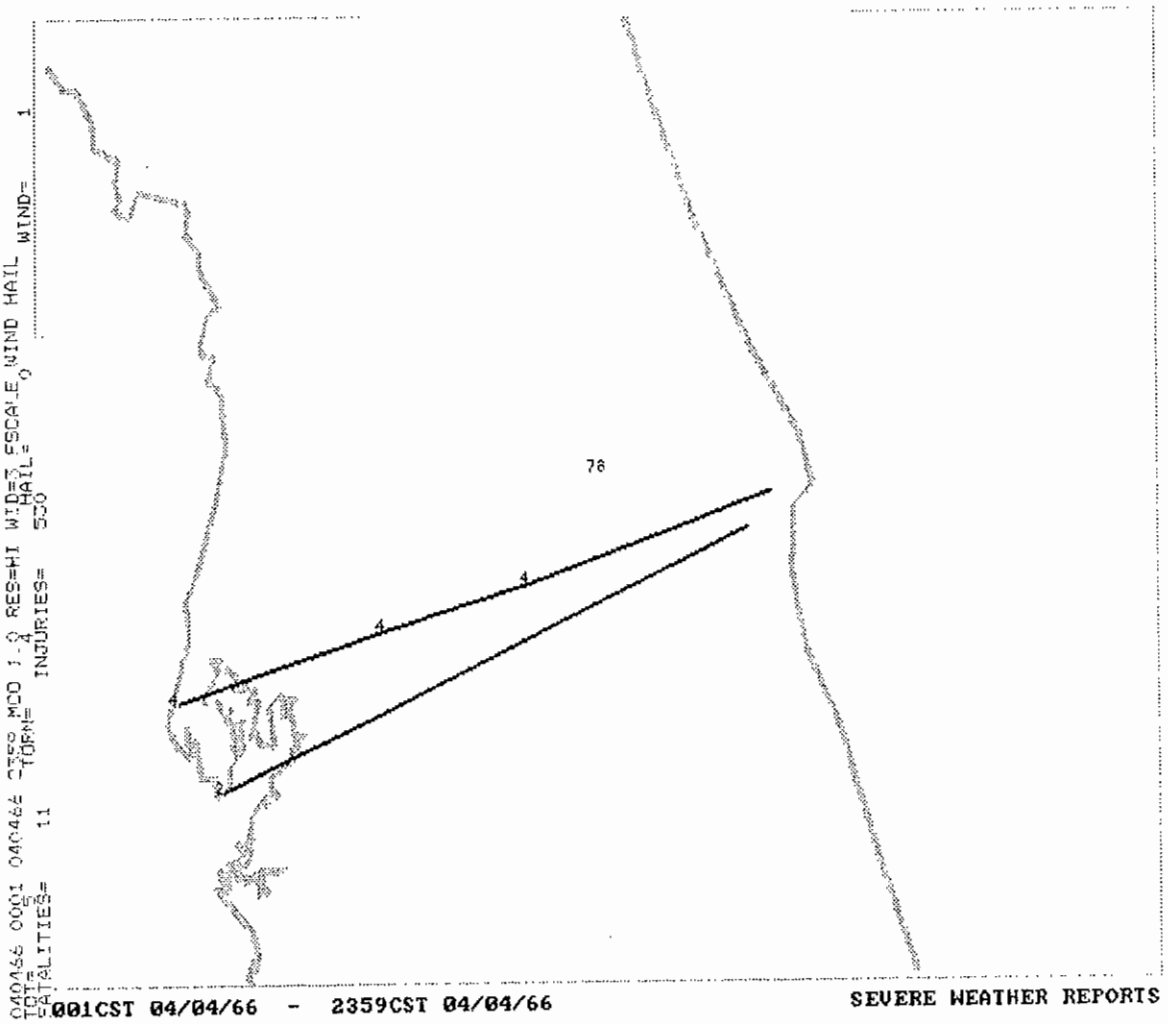
March 31, 1972





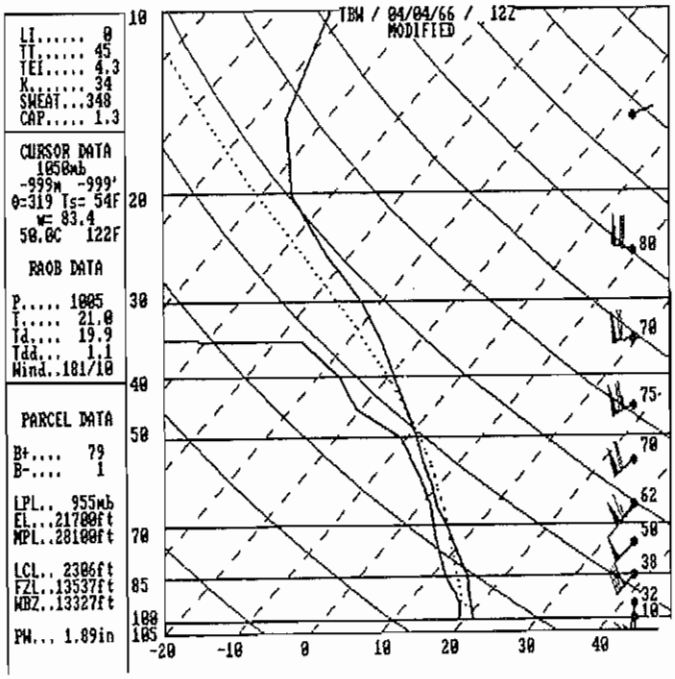


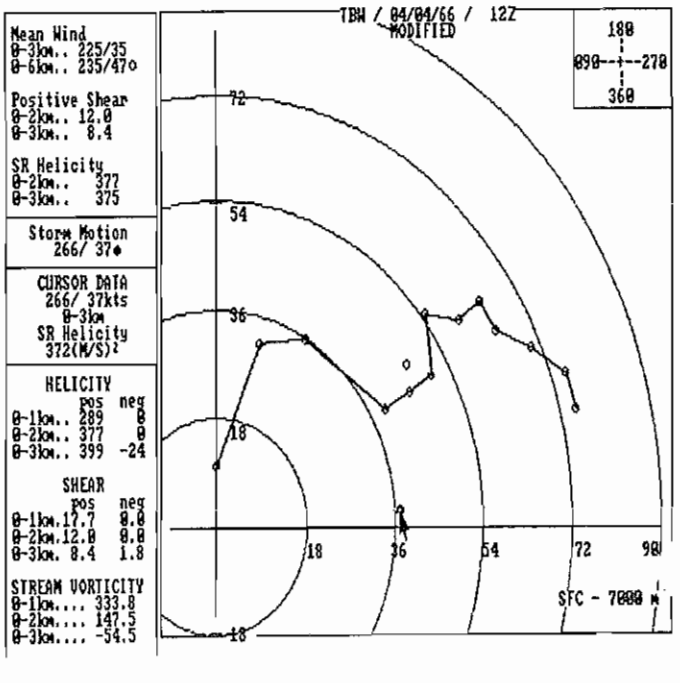


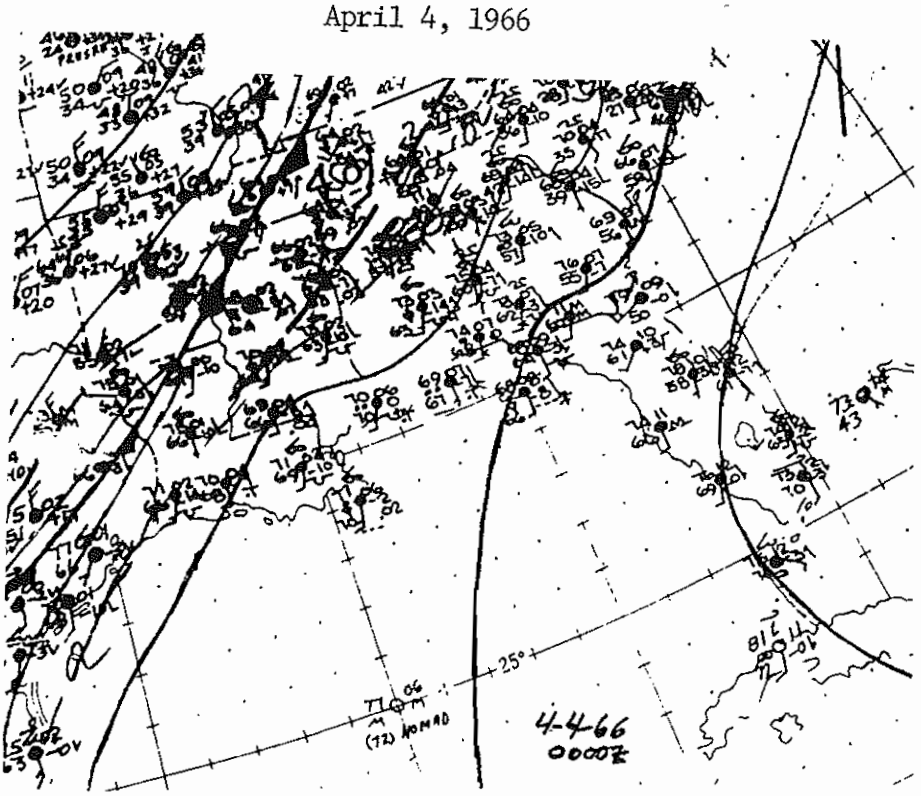


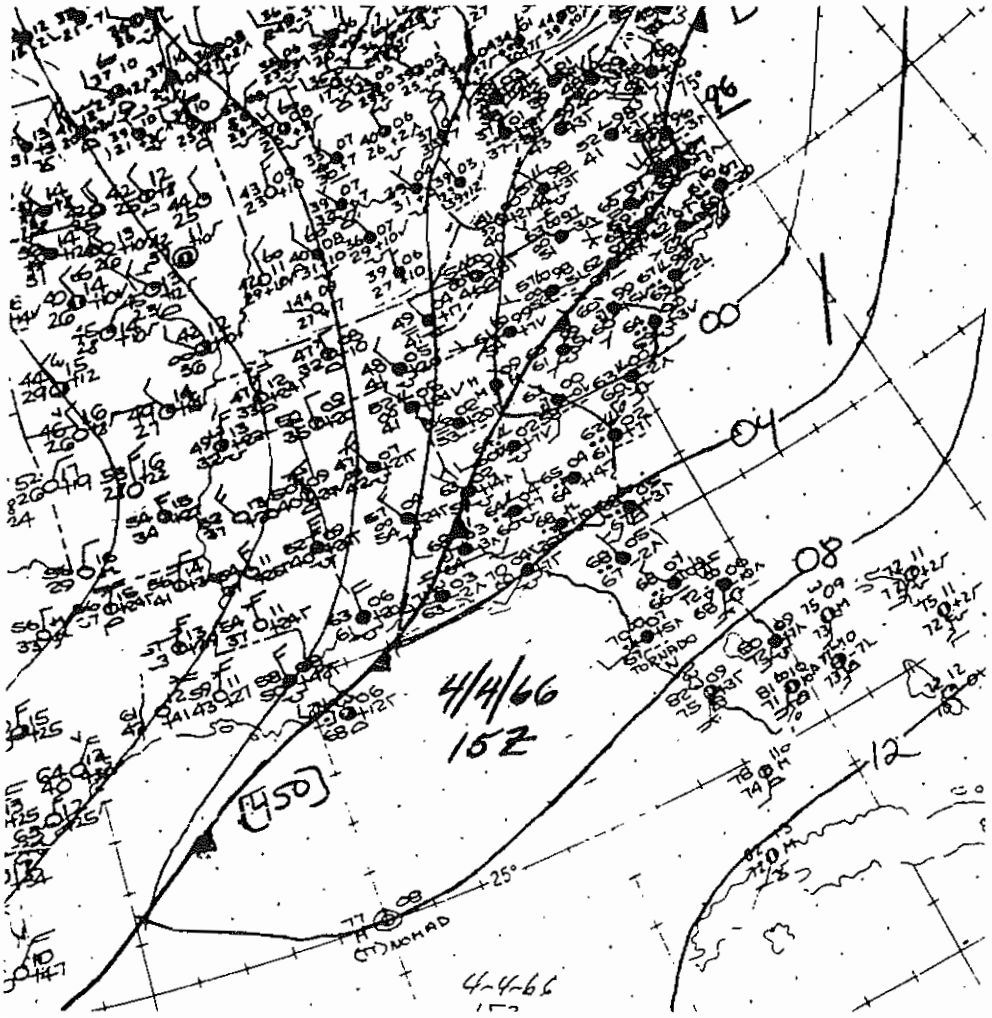
Deadliest Peninsular Florida Outbreak!

(Note: One of two outbreaks to produce F4 tornadoes)

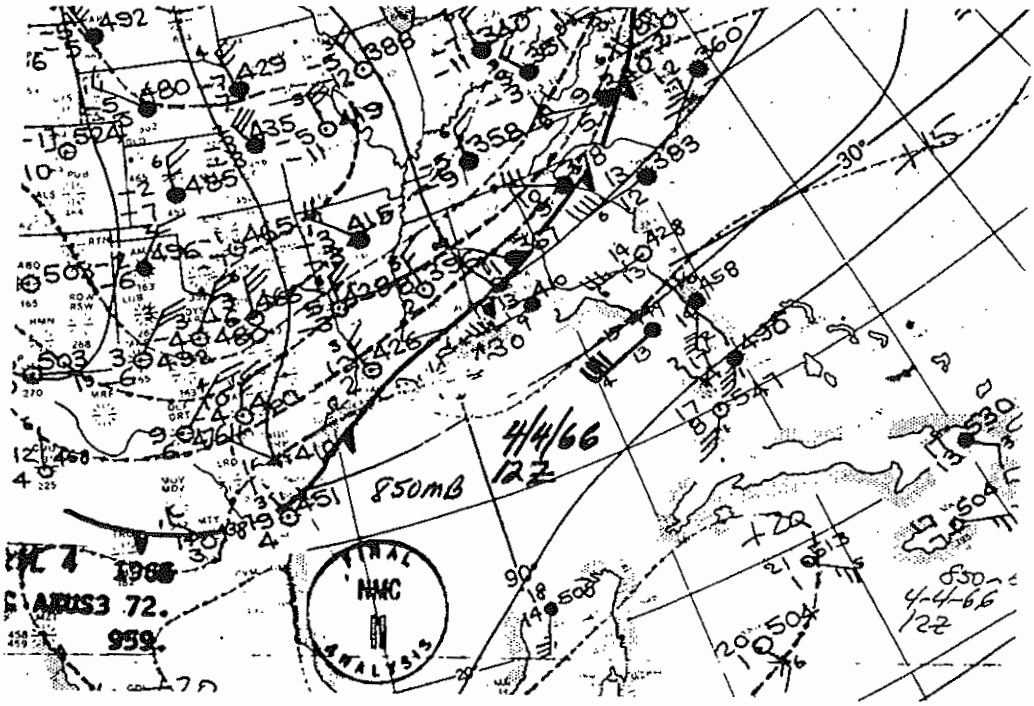


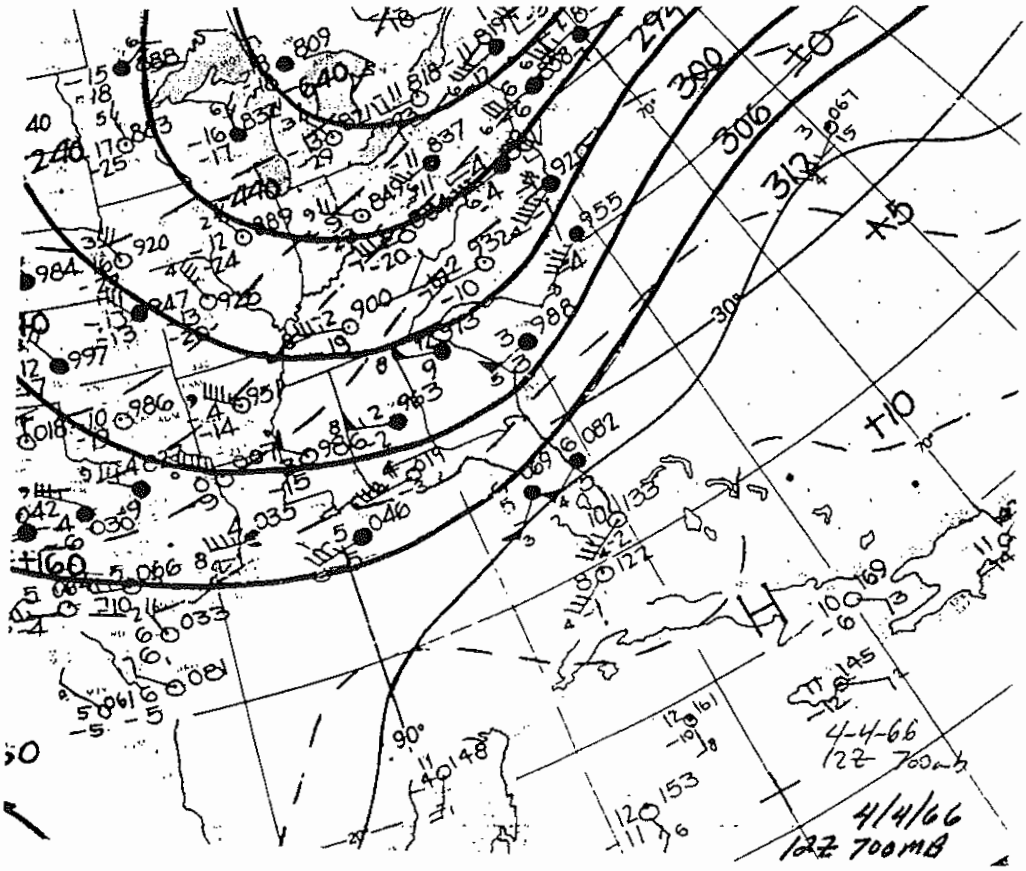



4-4-66
0000Z

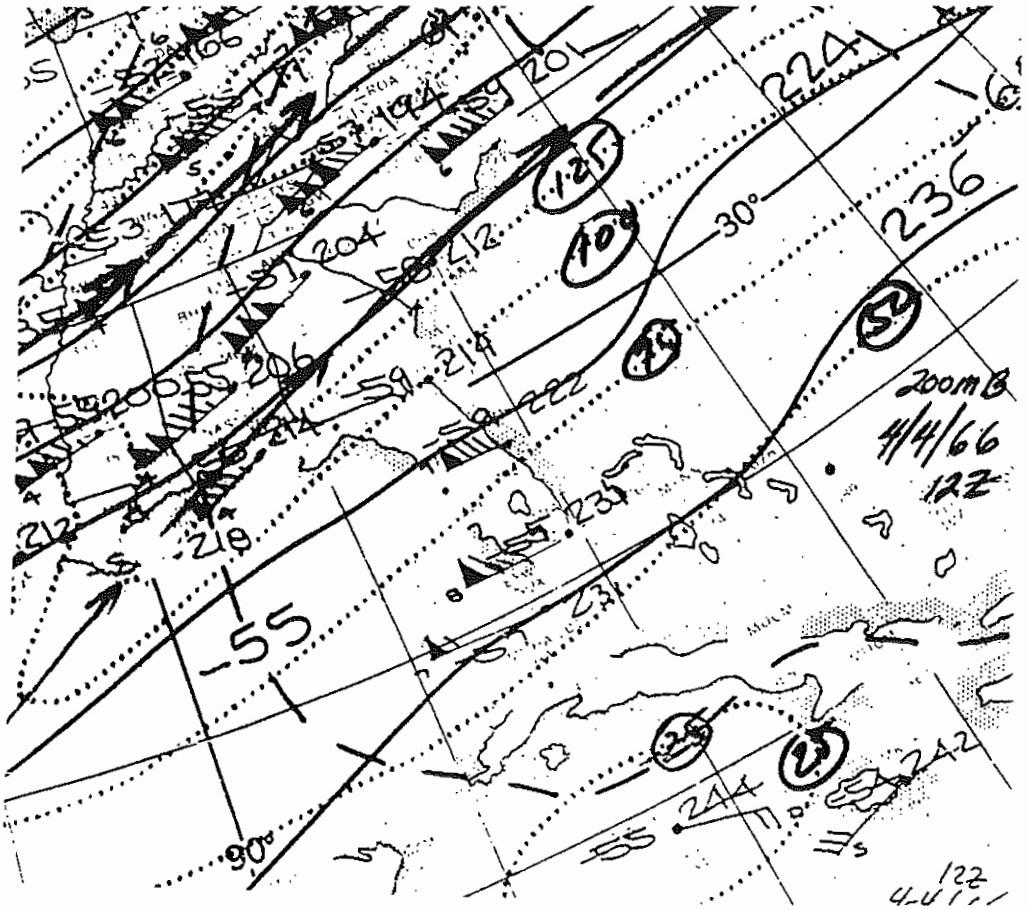

4/4/66
1652

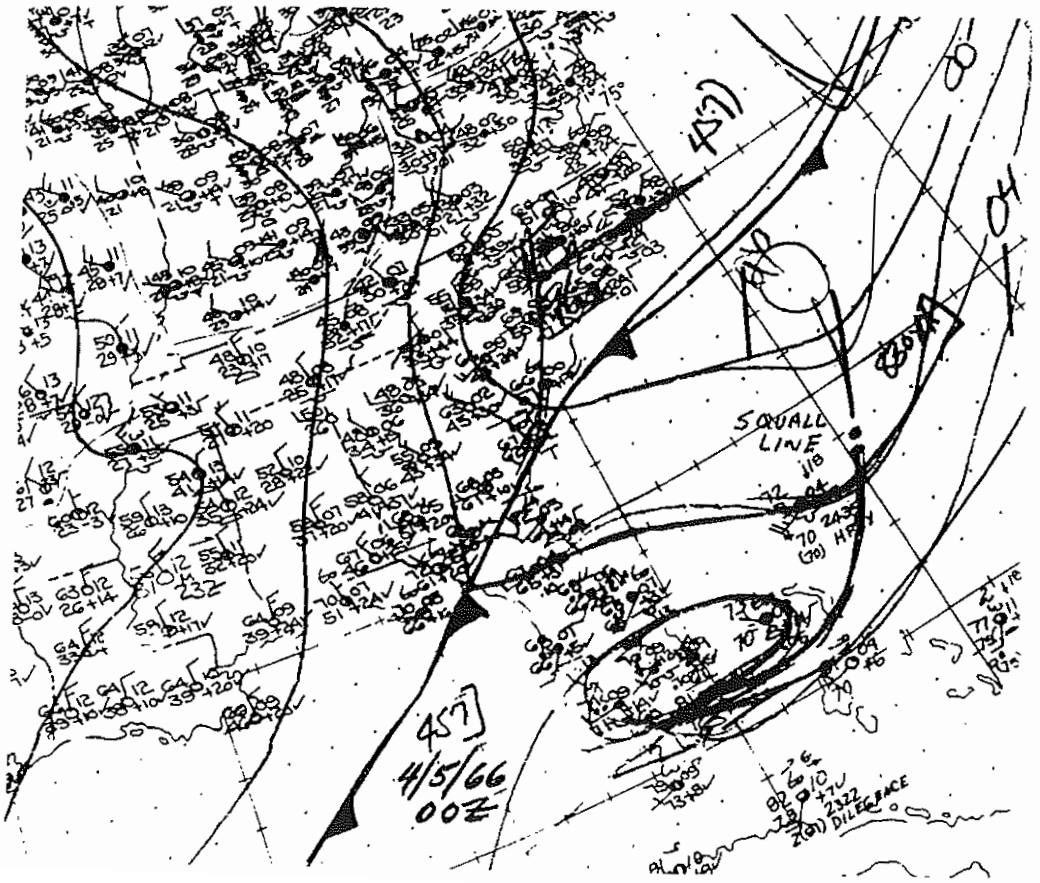
April 4, 1966

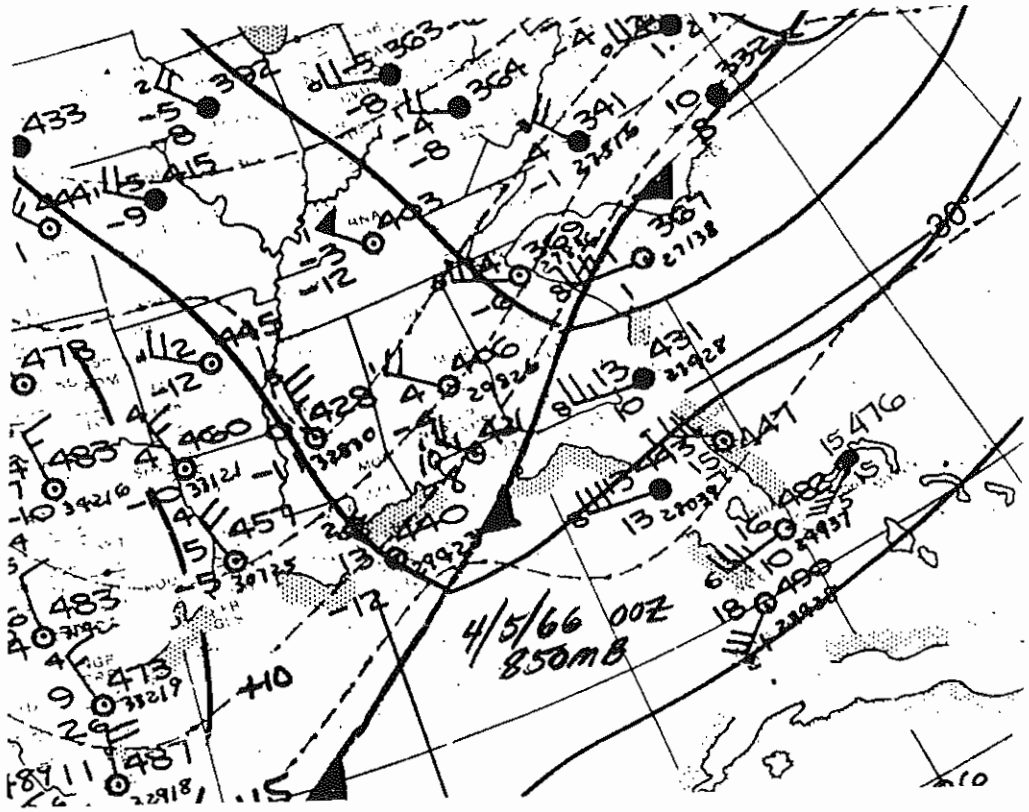

4/4/66
12Z
850MB
FINAL
NMC
ANALYSIS
4-4-66
12Z


4-4-66
12Z 700mb
4/4/66
12Z 700MB

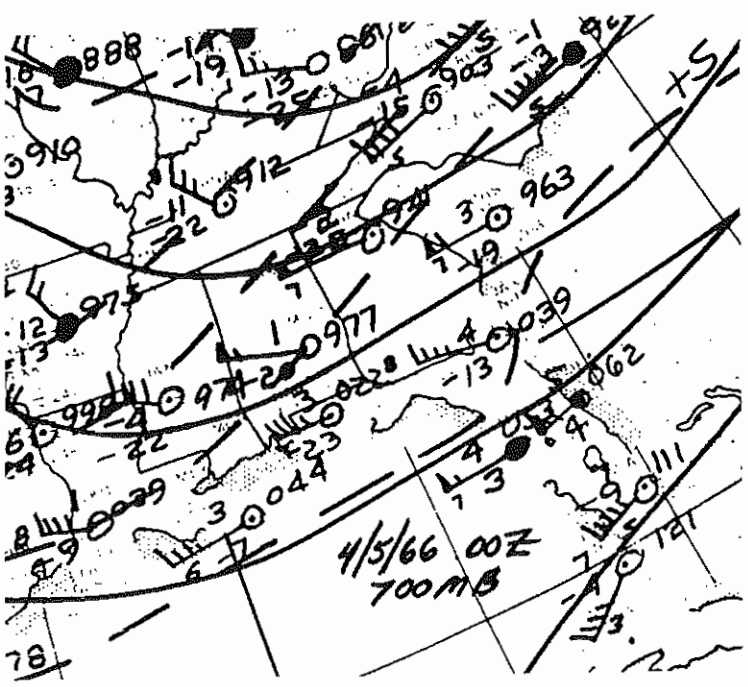
April 4, 1966

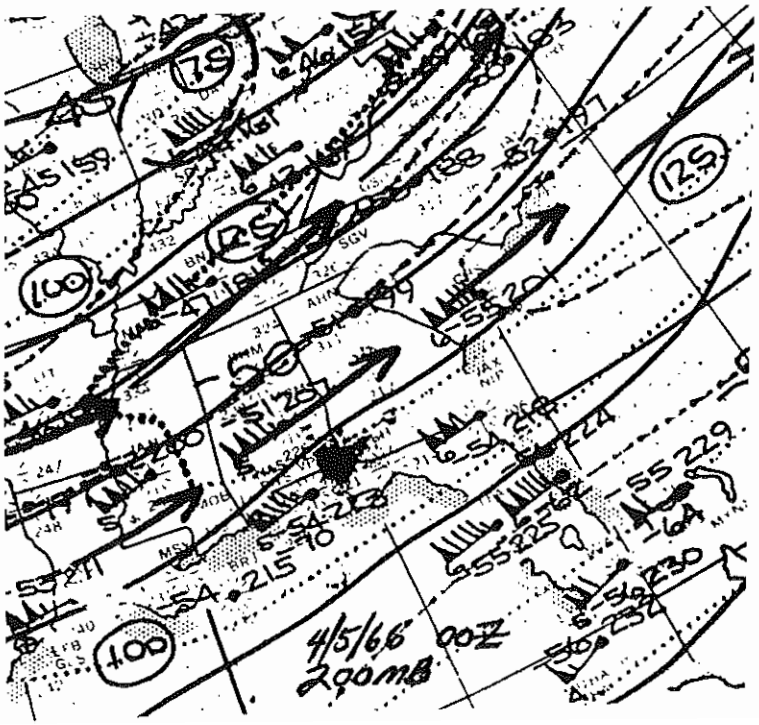

200mB
4/4/66
12Z
30°
90°
-55
224
236
201
204
212
214
222
231
218
244
242
12Z


SQUALL LINE
457
4/5/66
00Z
DILEGENCE



(Note 135 kt jet max over Cape Canaveral)





April 4, 1966

4

Highlights
out in Ft. Myers, 1B.
s has high hopes for
a sets sights for Paul
te sports, 1-5B

4/5/66

TODAY

Florida's Space Age Newspaper

Tuesday, April 5, 1966 — Published in Brevard County, Florida — 10c Daily, 50c Weekly

Next Space Shots
Orbiting Astronomical Observatory, (OAO), 2:17 p.m. Tuesday, Atlas Centaur, 12:05 a.m. Wednesday.
TODAY's Weather:
Brevard and surrounding area: Cloudy, showers, thunder, gusty winds, high of 7[illegible]
Complete weather, 2A

ike Roar of 1,000 Freight Trains, wisters Batter Florida, Kill Nine

After the Storm: 10 Dead Ruin, Hope and Prayers

4/6/66

Erratic Twisters Catch Weathermen by Surprise

By JACK BRIEBART
TODAY Staff Writer

Monday's tornadoes caught weathermen by surprise.

"Conditions which favor the formation of severe tornadoes rarely occur this far South," said Forecaster Raymond Kraft, at the U. S. Weather Bureau in Miami.

What it takes for a tornado to form is very strong winds four miles or more above the earth and some pretty strong southerly winds.

"I wouldn't guess at the odds for getting a combination of the two things in Florida," said Kraft, "but they are very rare."

Why is not exactly known but the warm weather has something to do with it. "We've never, as far as I know, had a tornado in a tropical climate," said Kraft.

When the strong winds aloft and the southerly winds combine, they form an updraft — which is the tornado.

"It's sort of the reverse of pulling the plug out of a bathtub," said Kraft.

Unlike hurricanes, tornadoes can form quickly.

"In the Midwest," said Kraft, "they've been known to form out of a clear sky . . . but generally they form in squally weather."

Kraft admitted even looking back over all the information available to the weather bureau Sunday night and early Monday morning, he could not predict a tornado.

"And if I would have, I would have predicted the wrong area," he added.

Once it's determined conditions are favorable for a tornado, weathermen then can determine a belt in which tornadoes are likely to occur. Monday's belt, according to Kraft, was about 25 to 30 miles wide across the state.

Kraft said there were 10 actual tornadoes pinpointed across Florida Monday but he would guess there were many more.

"These things are very small. Most of the actual areas of total destruction are from 100 to 300 yards in diameter. And they are erratic.

"They'll bounce around and change paths and they usually don't last long. Their average life is only about half an hour."

Winds in tornadoes never have been measured but Kraft figures the ones Monday probably had highs of around 200 miles an hour.

"Estimates of some tornadoes have been as high as 600 miles an hour," Kraft said.

Damage is caused by the winds but much destruction is also the result of the change of pressure in the center of the winds.

"This pressure drops so quickly it literally causes explosions," said Kraft.

WEZY Rebounds

Cocoa Radio station WEZY was knocked off the air during the storm Monday but bounced back with emergency power. When the generators ran out of gas, employes siphoned gas out of their cars to keep the generators humming.

Earlier State Disasters

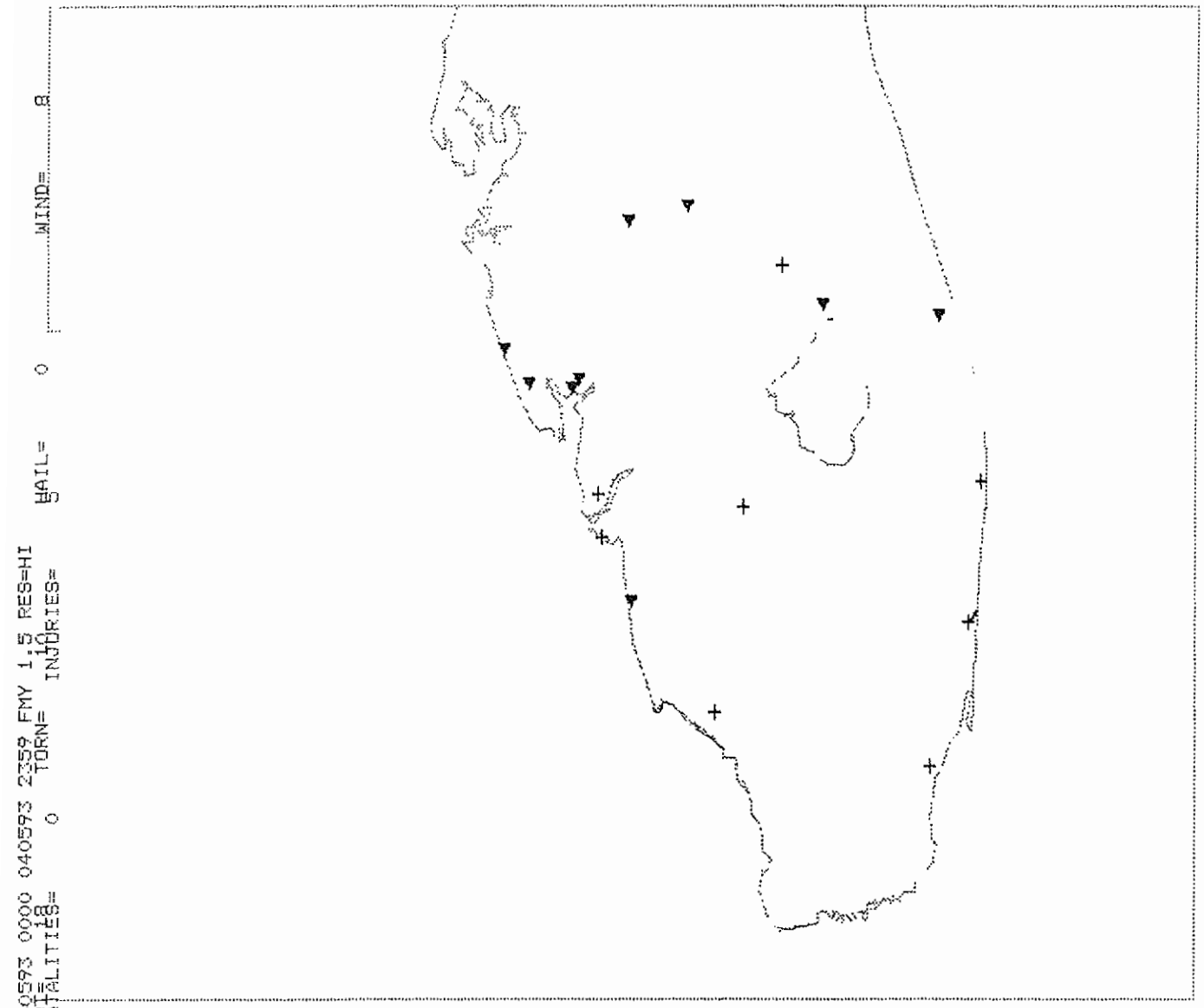
Florida has been battered by nature seven times since the Federal Disaster Act was passed in 1950. The following box shows the date of declaration making Florida available for federal aid, the type of disaster and the amount of federal funds allocated.

Date of Declaration	Type	Funds Allocated
Oct. 22,1953	Flood	$ 363,559
March 23, 1960	Severe Weather	$1,700,000
Sept. 12, 1960	Hurricane	$4,350,000
Dec. 17, 1962	High Tides	$1,714,000
Sept. 8, 1964	Hurricane Cleo	$2,300,000
Sept. 10, 1964	Hurricane Dora	$8,200,000
Sept. 14, 1965	Hurricane Betsy	$2,500,000

Hurricane Betsy figure could go higher, since all claims have not been processed. The assistance monies refer only to federal disaster funds from the Public Law 875 and do not include funds expended by other federal agencies.

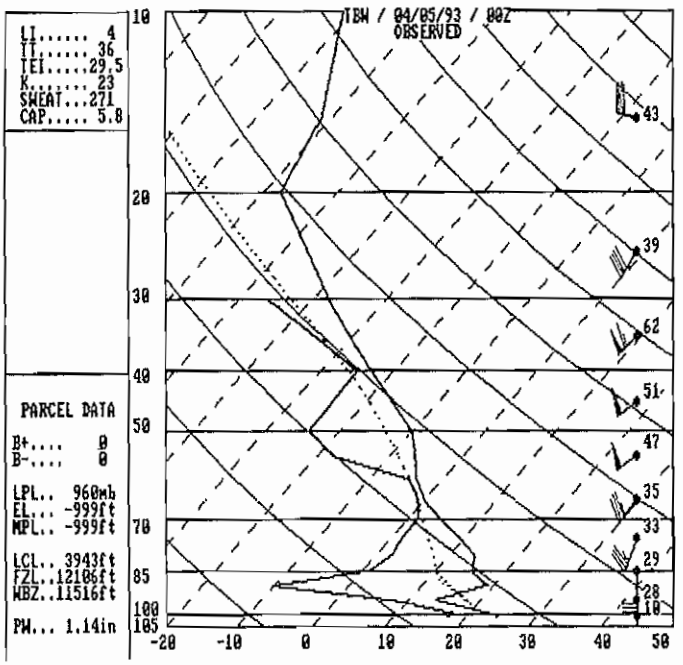
4/5/66

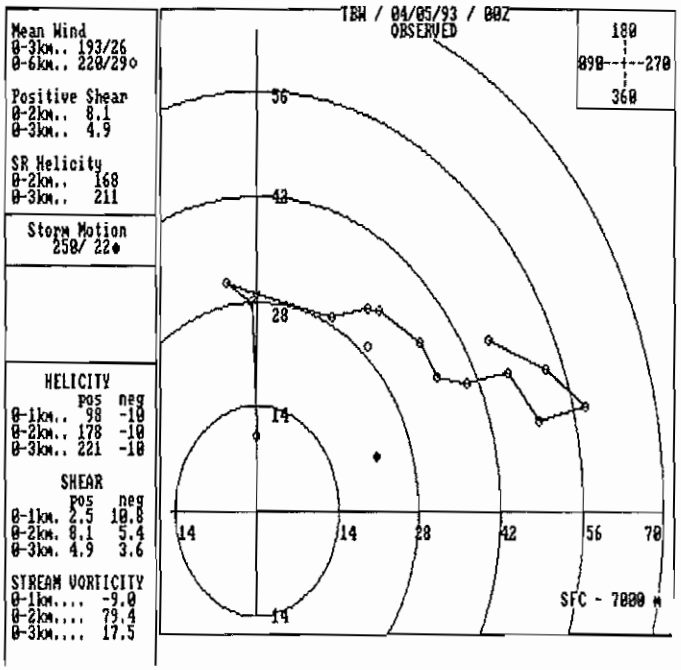
April 5, 1993

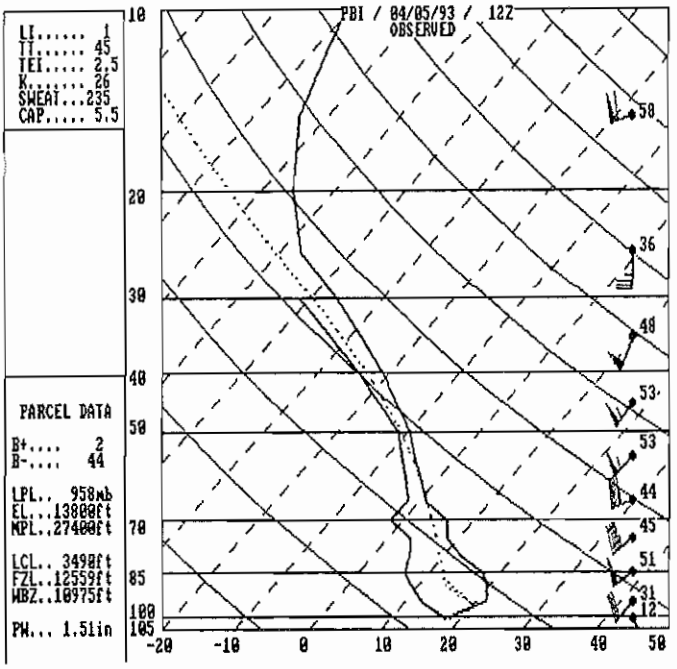


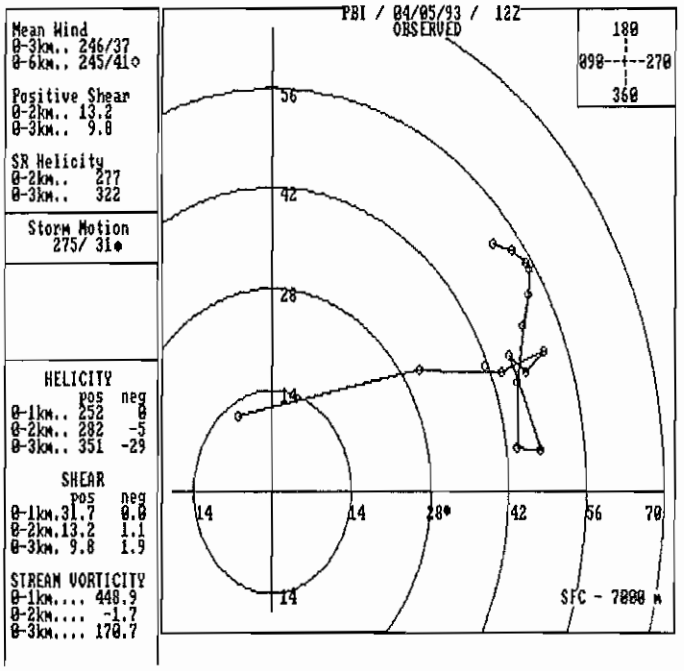
000CST 04/05/93 - 2359CST 04/05/93

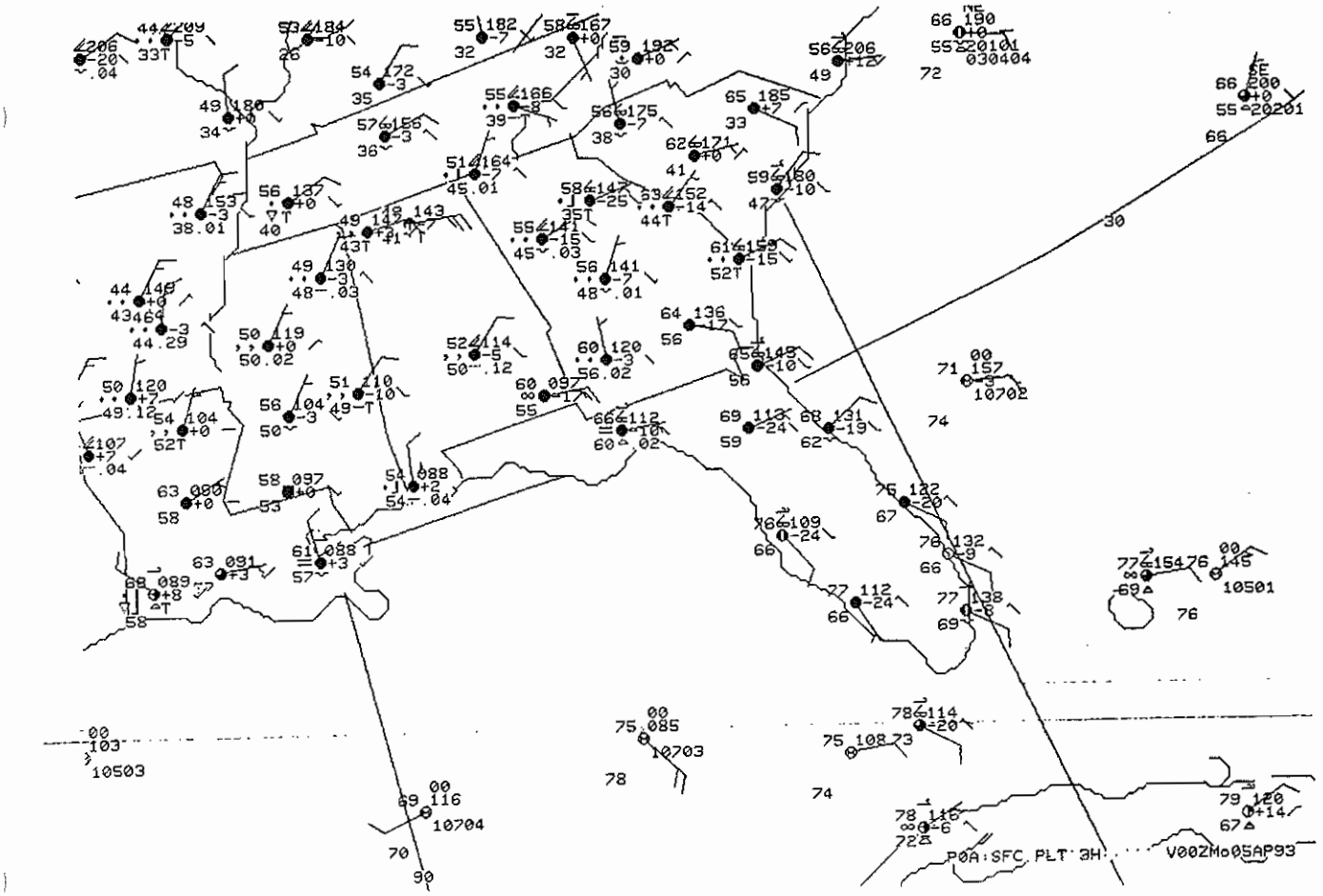
SEVERE WEATHER REPORTS






PBI / 04/05/93 / 12Z
OBSERVED
LI..... 1
TT..... 45
TEI..... 2.5
K..... 26
SWEAT...235
CAP..... 5.5
PARCEL DATA
B+.... 2
B-.... 44
LPL.. 958mb
EL...13800ft
MPL..27400ft
LCL.. 3498ft
FZL..12559ft
WBZ..10975ft
PW... 1.51in


Mean Wind
0-3km.. 246/37
0-6km.. 245/41
Positive Shear
0-2km.. 13.2
0-3km.. 9.8
SR Helicity
0-2km.. 277
0-3km.. 322
Storm Motion
275/ 31
HELICITY
pos neg
0-1km.. 252 0
0-2km.. 282 -5
0-3km.. 351 -29
SHEAR
pos neg
0-1km.. 31.7 0.0
0-2km.. 13.2 1.1
0-3km.. 9.8 1.9
STREAM VORTICITY
0-1km.... 448.9
0-2km.... -1.7
0-3km.... 170.7
PBI / 04/05/93 / 12Z
OBSERVED
SFC - 7000 m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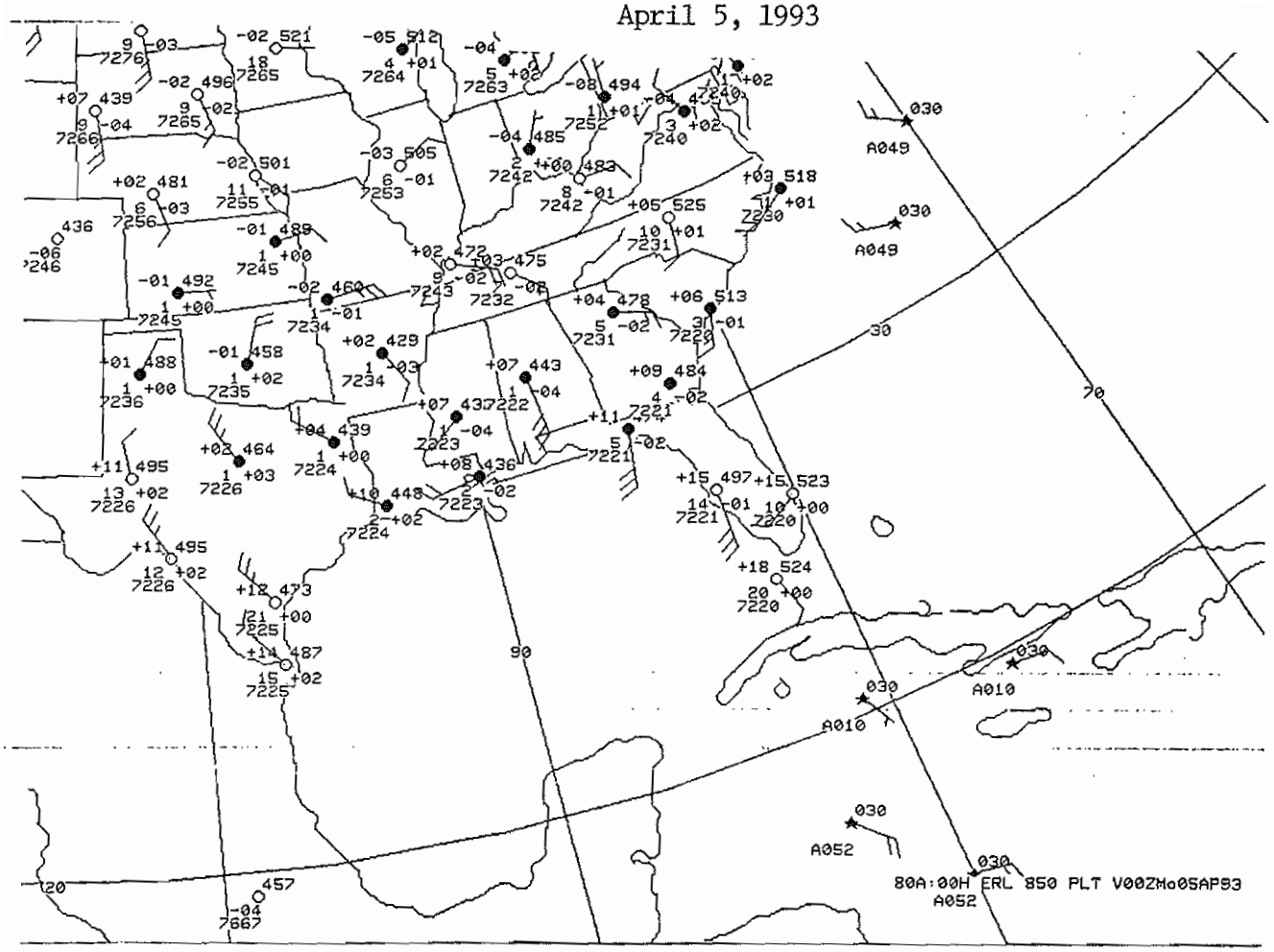
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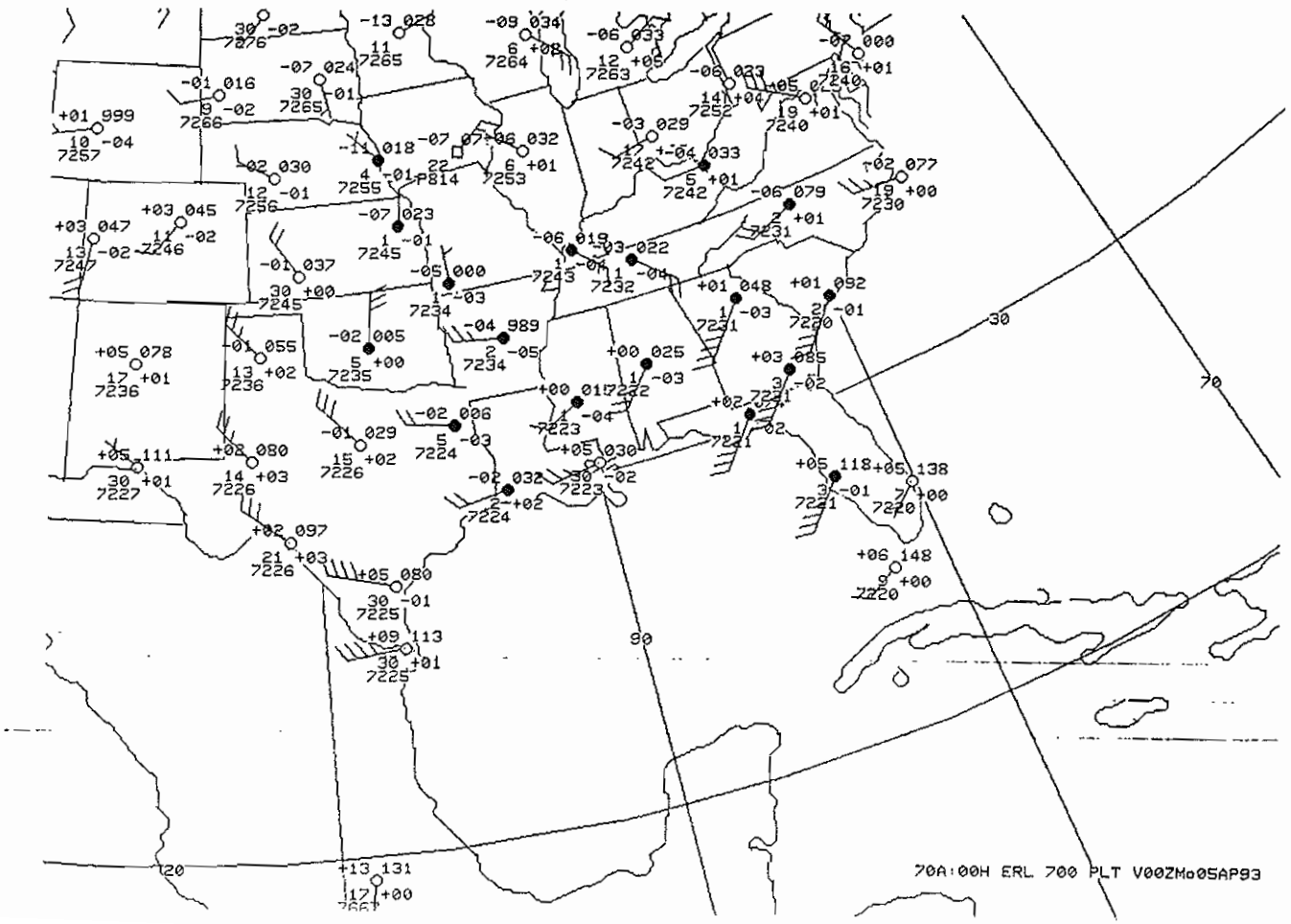
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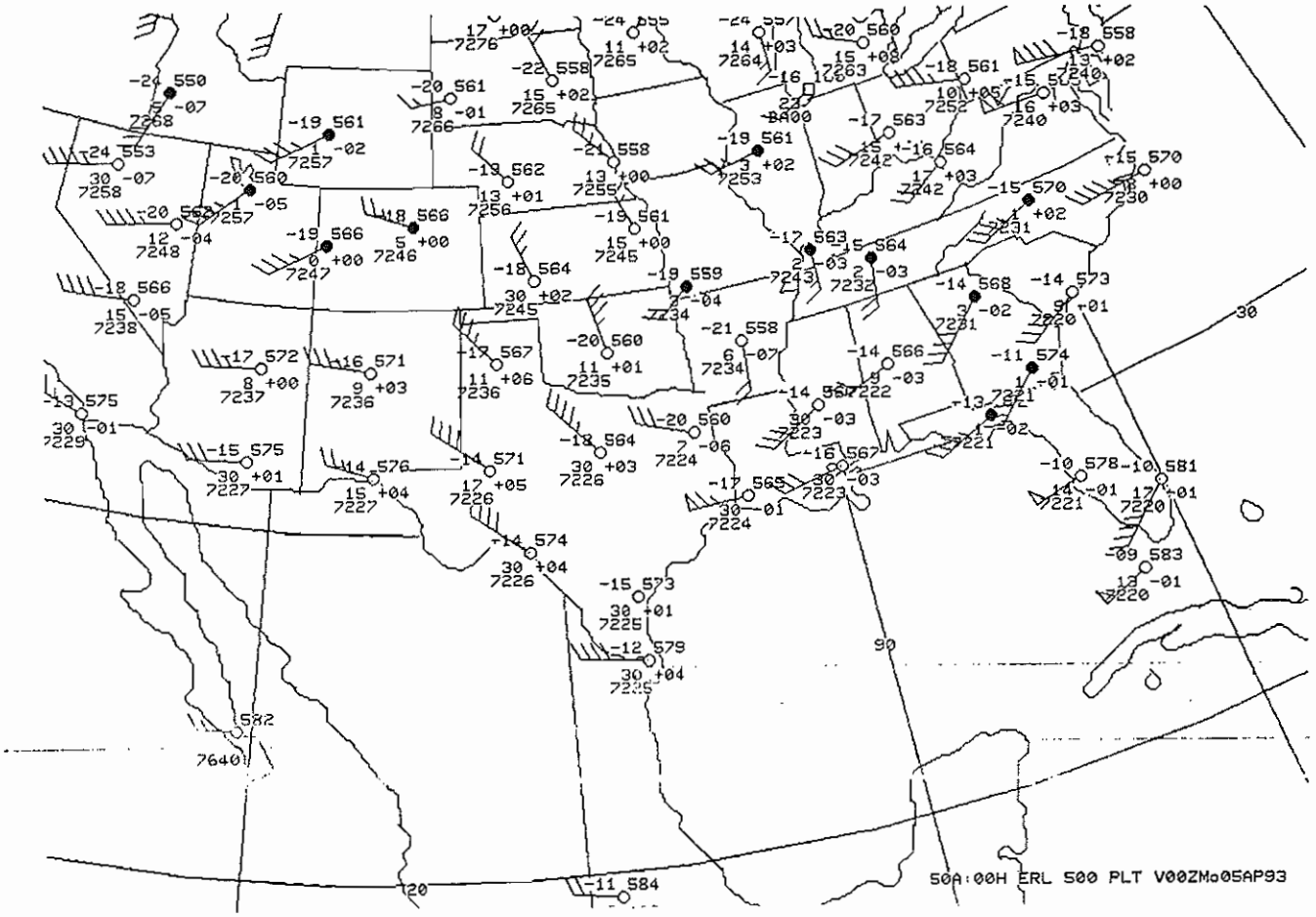
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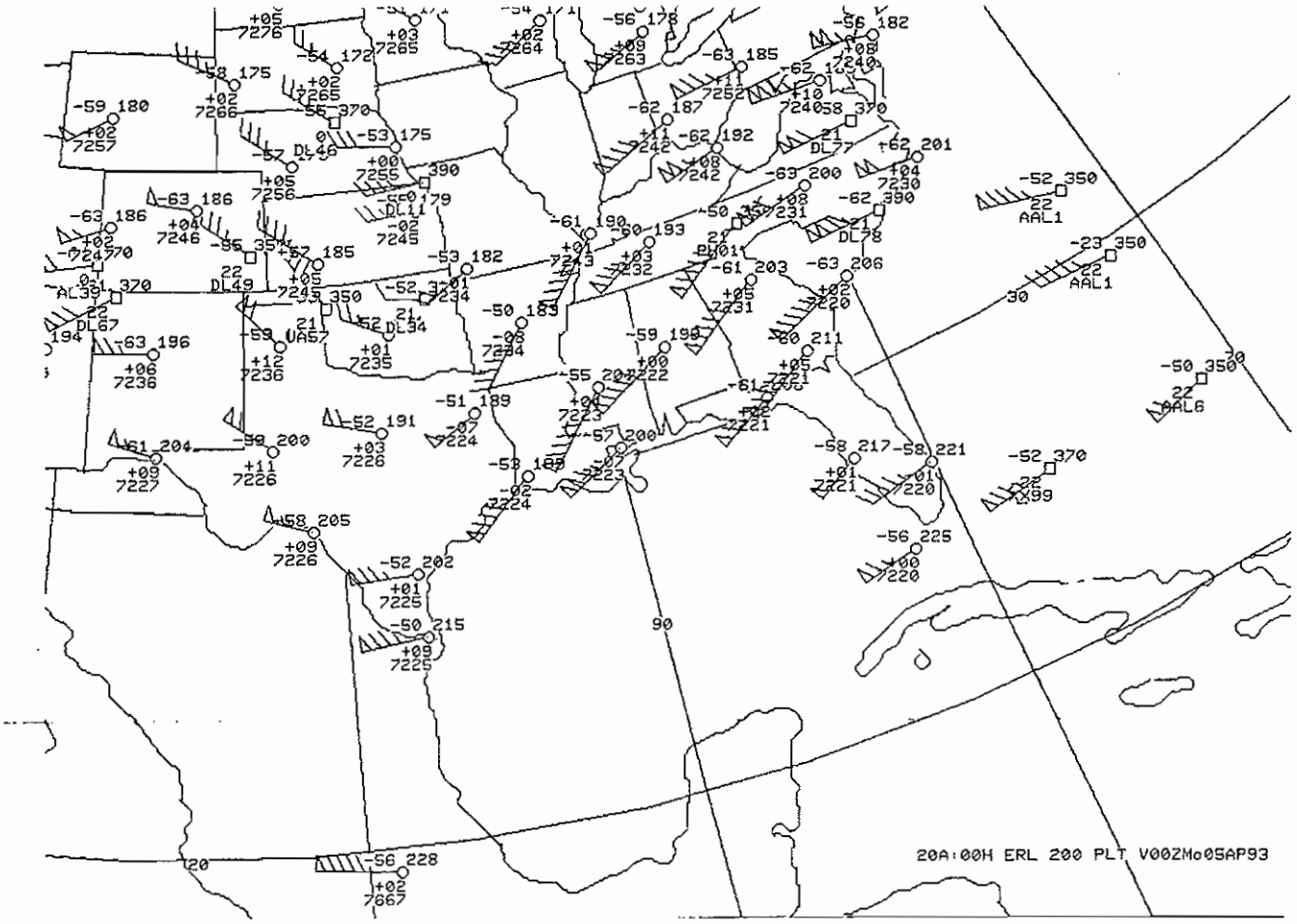
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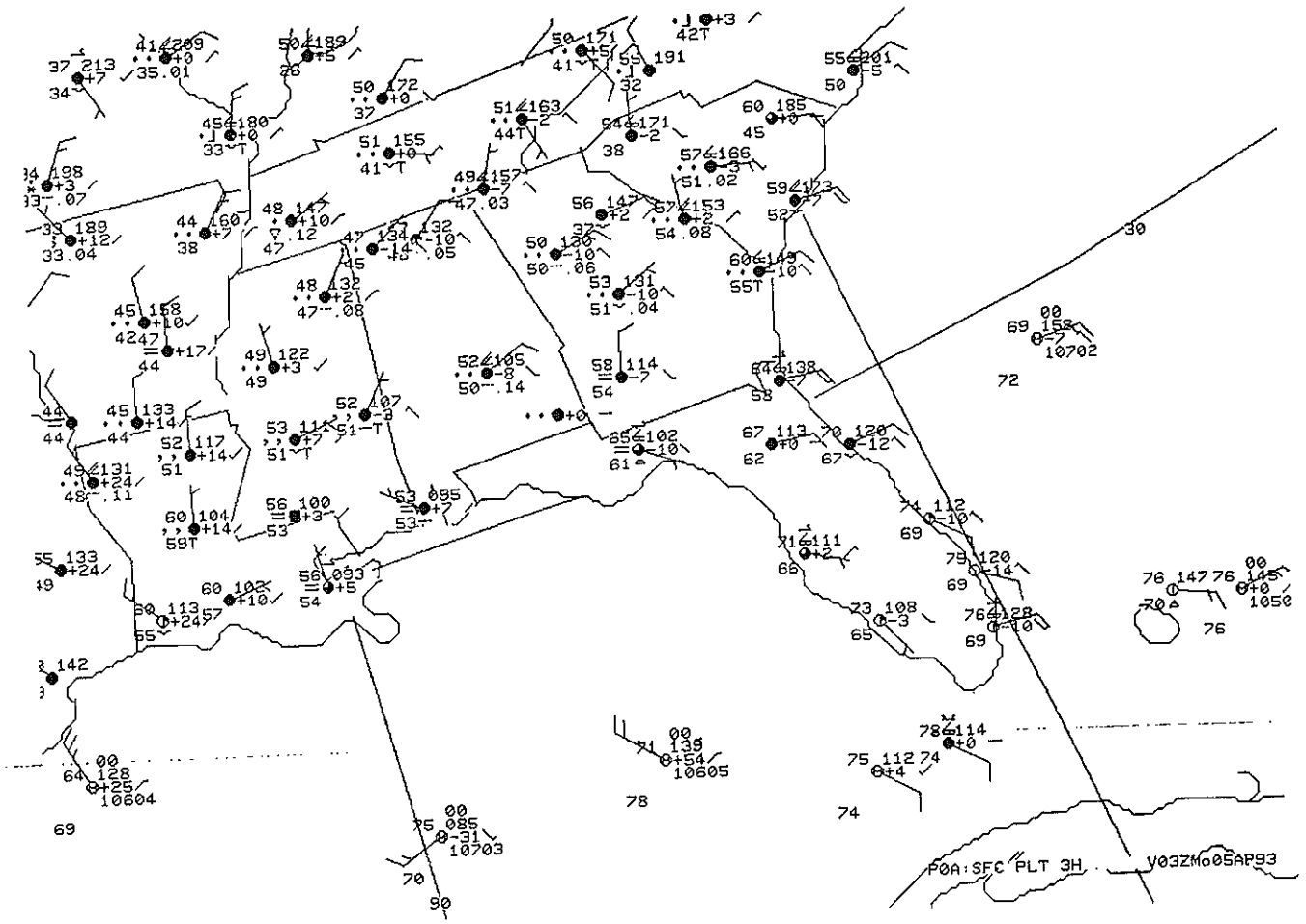
April 5, 1993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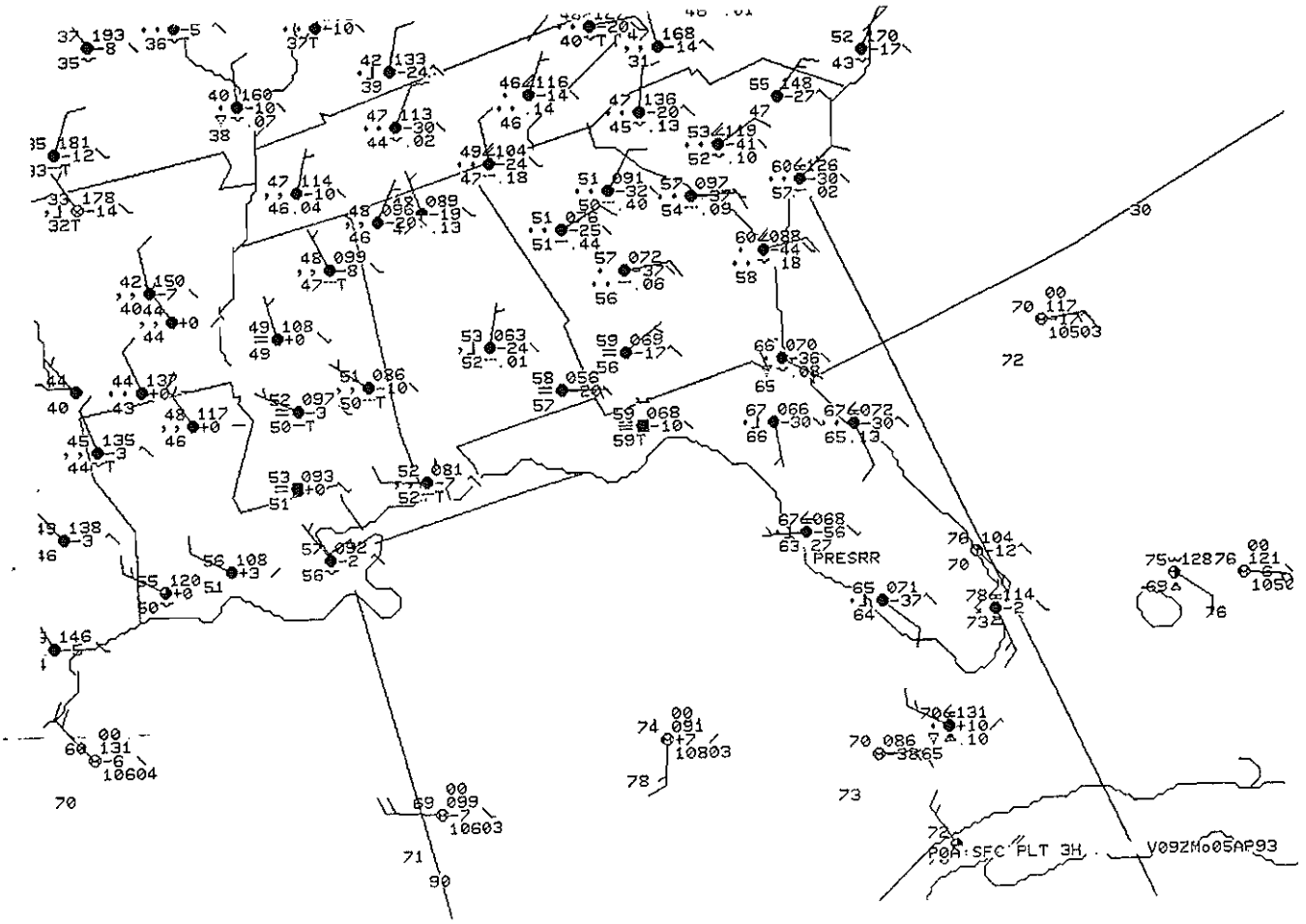
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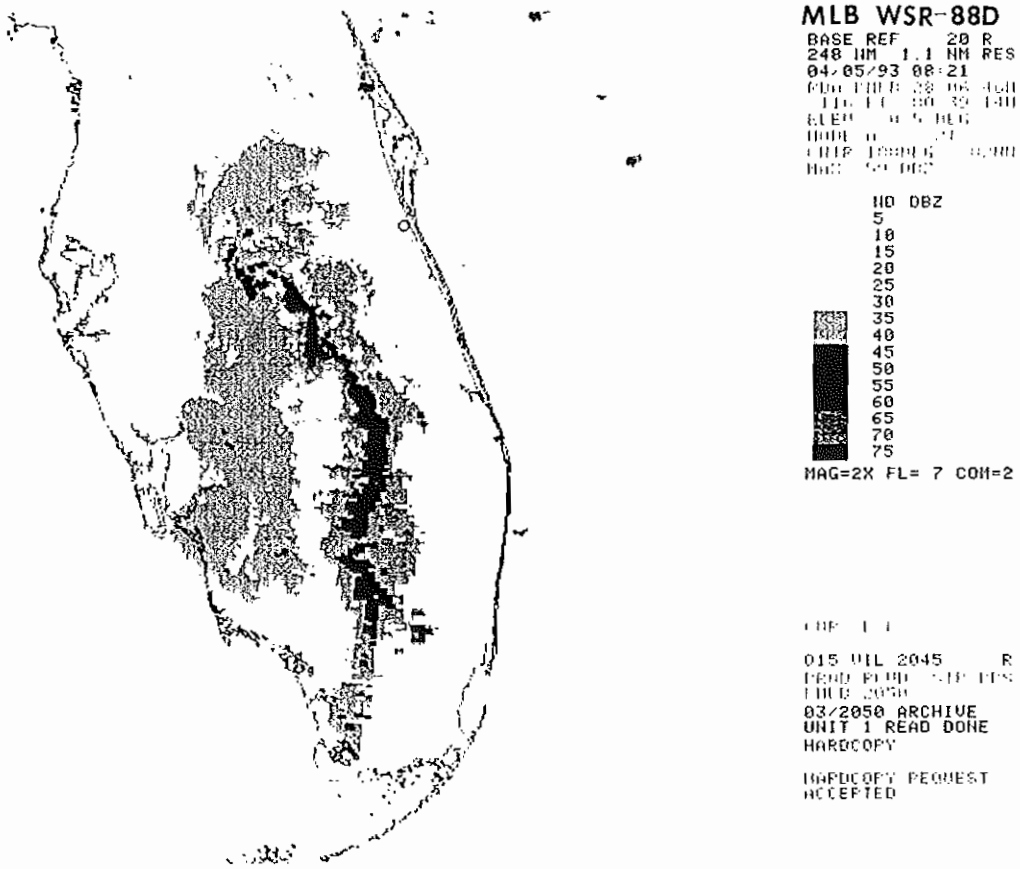
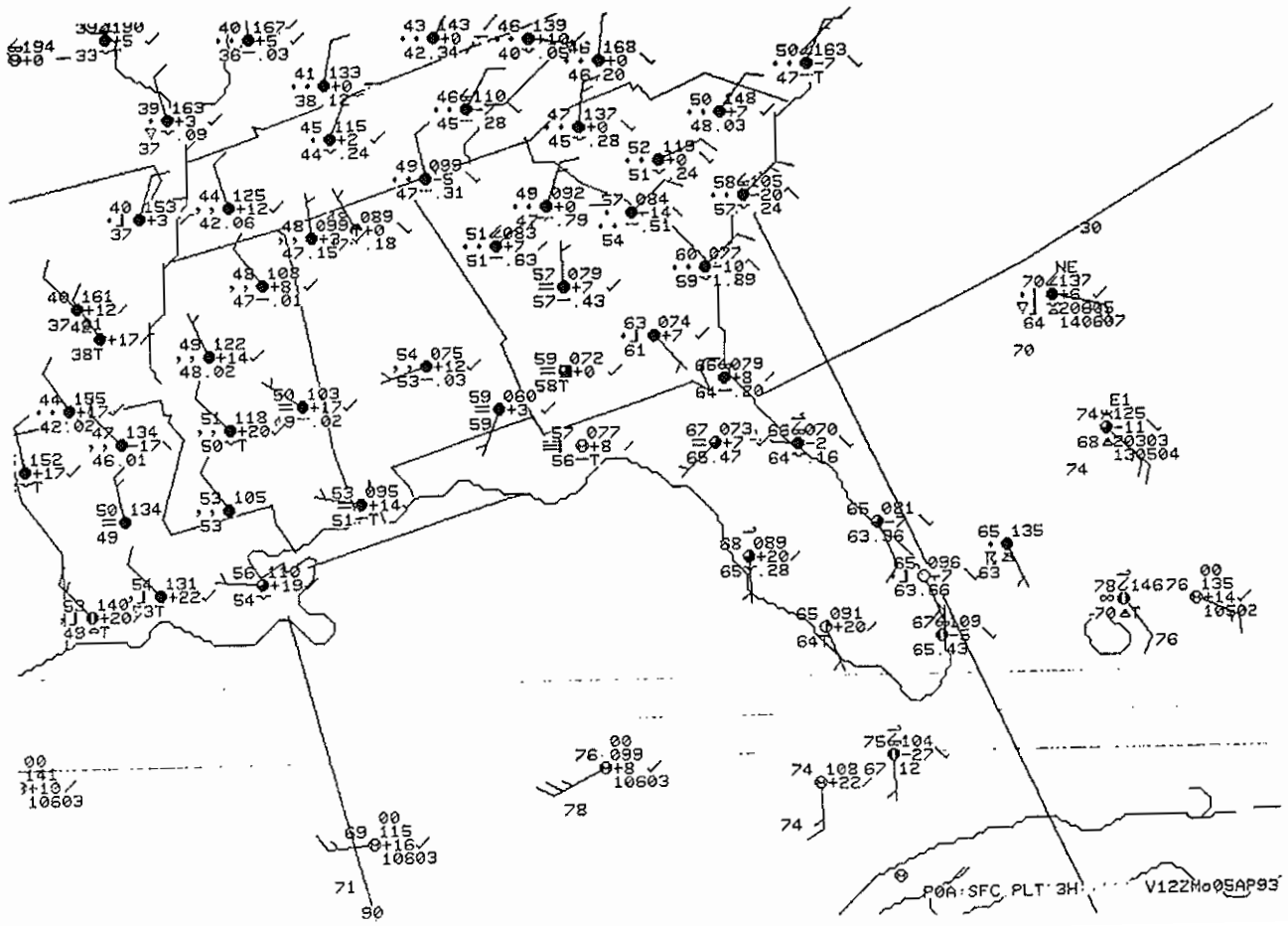

MLB WSR-88D
BASE REF 20 R
248 NM 1.1 NM RES
04/05/93 08:21
NO DBZ
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
MAG=2X FL= 7 COM=2
015 VIL 2045 R
03/2050 ARCHIVE
UNIT 1 READ DONE
HARDCOPY
HARDCOPY REQUEST
ACCEPTED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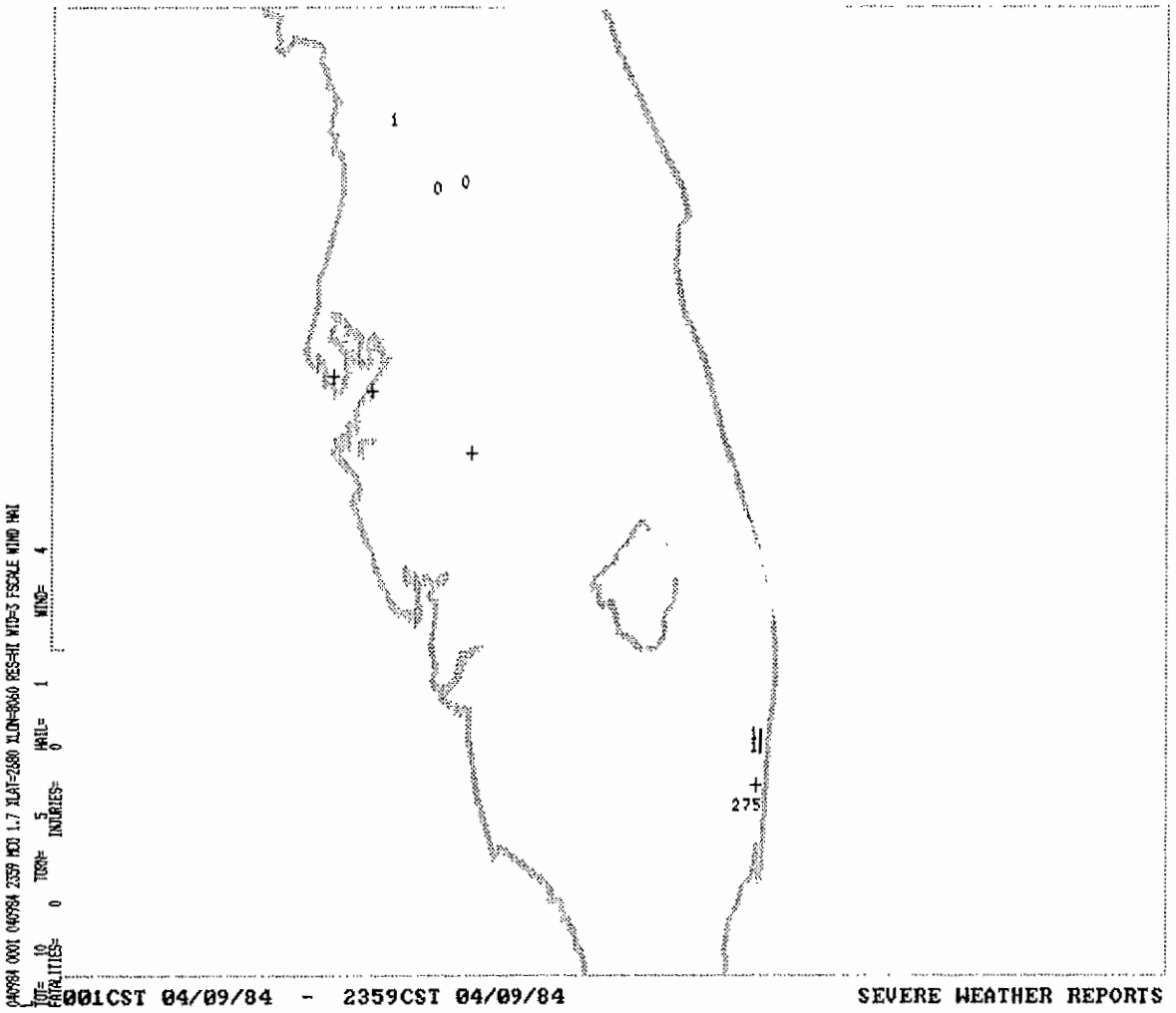
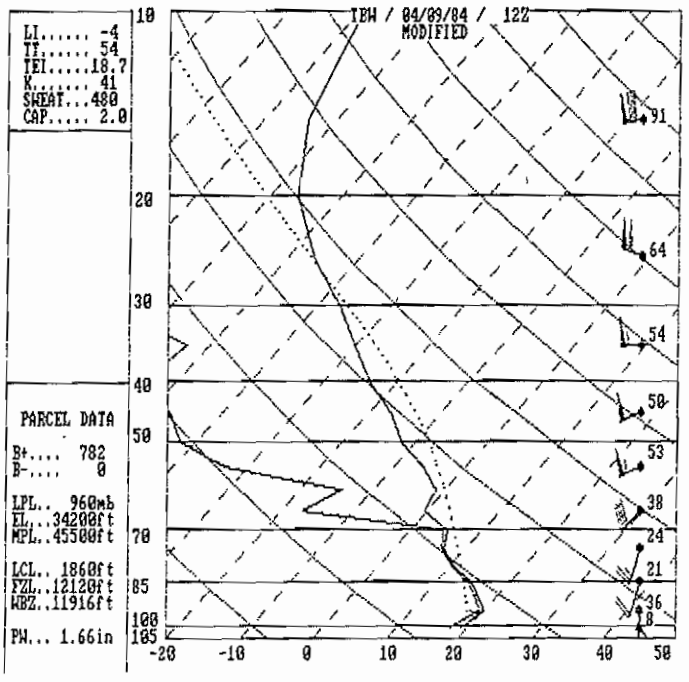
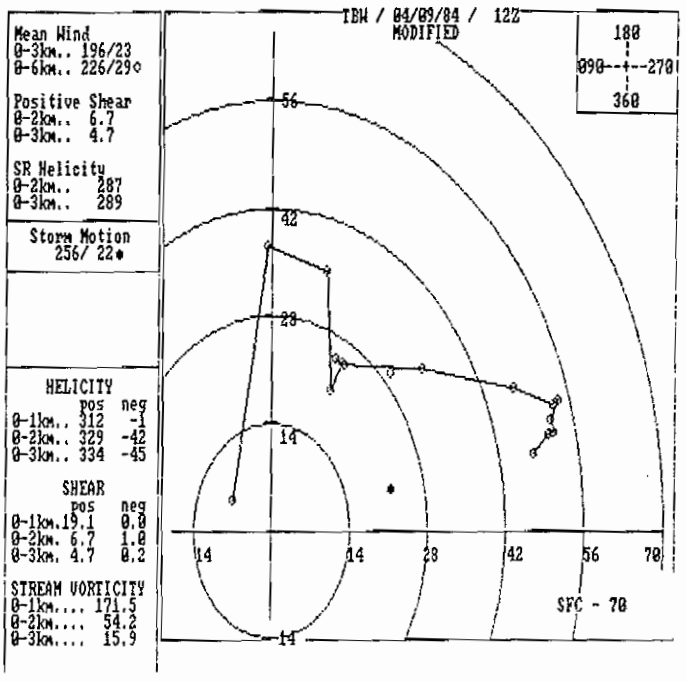
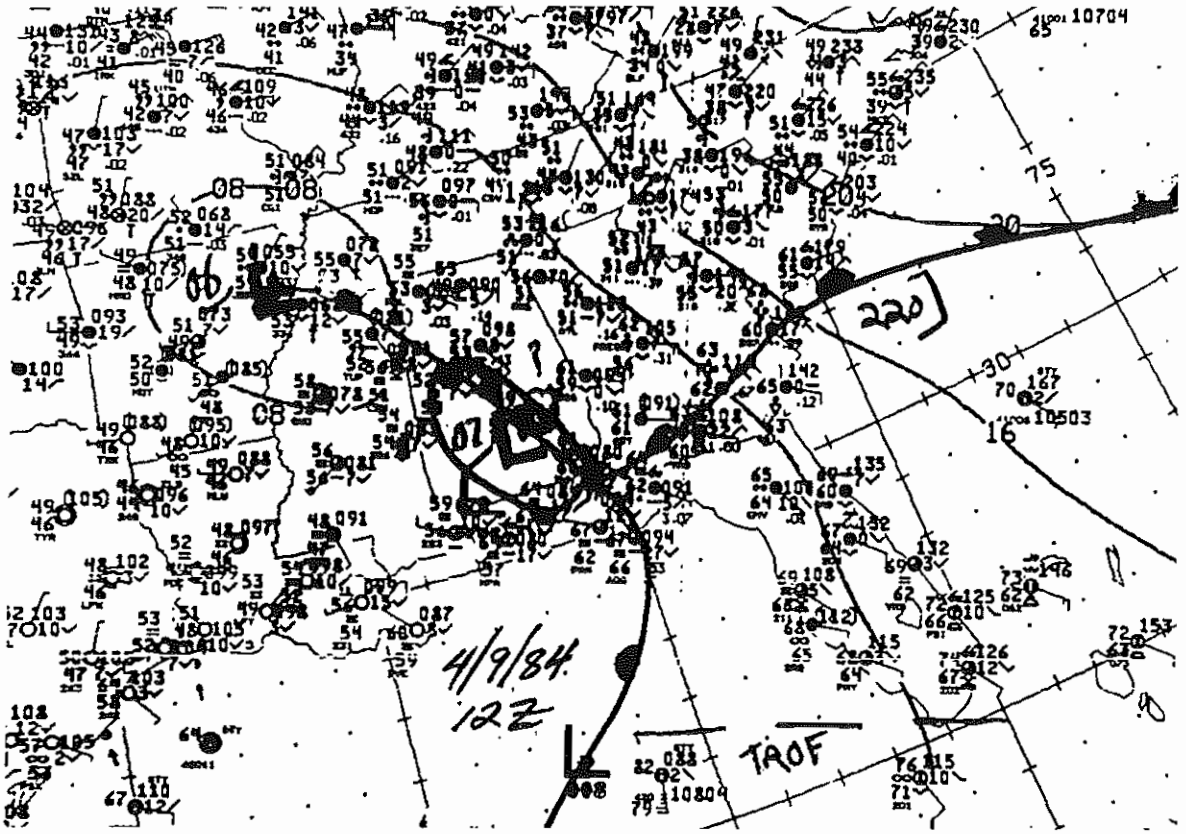
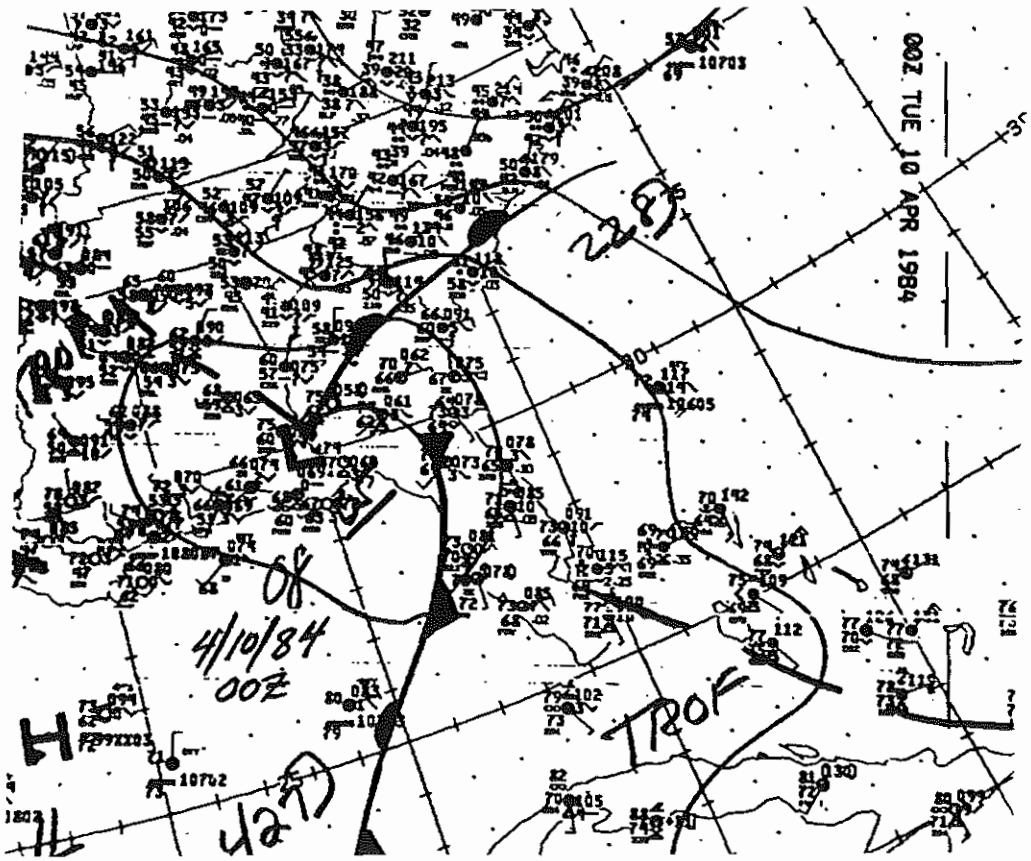

040984 0001 040984 2359 MCD 1.7 XLAT=2680 XLON=8660 RES=HI WIND-F FSCALE WIND HAI
TOR= 0 TORN= 5 INJURIES= 0 HAIL= 1 WIND= 4
FATALITIES= 10
1
0 0
275
0001CST 04/09/84 - 2359CST 04/09/84
SEVERE WEATHER REPORTS


LI..... -4
TT..... 54
TEI.....18.7
K..... 41
SWEAT...480
CAP..... 2.0
PARCEL DATA
B+.... 782
B-.... 0
LPL.. 960mb
EL.. 34200ft
MPL..45500ft
LCL.. 1860ft
FZL..12120ft
WBZ..11916ft
PW... 1.66in
TBW / 04/09/84 / 12Z
MODIFIED
91
64
54
50
53
38
24
21
36
8
-20 -10 0 10 20 30 40 50
10 20 30 40 50 70 85 100 105


Mean Wind
0-3km.. 196/23
0-6km.. 226/29
Positive Shear
0-2km.. 6.7
0-3km.. 4.7
SR Helicity
0-2km.. 287
0-3km.. 289
Storm Motion
256/ 22
HELICITY
pos neg
0-1km.. 312 -1
0-2km.. 329 -42
0-3km.. 334 -45
SHEAR
pos neg
0-1km.19.1 0.0
0-2km. 6.7 1.0
0-3km. 4.7 0.2
STREAM VORTICITY
0-1km.... 171.5
0-2km.... 54.2
0-3km.... 15.9
TBW / 04/09/84 / 12Z
MODIFIED
180
090 270
360
56
42
28
14
14 14 28 42 56 70
14
SFC - 7Θ


4/9/84
12Z
TROF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4/10/84
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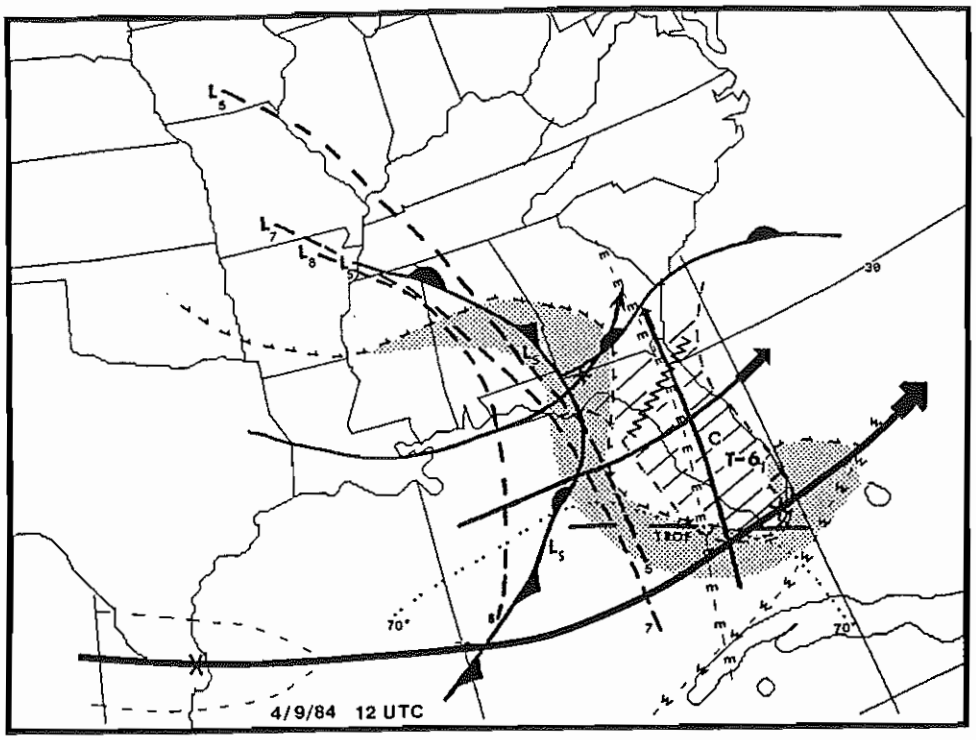
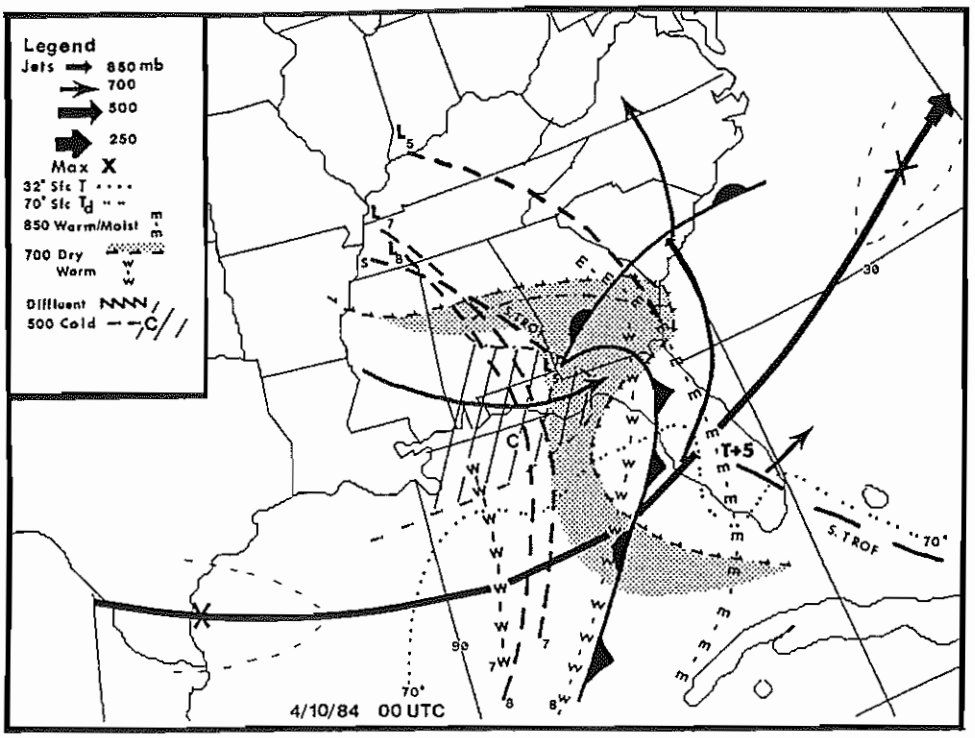
TROF



(From Hagemeyer and Schmocker 1992)



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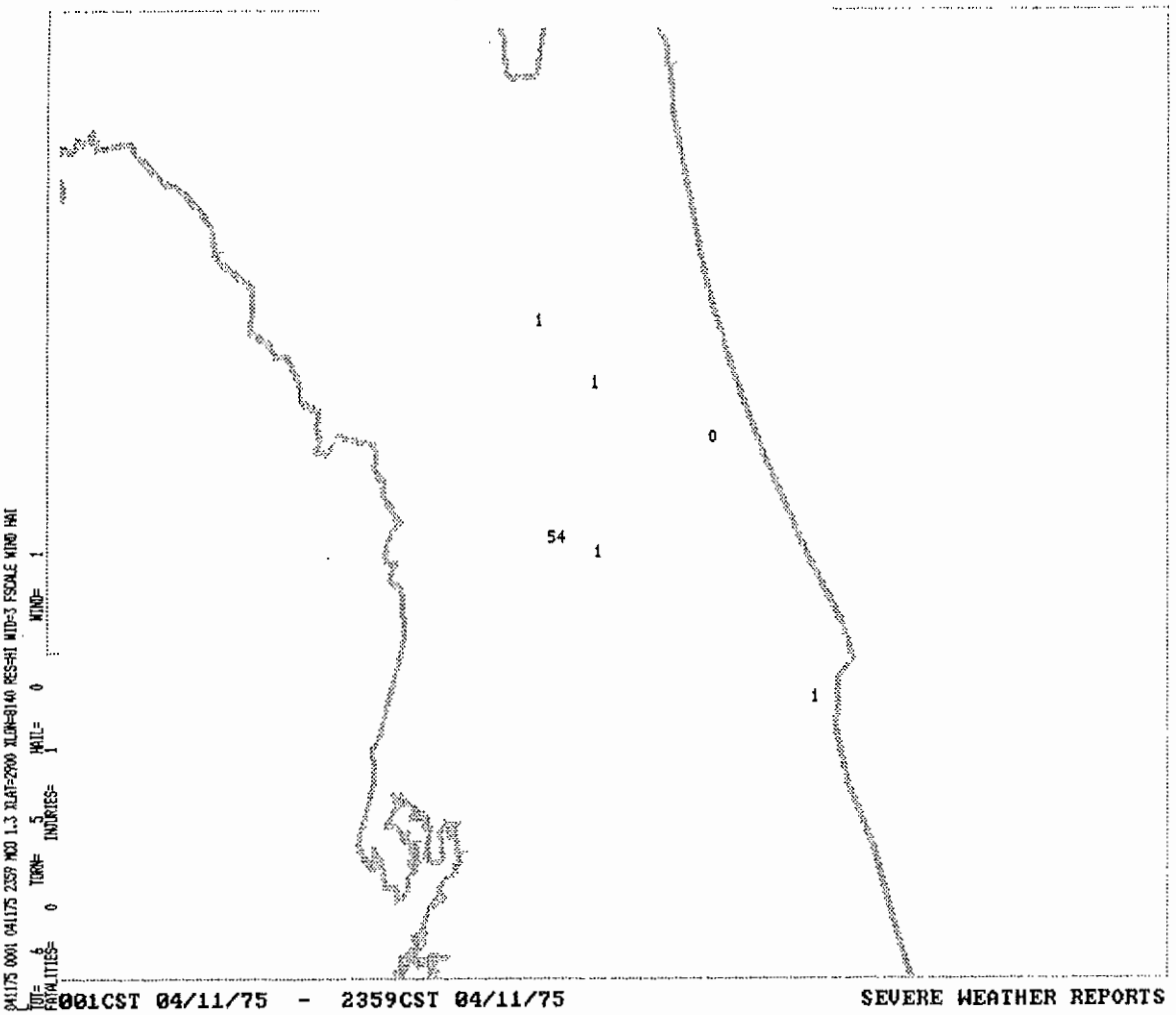
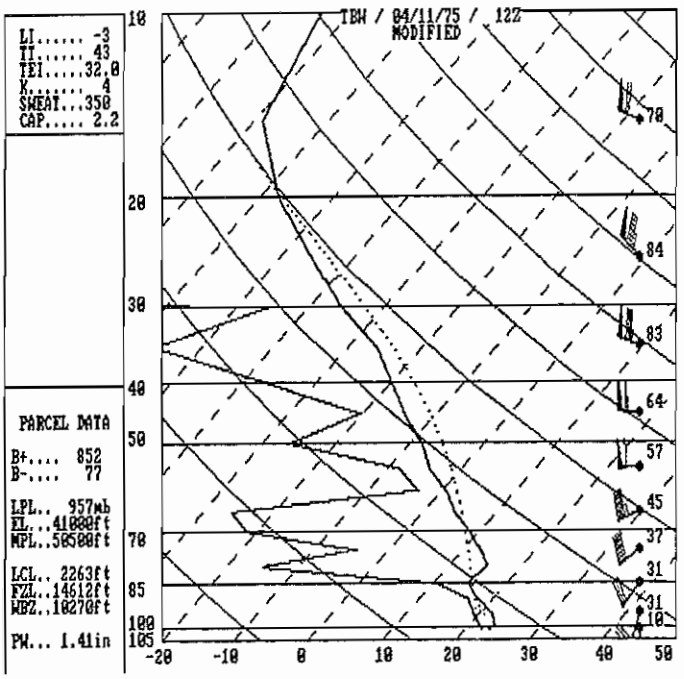
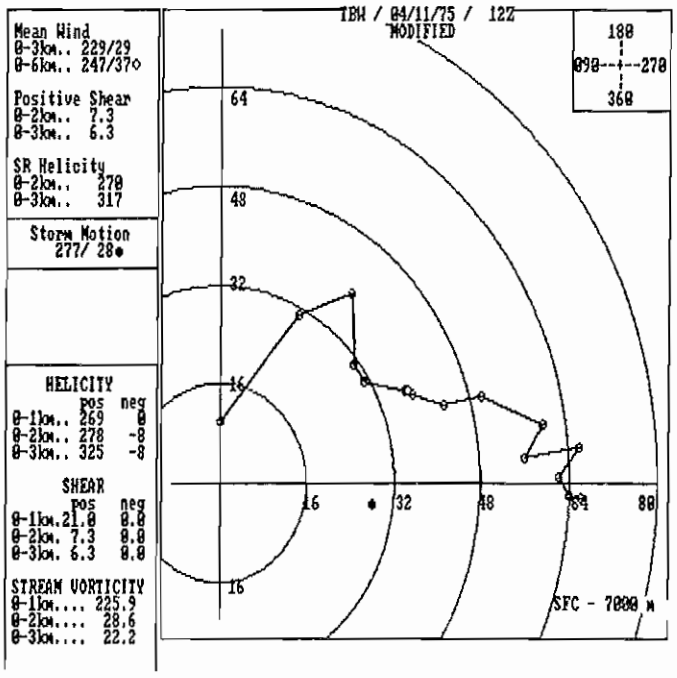
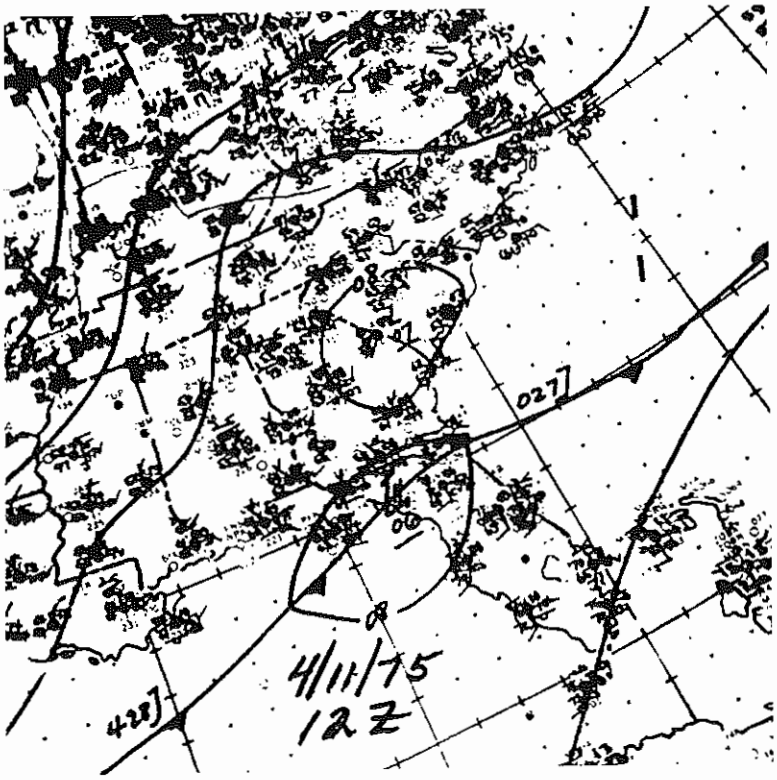
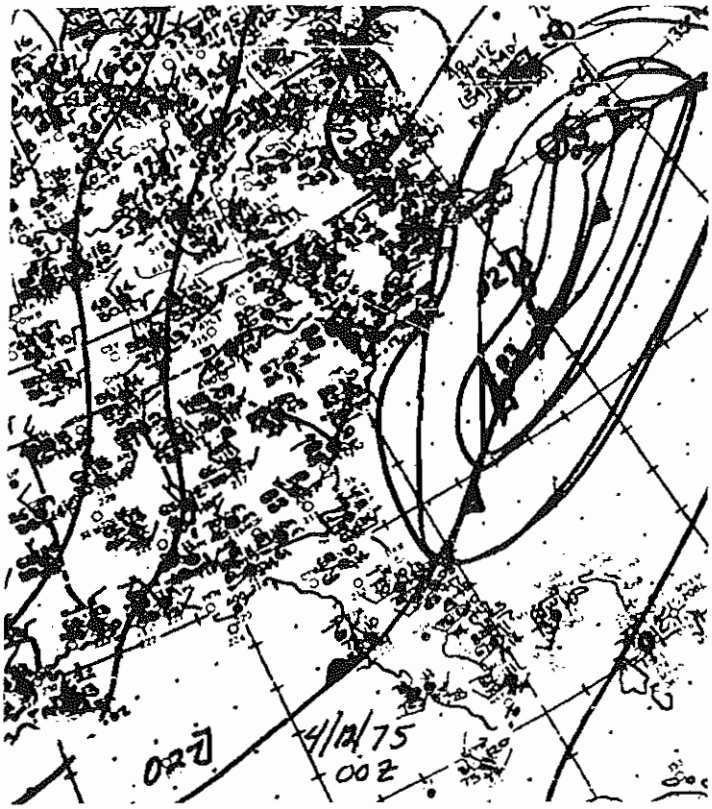

041175 0001 041175 2359 MOD 1.3 XLAT=2900 XLON=8140 RES=HI WIND-3 FSCALE WIND HAI
TOR= 0 INJURIES= 5 HAIL= 1 WIND= 1
TOT= 6 FATALITIES= 0
1
1
0
54
1
1
0001CST 04/11/75 - 2359CST 04/11/75
SEVERE WEATHER REPORTS


LI..... -3
TT..... 43
TEI.....32.0
K..... 4
SWEAT...350
CAP..... 2.2
PARCEL DATA
B+.... 852
B-.... 77
LPL.. 957mb
EL...41000ft
MPL..56500ft
LCL.. 2263ft
FZL..14612ft
WBZ..10270ft
PW... 1.41in
TBW / 04/11/75 / 122
MODIFIED
10
20
30
40
50
70
85
100
105
-20
-10
0
10
20
30
40
50
78
84
83
64
57
45
37
31
31
10


Mean Wind
0-3km.. 229/29
0-6km.. 247/37
Positive Shear
0-2km.. 7.3
0-3km.. 6.3
SR Helicity
0-2km.. 270
0-3km.. 317
Storm Motion
277/ 28
HELICITY
pos neg
0-1km.. 269 0
0-2km.. 278 -8
0-3km.. 325 -8
SHEAR
pos neg
0-1km.21.0 0.0
0-2km. 7.3 0.0
0-3km. 6.3 0.0
STREAM VORTICITY
0-1km.... 225.9
0-2km.... 28.6
0-3km.... 22.2
TBW / 04/11/75 / 122
MODIFIED
180
090
270
360
64
48
32
16
16
32
48
64
80
16
SFC - 7000 M


4/11/75
12Z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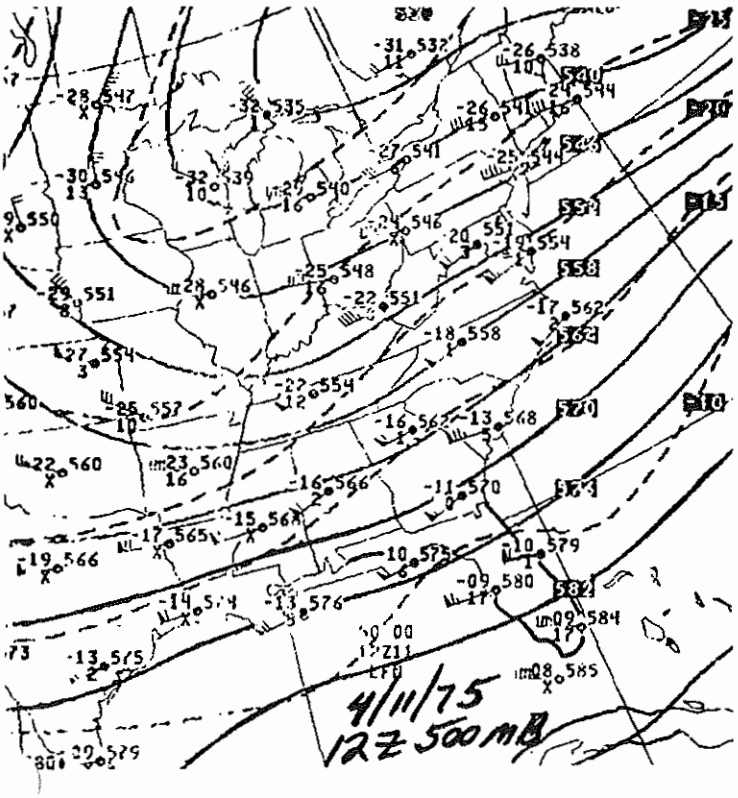
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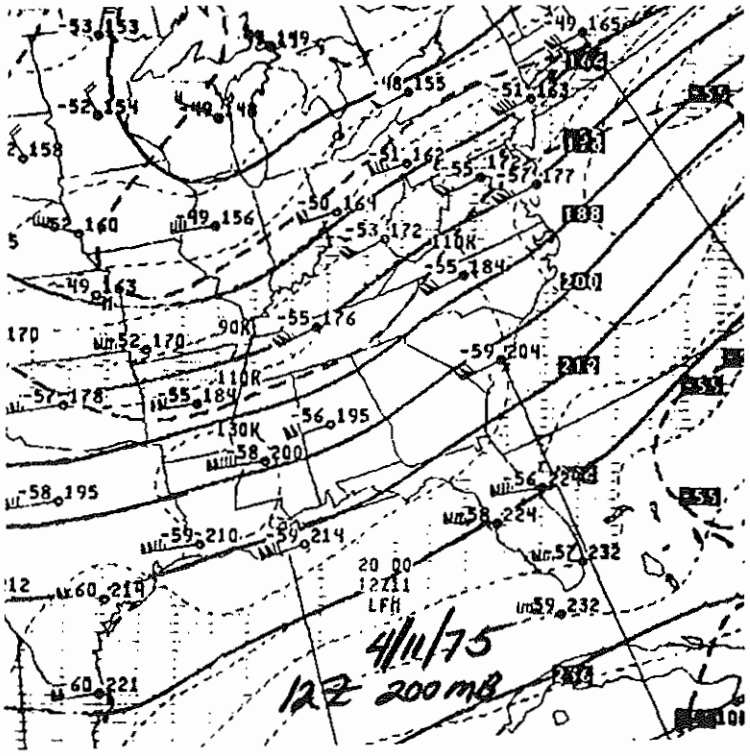
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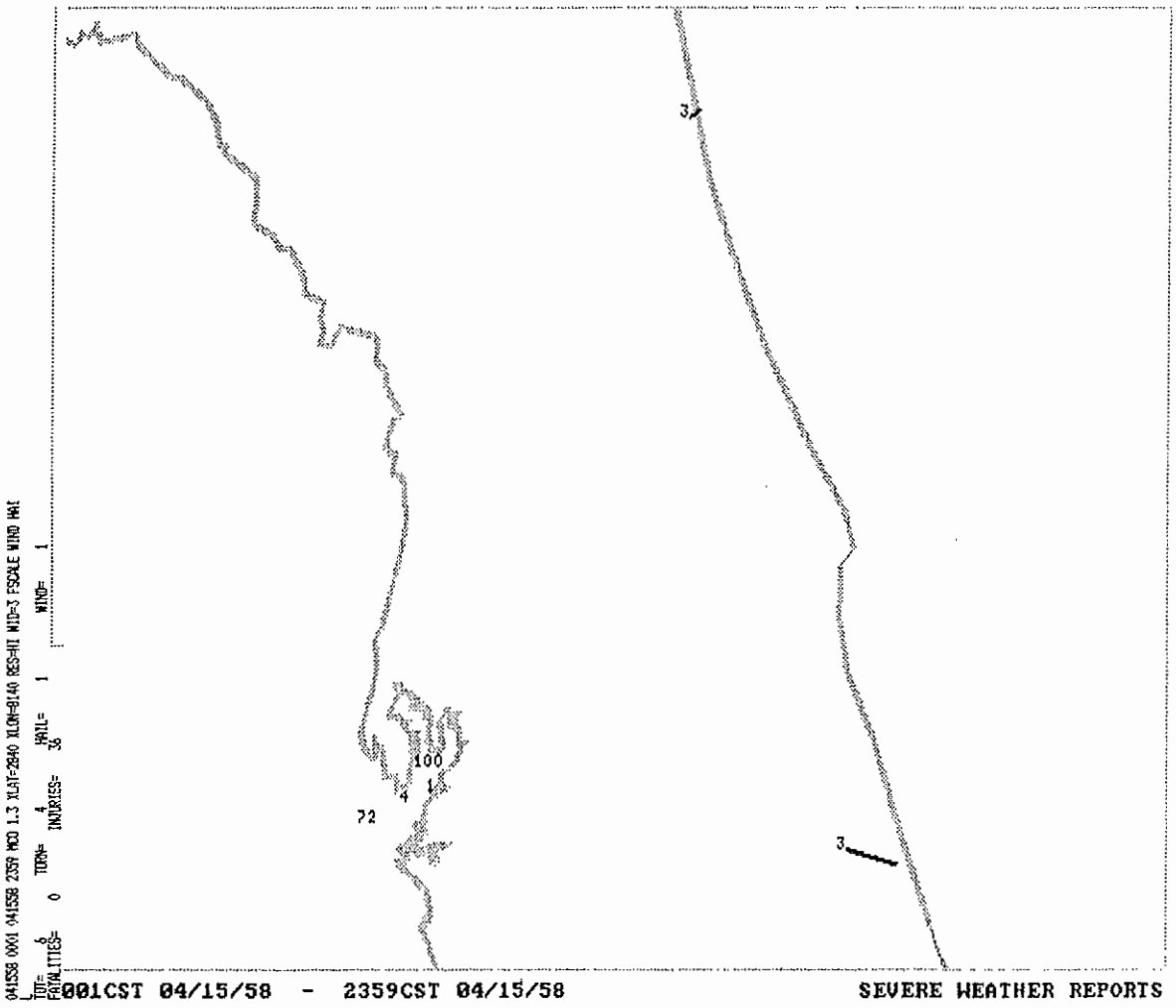
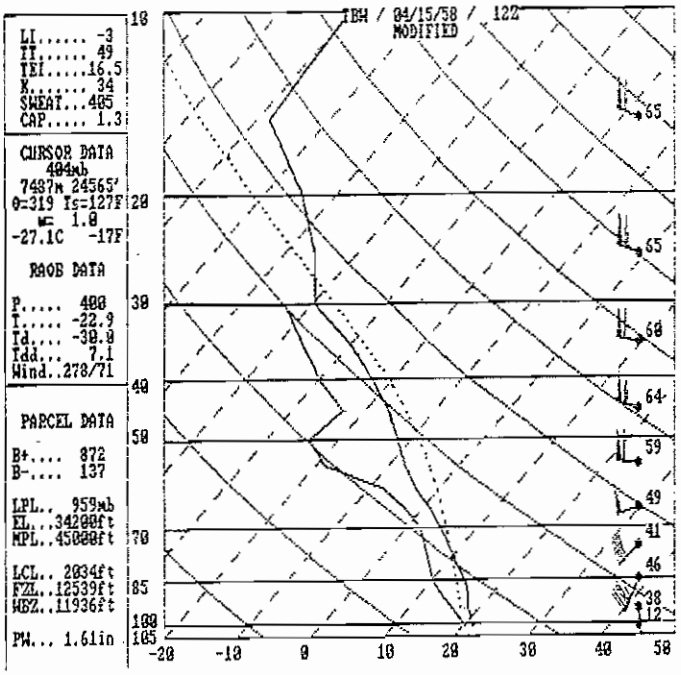
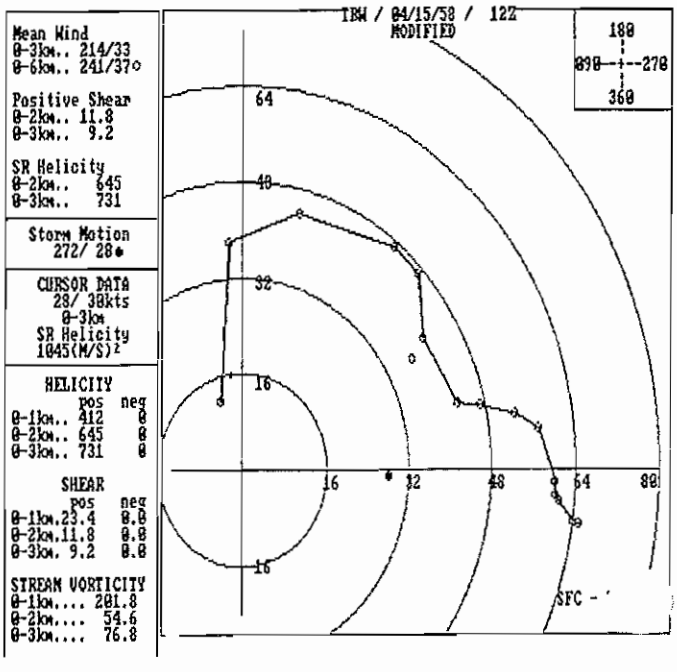
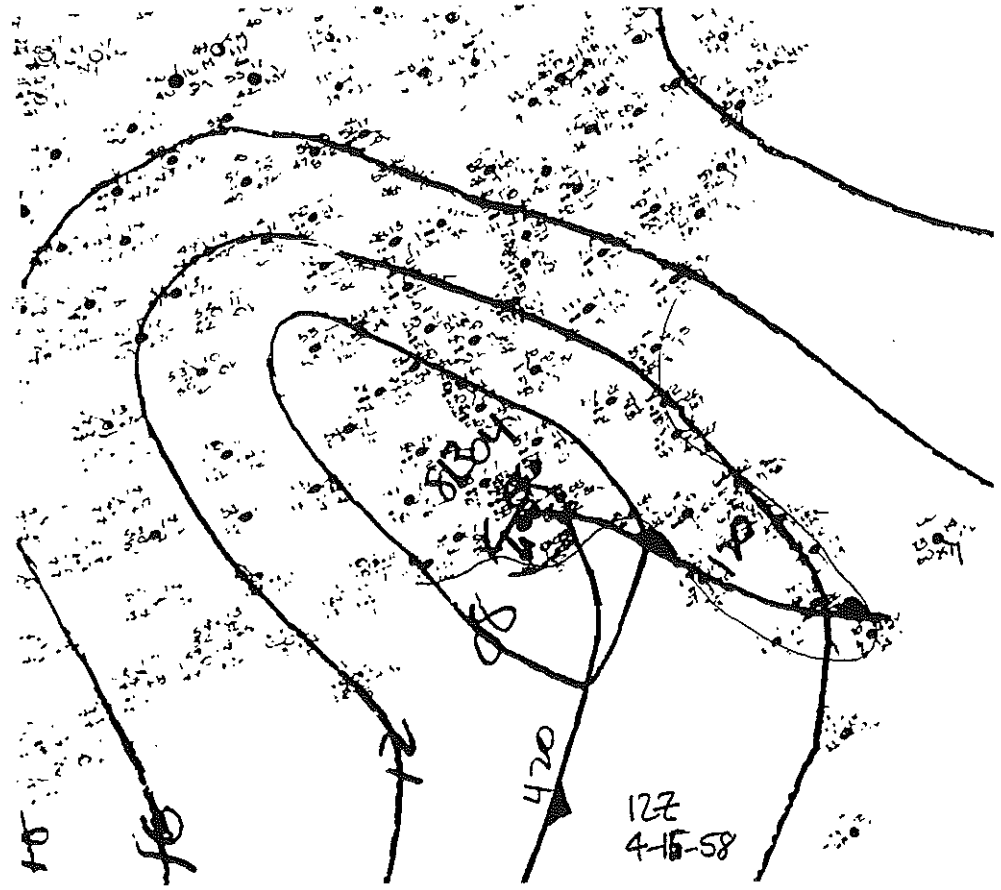
12Z 200 MB

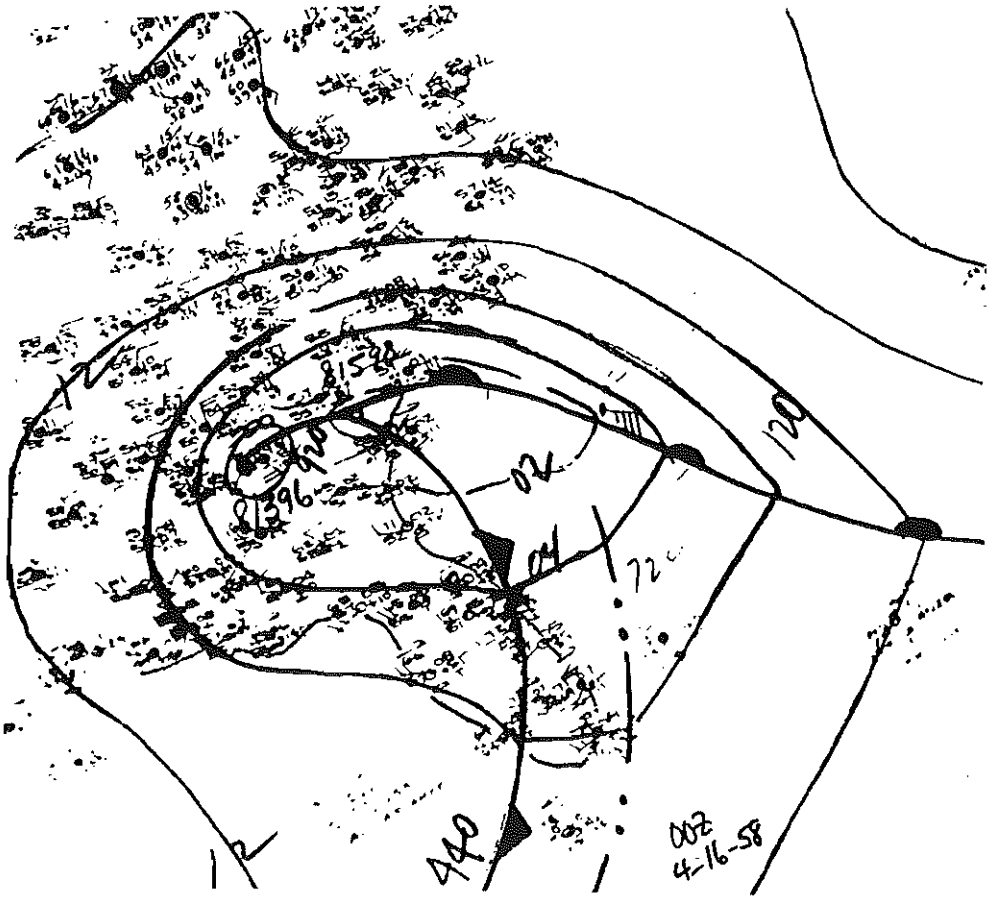


(Note: One of two outbreaks to produce F4 tornadoes)






12Z
4-15-58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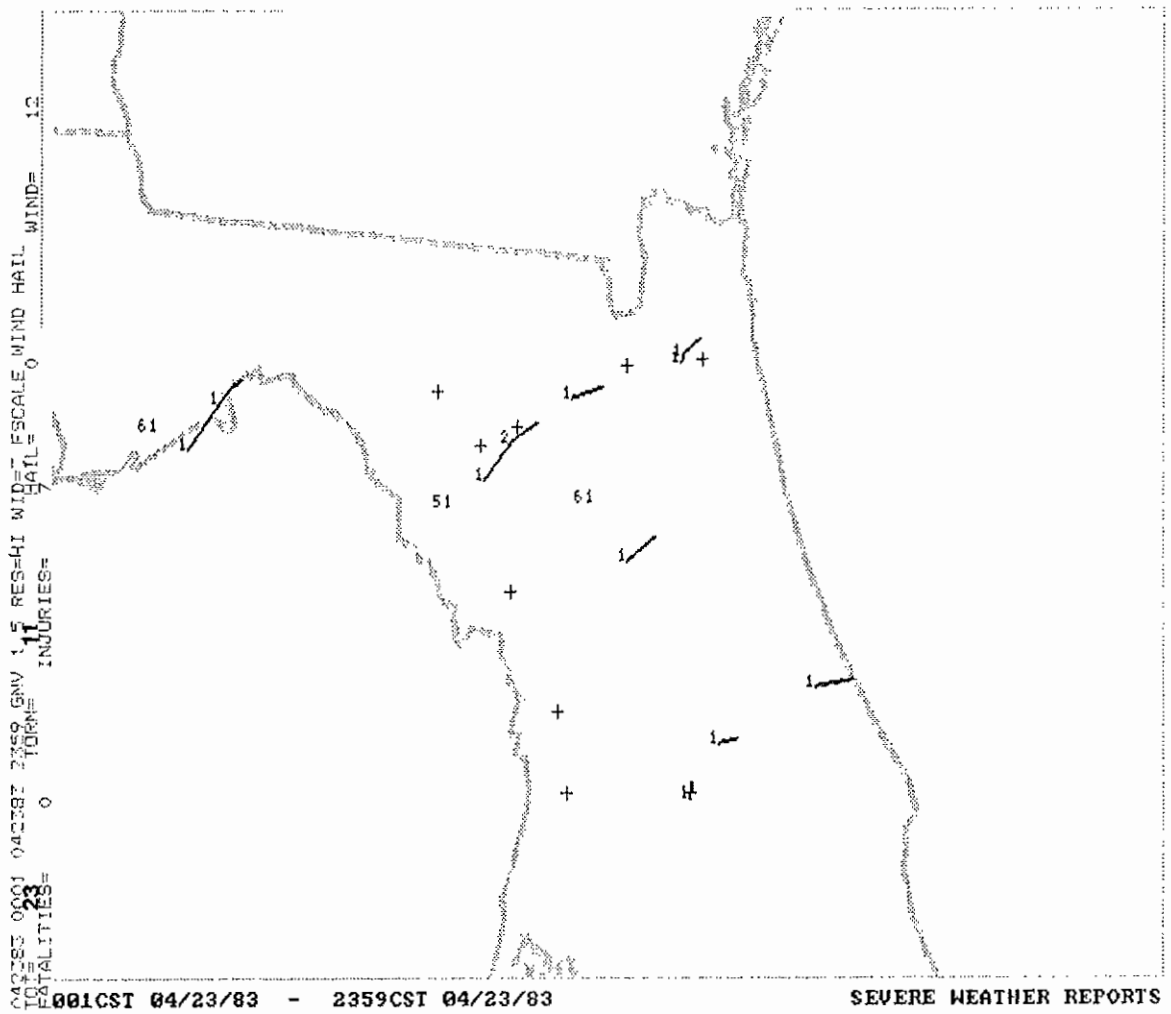
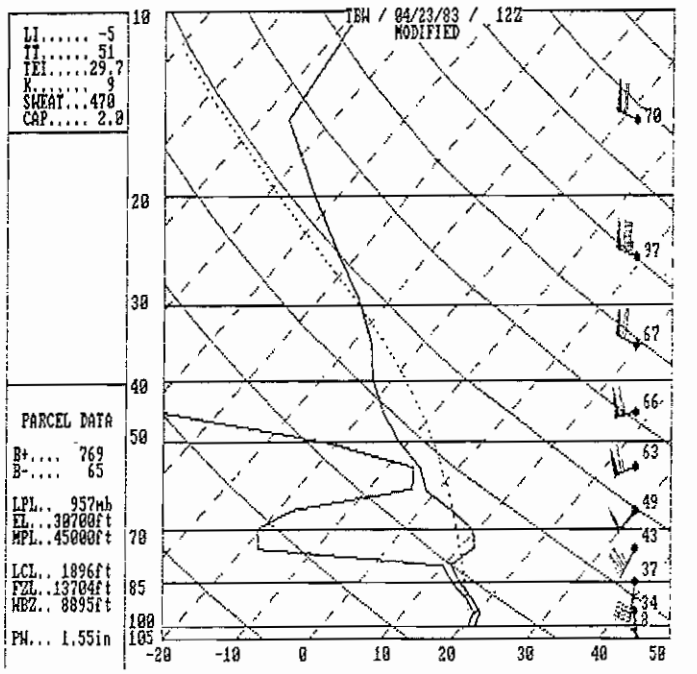
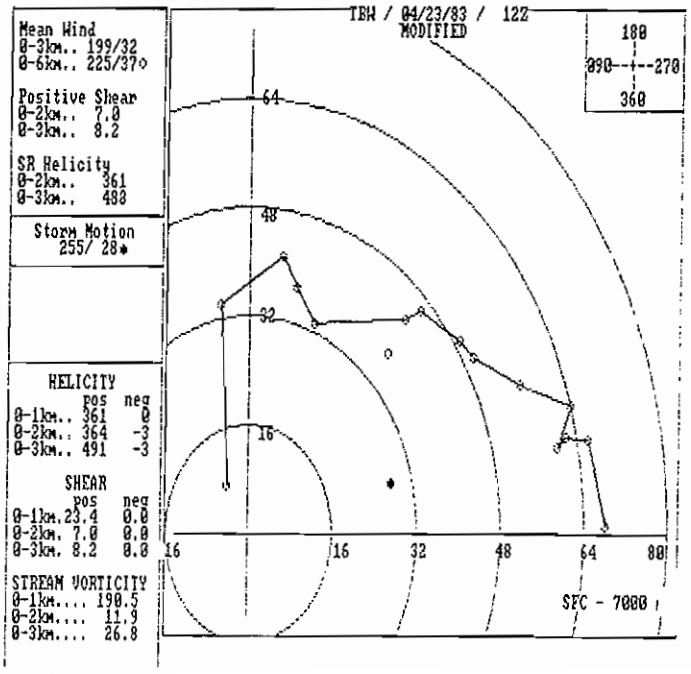
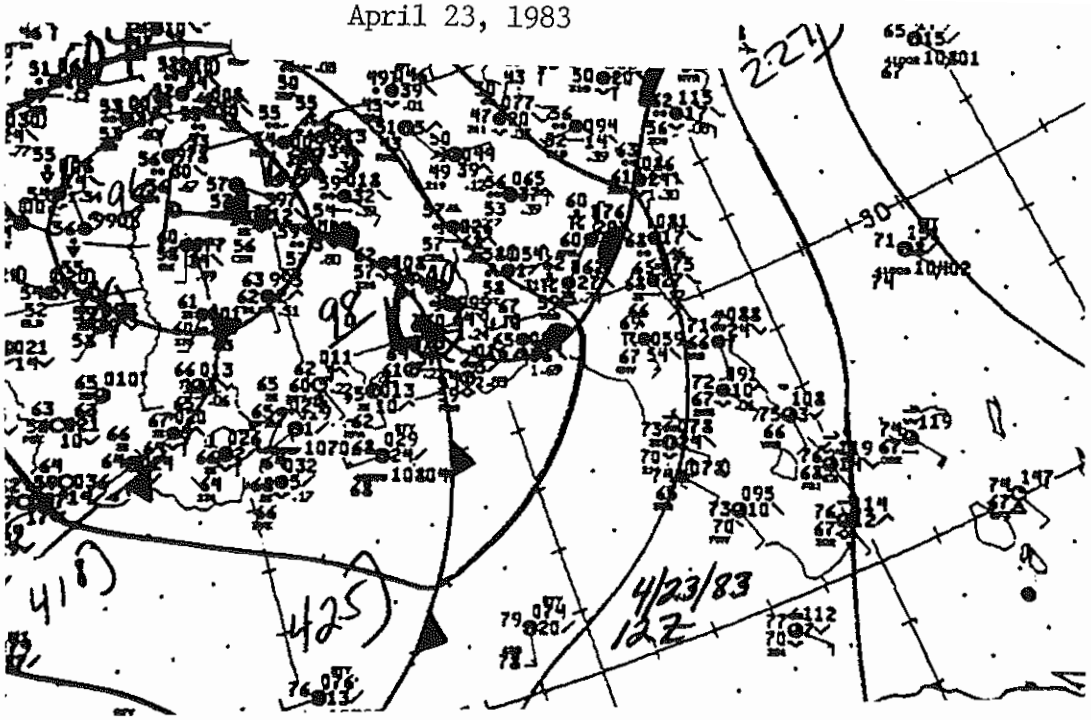
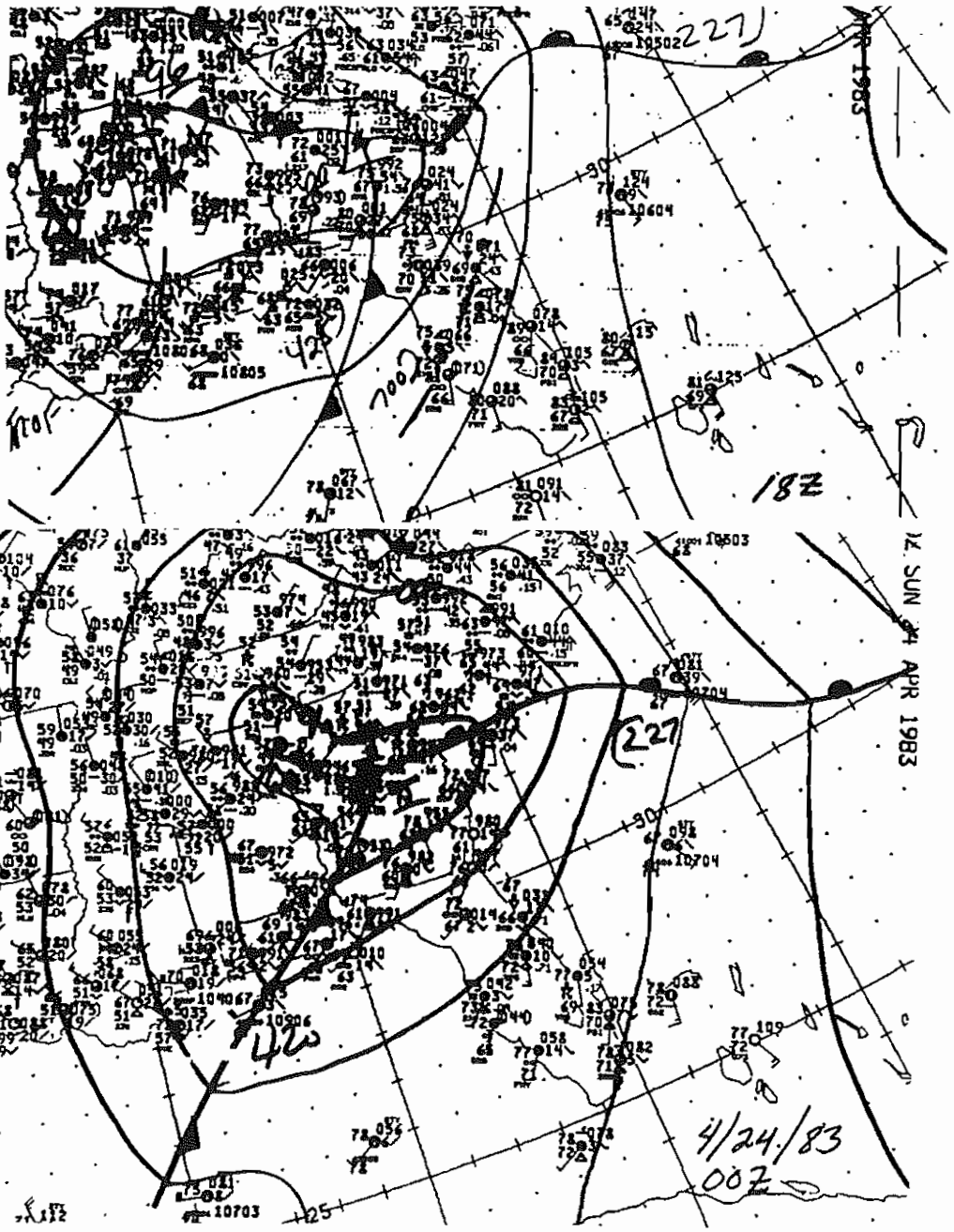

042383 0001 042387 2359 GMV 1.5 RES=HI WIND=T ESCALE=0 WIND HAIL WIND=
TOTALITIES= 23 TORN= 0 HAIL= 7 INJURIES= 11
61
51
61
0001CST 04/23/83 - 2359CST 04/23/83
SEVERE WEATHER REPORTS

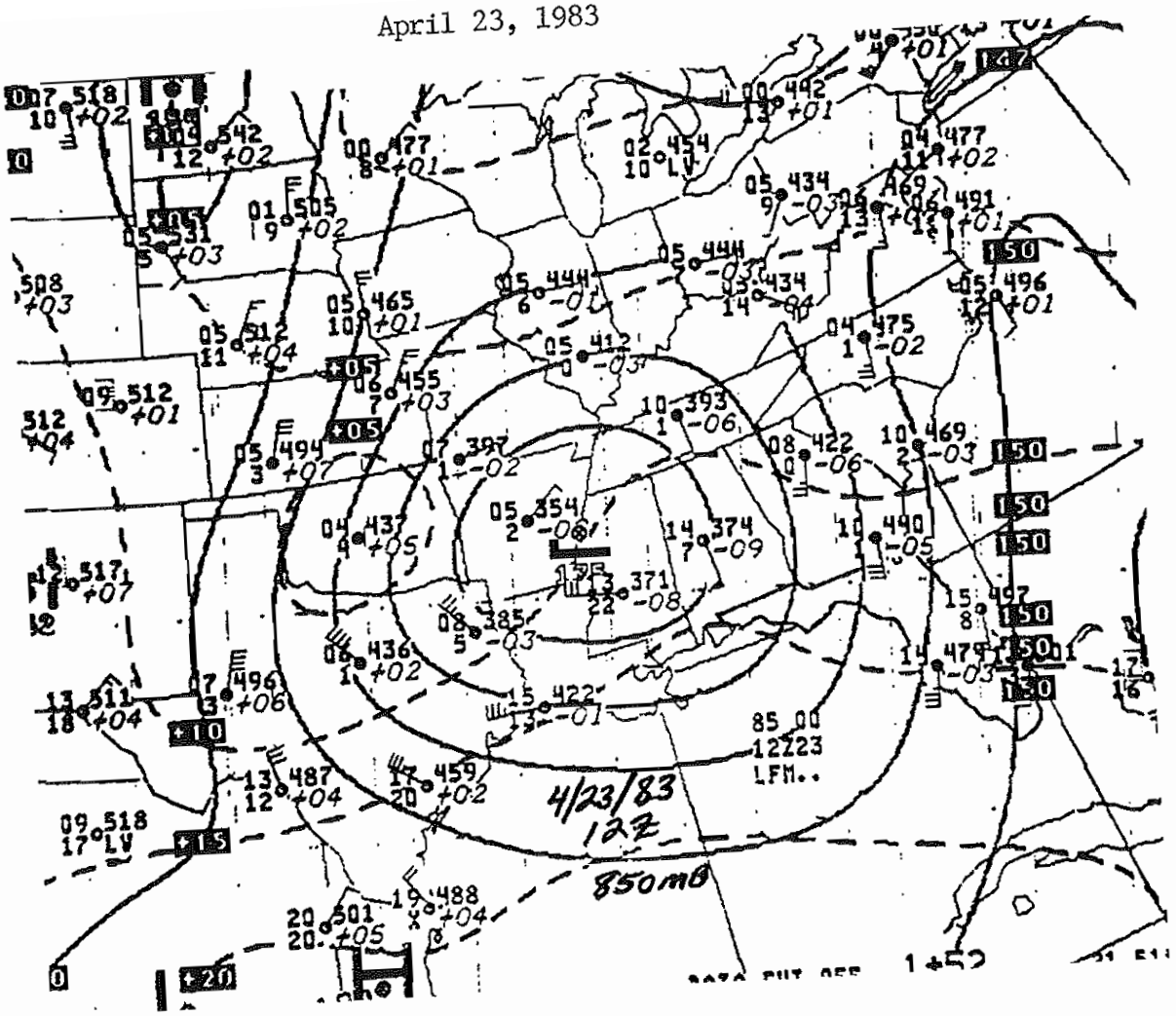

LI..... -5
TT..... 51
TEI.....29.7
K..... 9
SHEAT...470
CAP..... 2.8
PARCEL DATA
B+.... 769
B-.... 65
LPL.. 957mb
EL...30700ft
MPL..45000ft
LCL.. 1896ft
FZL..13704ft
MBZ.. 8895ft
PW... 1.55in
TBW / 04/23/83 / 12Z
MODIFIED
10
20
30
40
50
70
85
100
105
-20
-10
0
10
20
30
40
50
70
37
67
66
63
49
43
37
34
18

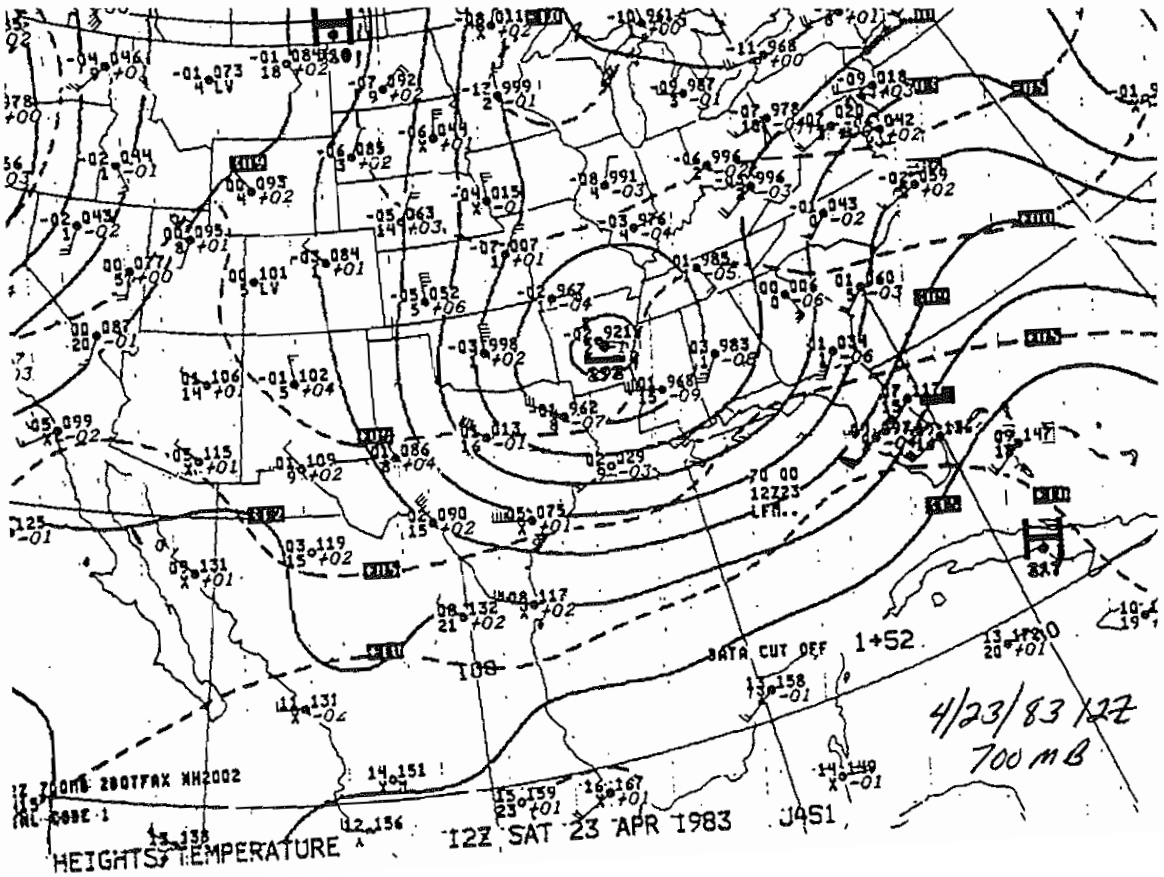

Mean Wind
0-3km.. 199/32
0-6km.. 225/37
Positive Shear
0-2km.. 7.0
0-3km.. 8.2
SR Helicity
0-2km.. 361
0-3km.. 488
Storm Motion
255/ 28
HELICITY
pos neg
0-1km.. 361 0
0-2km.. 364 -3
0-3km.. 491 -3
SHEAR
pos neg
0-1km.23.4 0.0
0-2km. 7.0 0.0
0-3km. 8.2 0.0
STREAM VORTICITY
0-1km.... 190.5
0-2km.... 11.9
0-3km.... 26.8
TBW / 04/23/83 / 12Z
MODIFIED
180
090
270
360
64
48
32
16
16
16
32
48
64
80
SFC - 7000

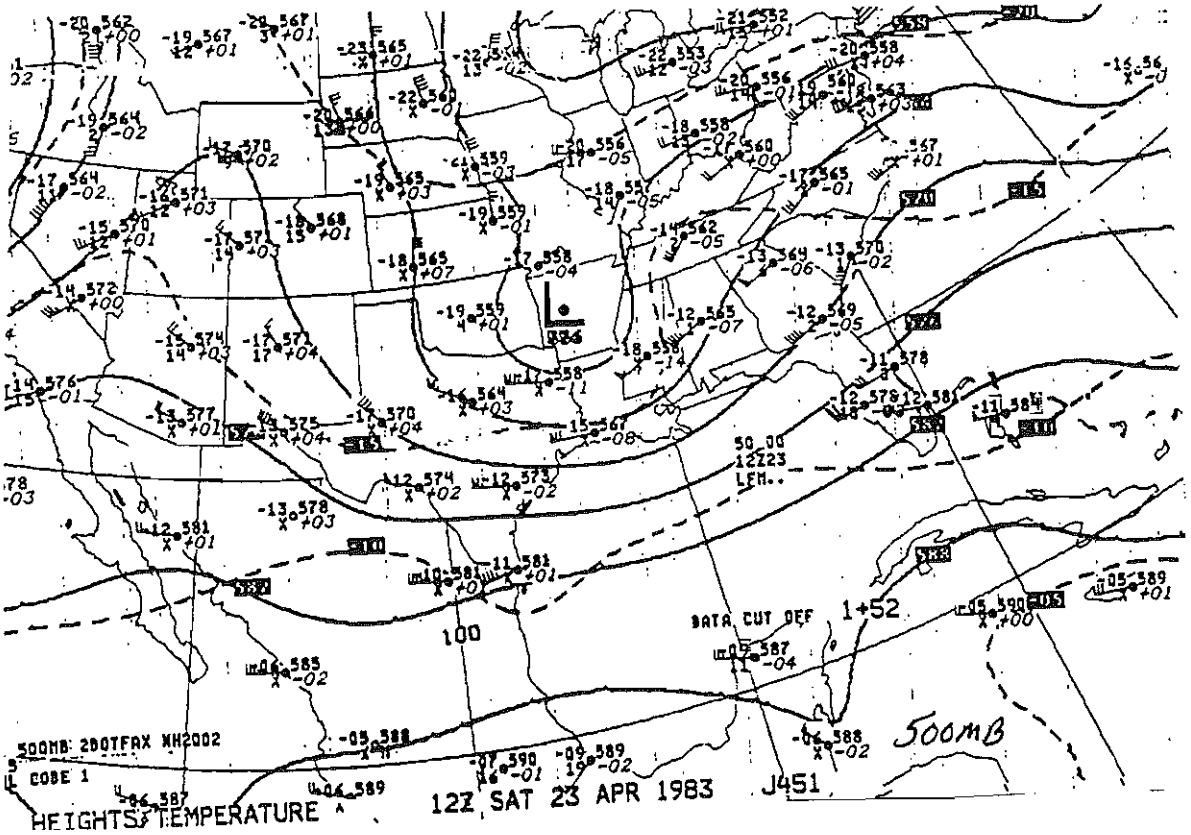

4/23/83
12Z

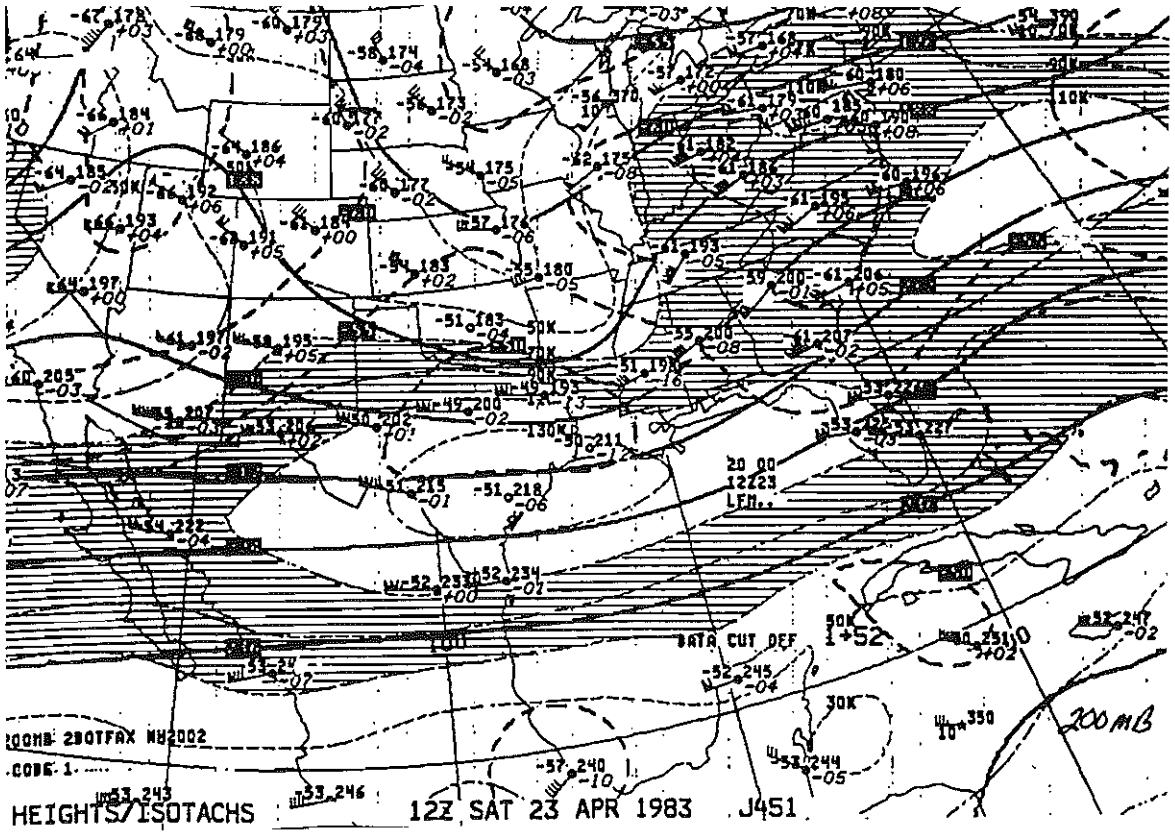

18Z
4/24/83
00Z

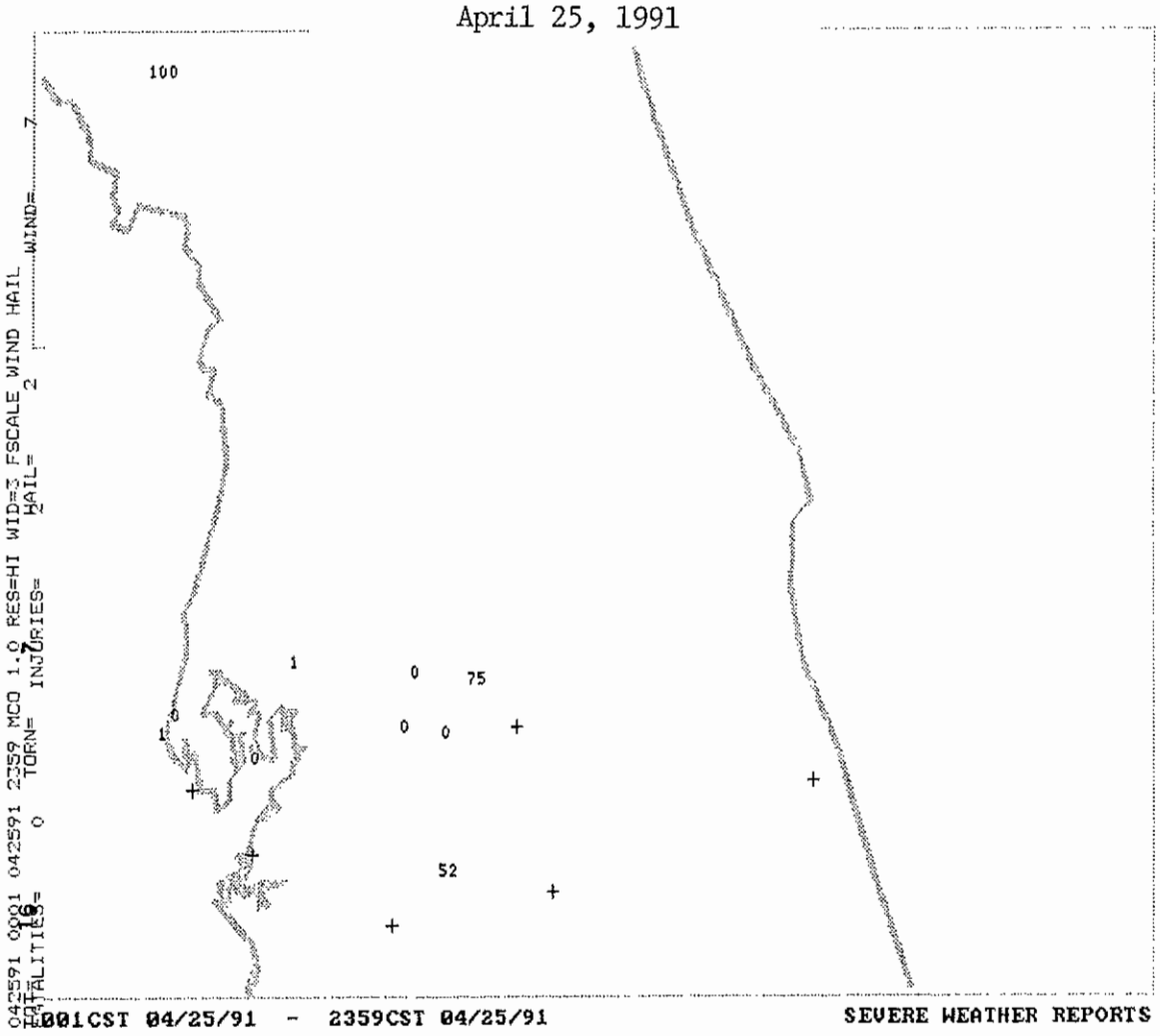
April 23, 1983

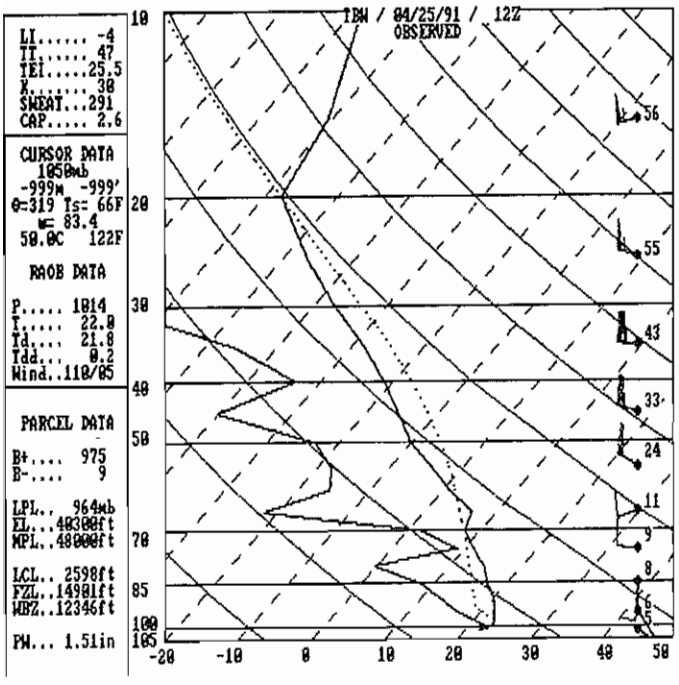


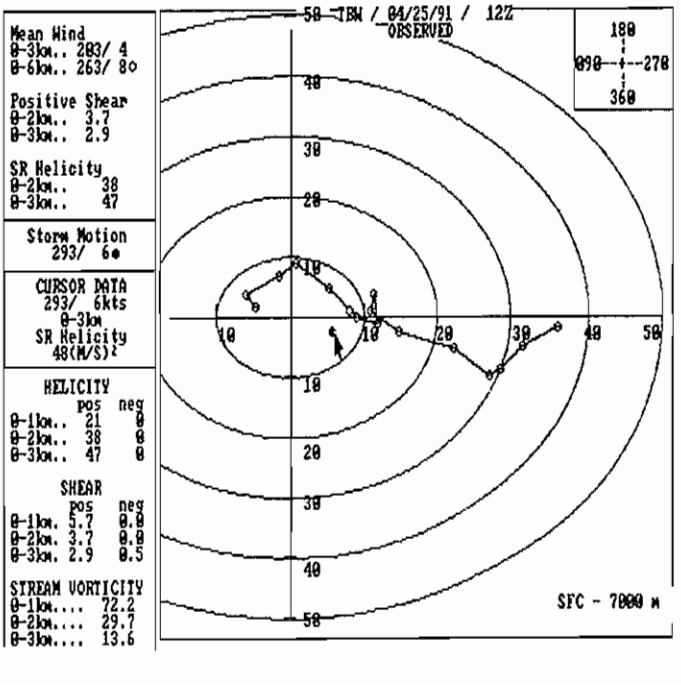



500MB 2BOTFAX NH2002
CODE 1
HEIGHTS/TEMPERATURE
12Z SAT 23 APR 1983
J451
500MB
DATA CUT OFF
1+52
20 00
12223
LFM..

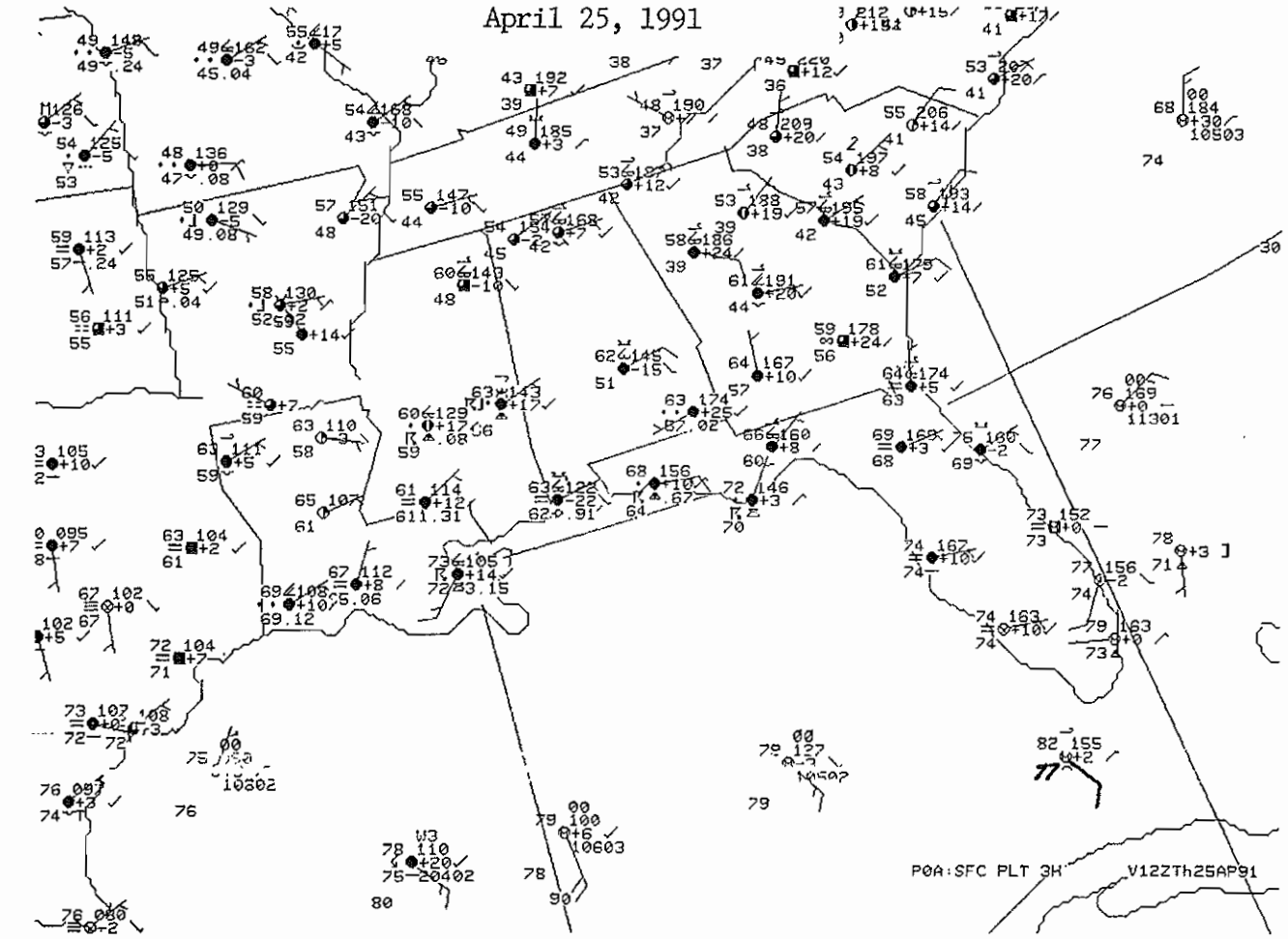

200MB 2BOTFAX NH2002
CODE 1
HEIGHTS/ISOTACHS
12Z SAT 23 APR 1983
J451
200MB
DATA CUT OFF
1+52
20 00
12223
LFM..

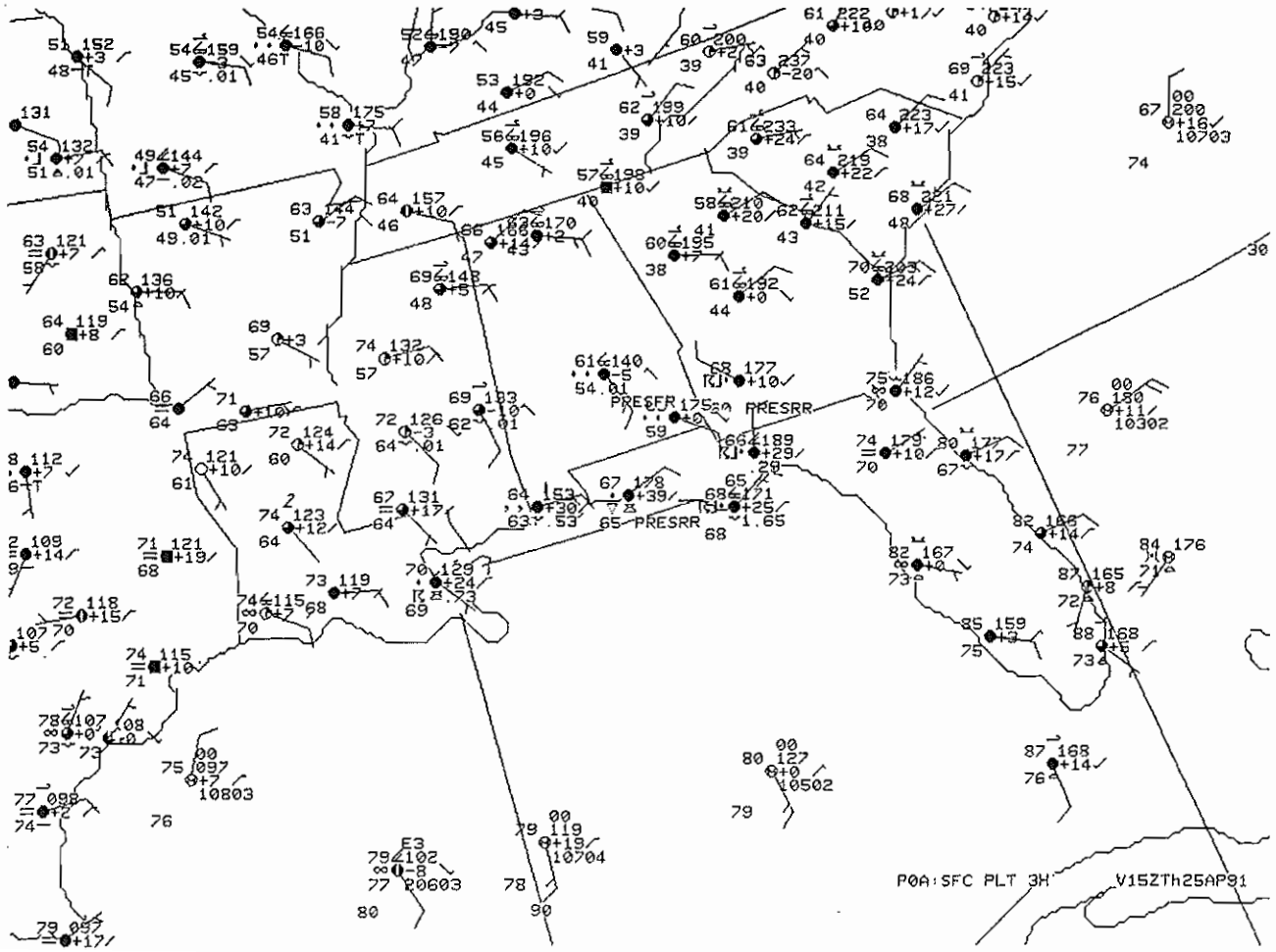

042591 0001 042591 2359 MCD 1.0 RES=HI WID=3 FSCALE WIND HAIL
FATALITIES= 0 TORN= INJURIES= HAIL= 2 WIND=
100
75
52
0001CST 04/25/91 - 2359CST 04/25/91
SEVERE WEATHER REPORTS

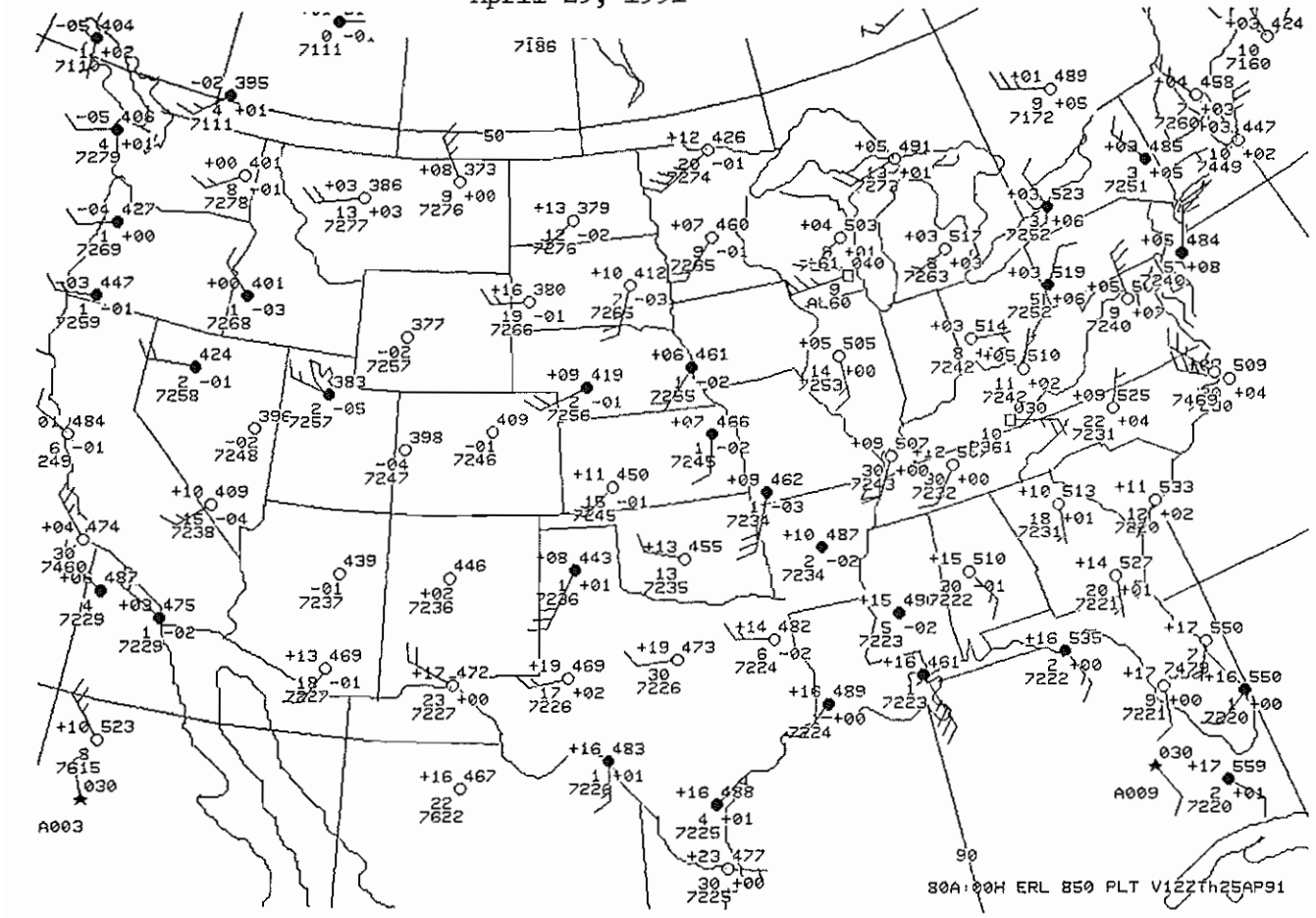

LI..... -4
TI..... 47
TEI.....25.5
K..... 38
SWEAT...291
CAP..... 2.6
CURSOR DATA
1050mb
-999m -999°
θ=319 Ts= 66F
= 83.4
50.0C 122F
RAOB DATA
P..... 1014
T..... 22.0
Td.... 21.8
Tdd... 0.2
Wind..110/05
PARCEL DATA
B+.... 975
B-.... 9
LPL.. 964mb
EL...40300ft
MPL..48000ft
LCL.. 2598ft
FZL..14981ft
WBZ..12346ft
PW... 1.51in
TBW / 04/25/91 / 12Z
OBSERVED
56
55
43
33
24
11
9
8
6
5
-20 -10 0 10 20 30 40 50

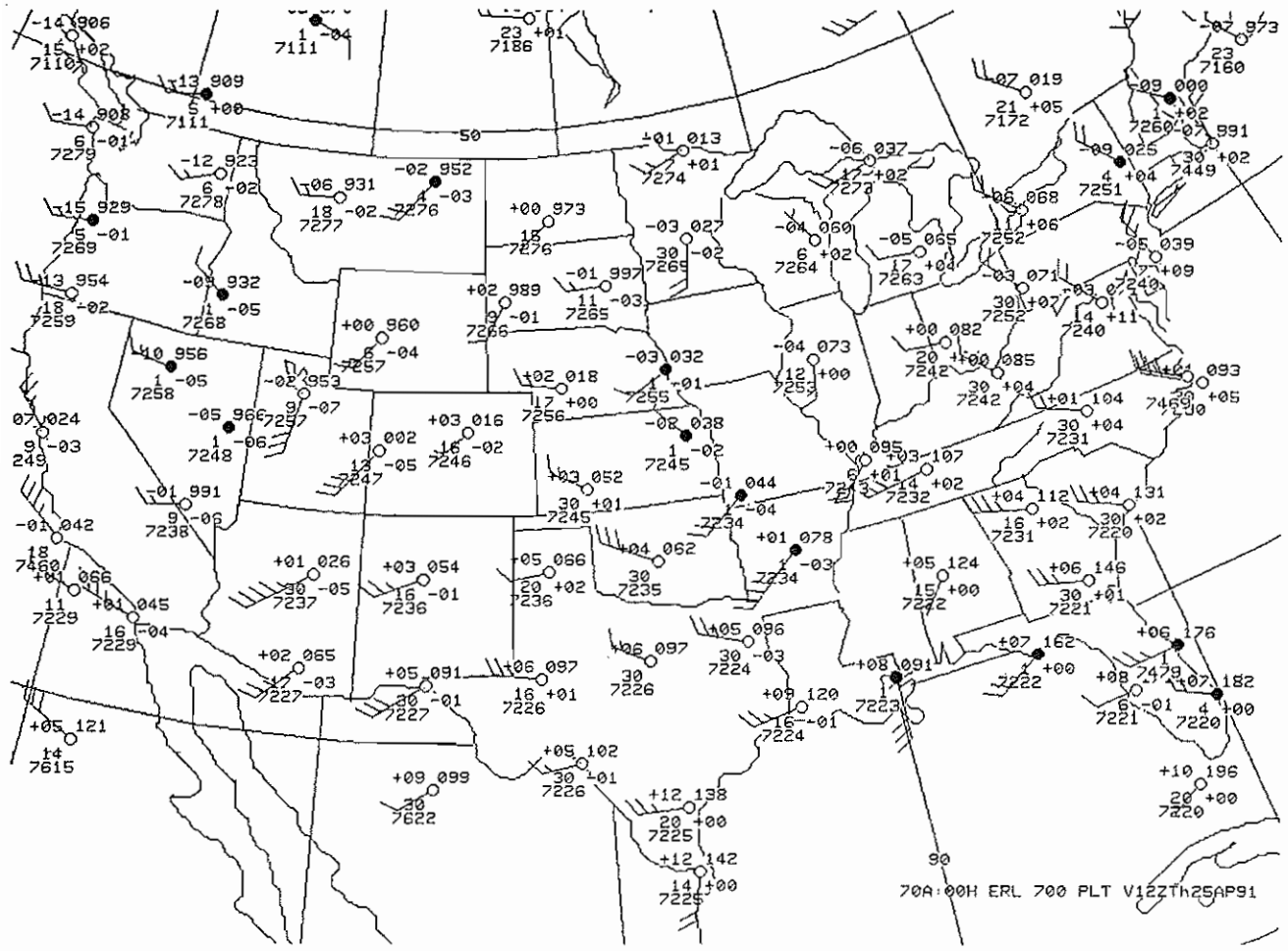

Mean Wind
0-3km.. 283/ 4
0-6km.. 263/ 80
Positive Shear
0-2km.. 3.7
0-3km.. 2.9
SR Helicity
0-2km.. 38
0-3km.. 47
Storm Motion
293/ 6kts
CURSOR DATA
293/ 6kts
0-3km
SR Helicity
48(M/S)²
HELICITY
pos neg
0-1km.. 21 0
0-2km.. 38 0
0-3km.. 47 0
SHEAR
pos neg
0-1km. 5.7 0.0
0-2km. 3.7 0.0
0-3km. 2.9 0.5
STREAM VORTICITY
0-1km.... 72.2
0-2km.... 29.7
0-3km.... 13.6
TBW / 04/25/91 / 12Z
OBSERVED
180
090 270
360
SFC - 7000 M

April 25, 1991

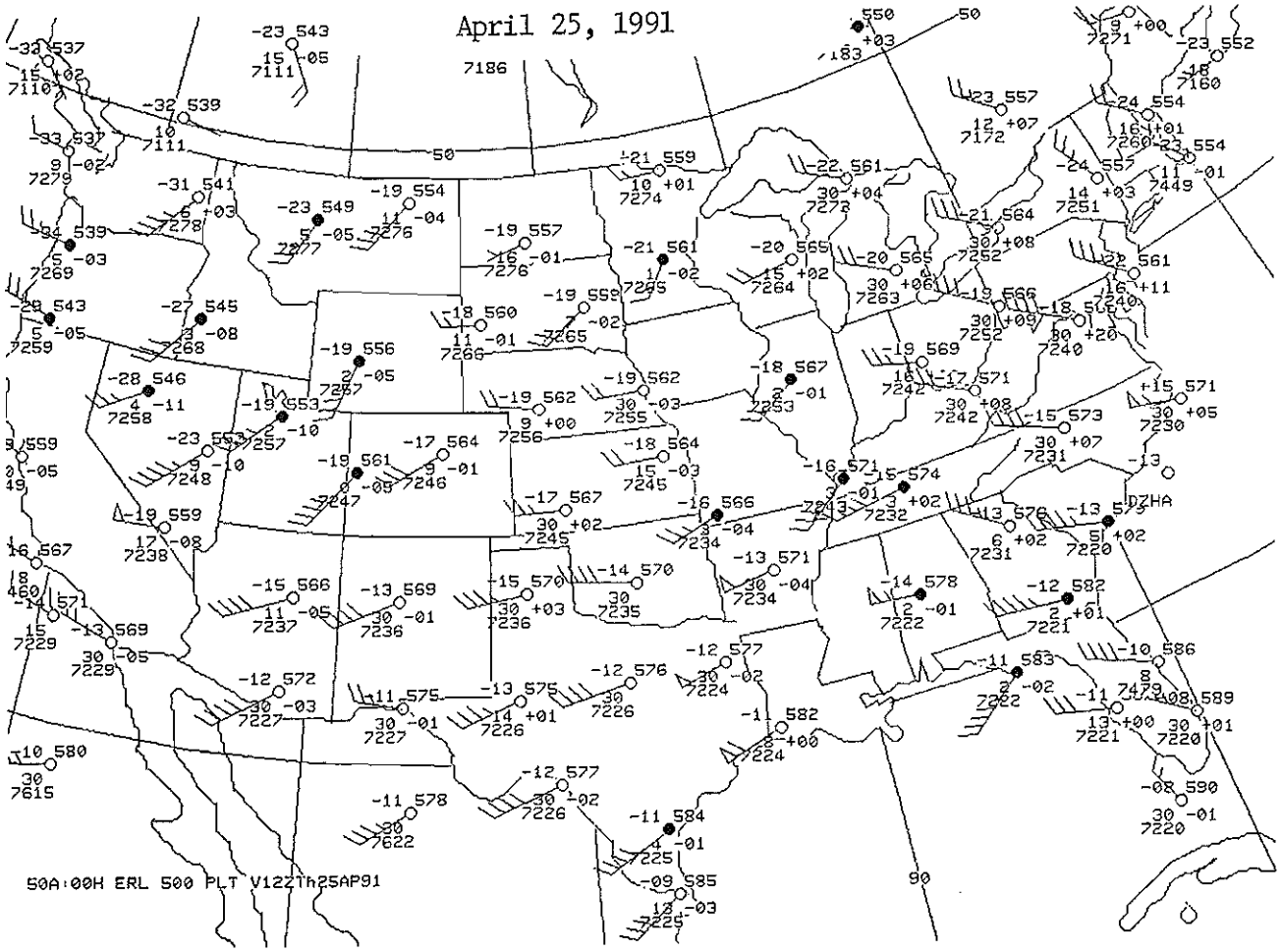


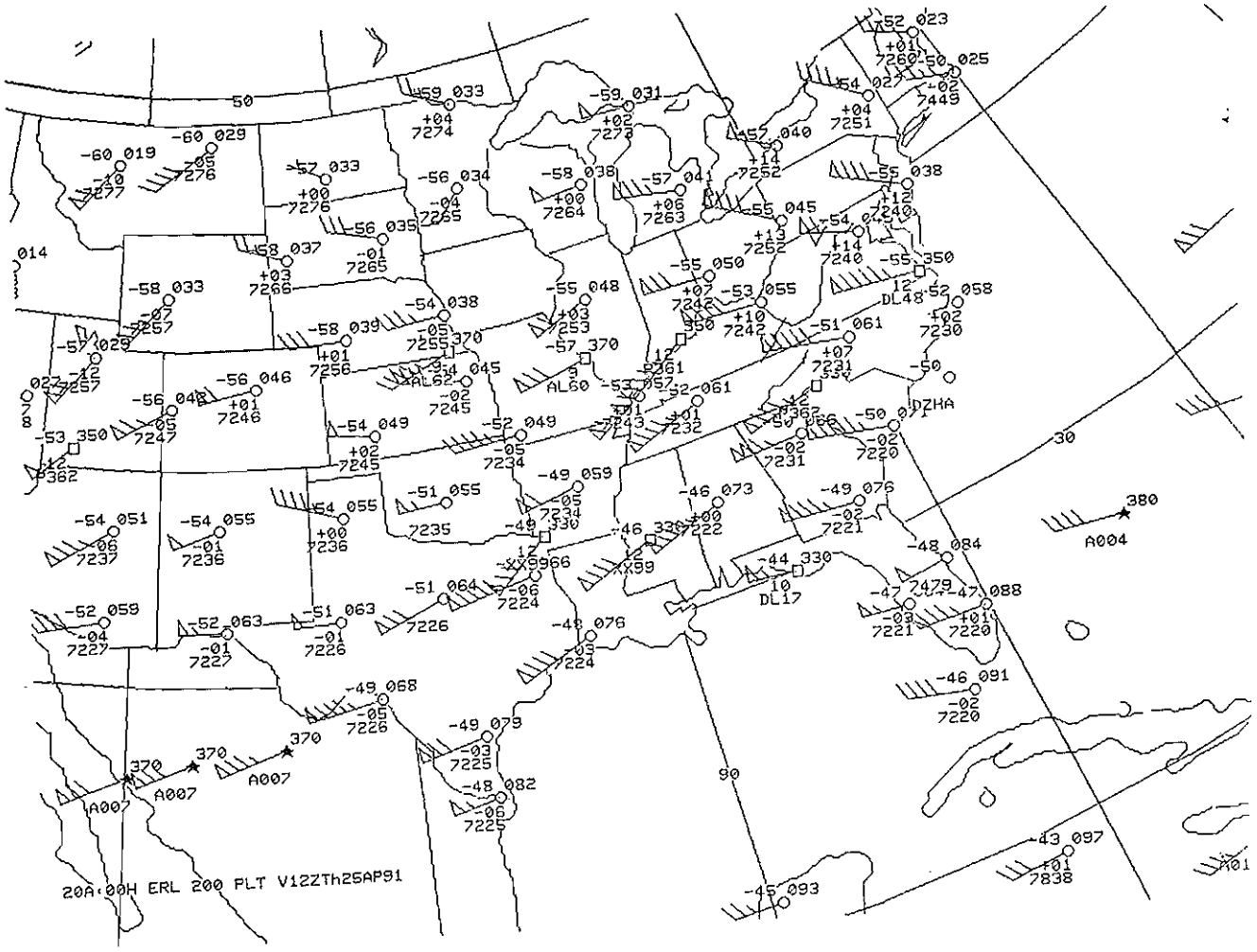


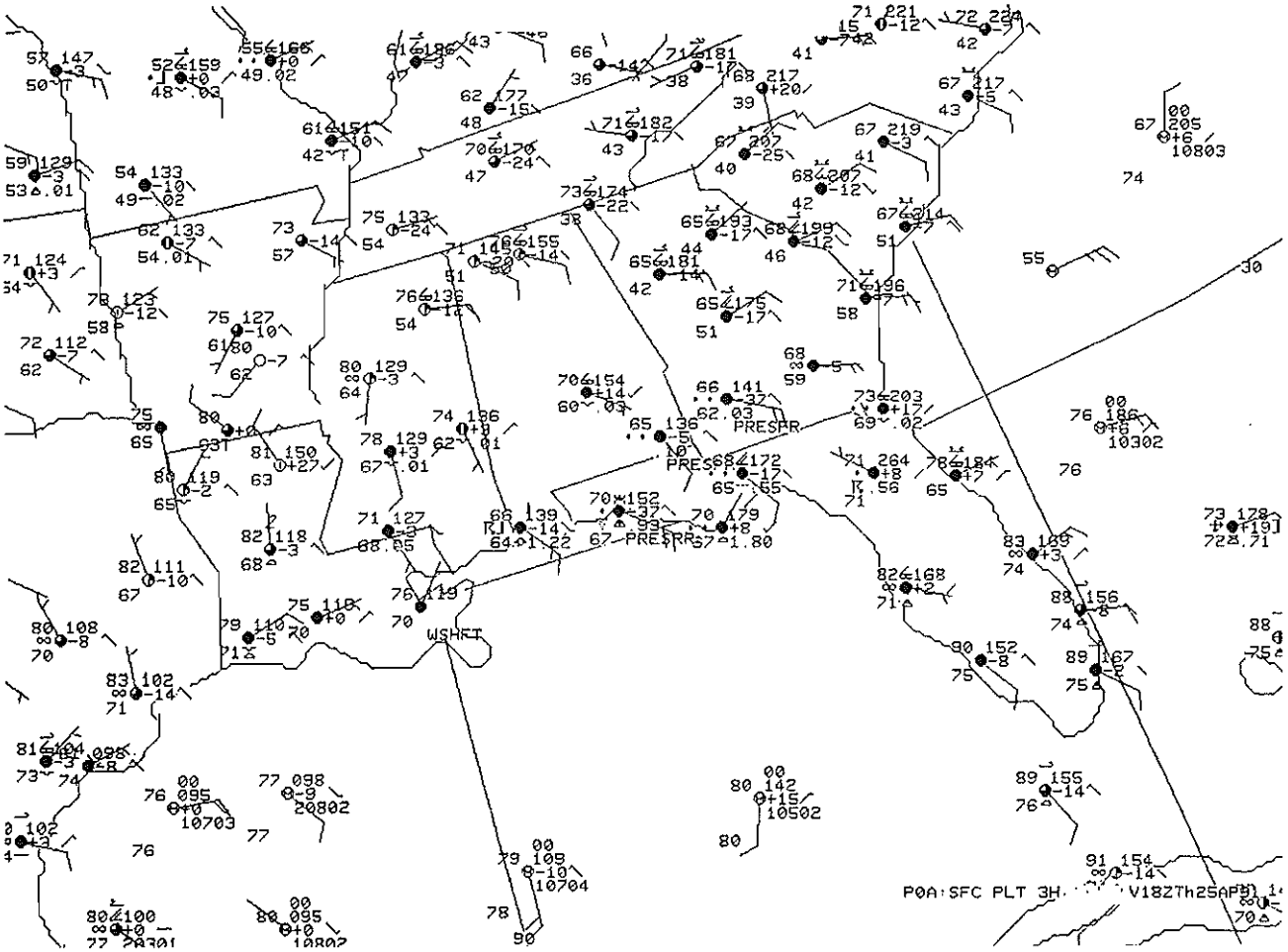

80A:00H ERL 850 PLT V12Zth25APR91

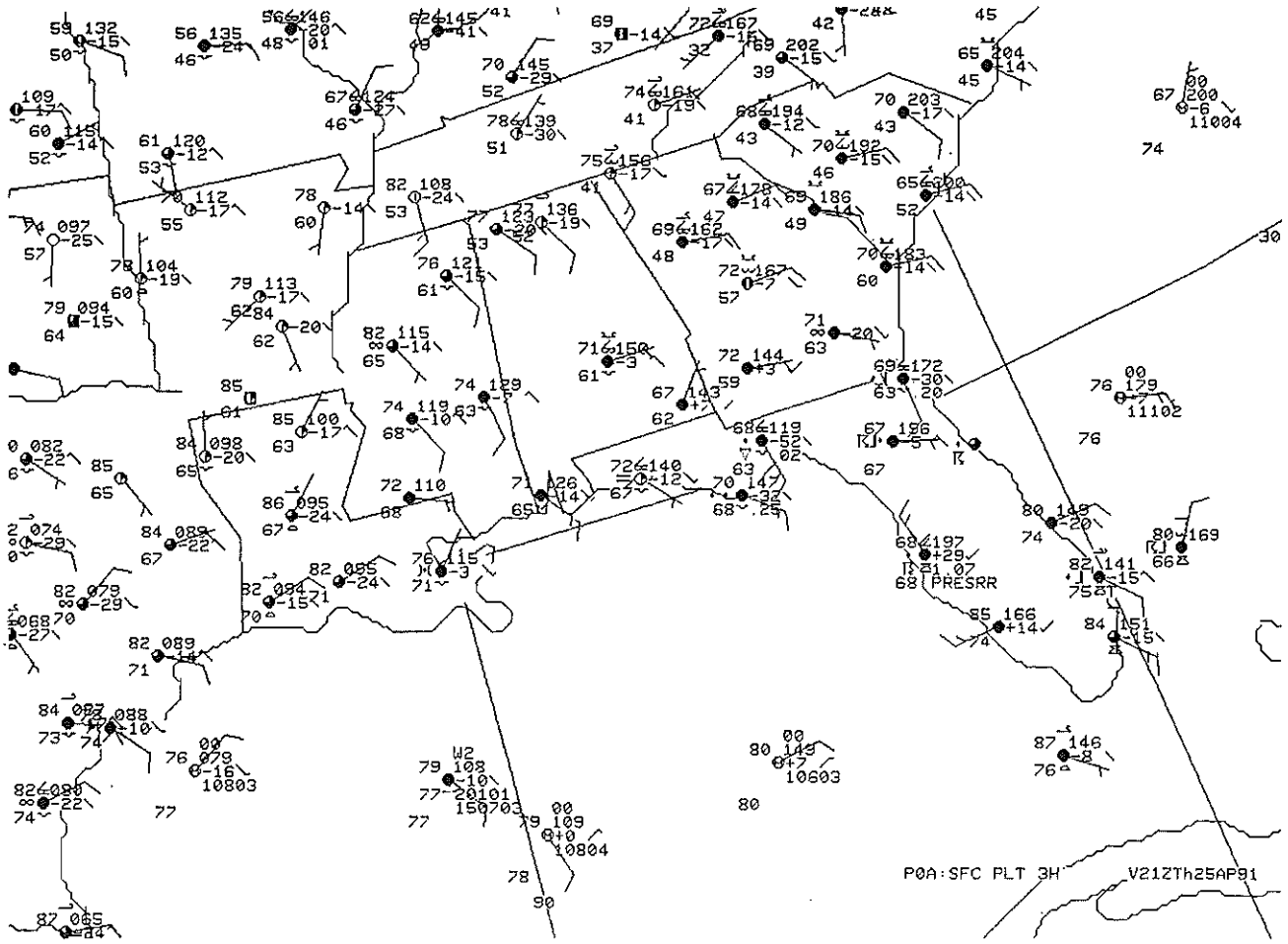

70A:00H ERL 700 PLT V12Zth25APR91

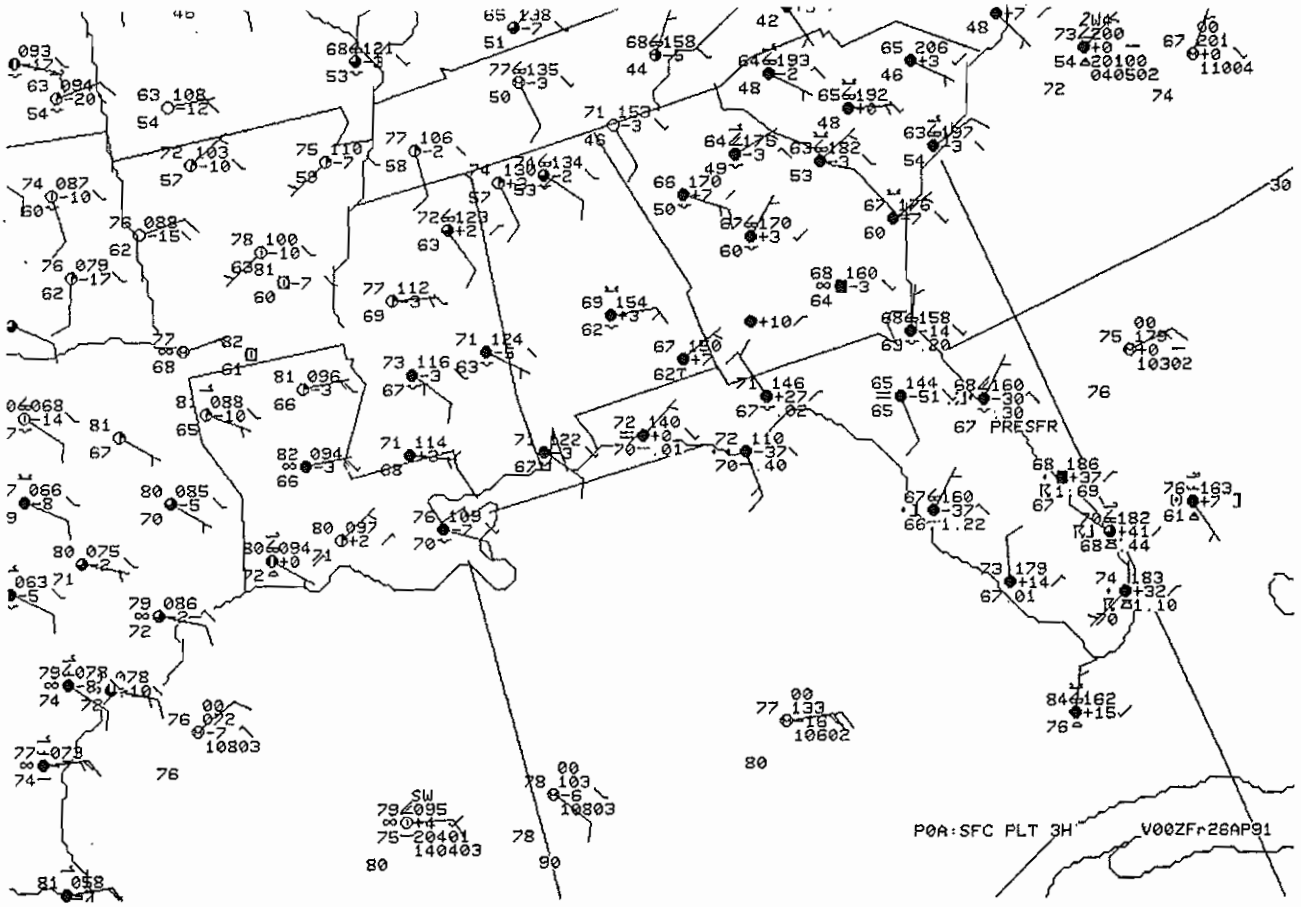
April 25, 1991

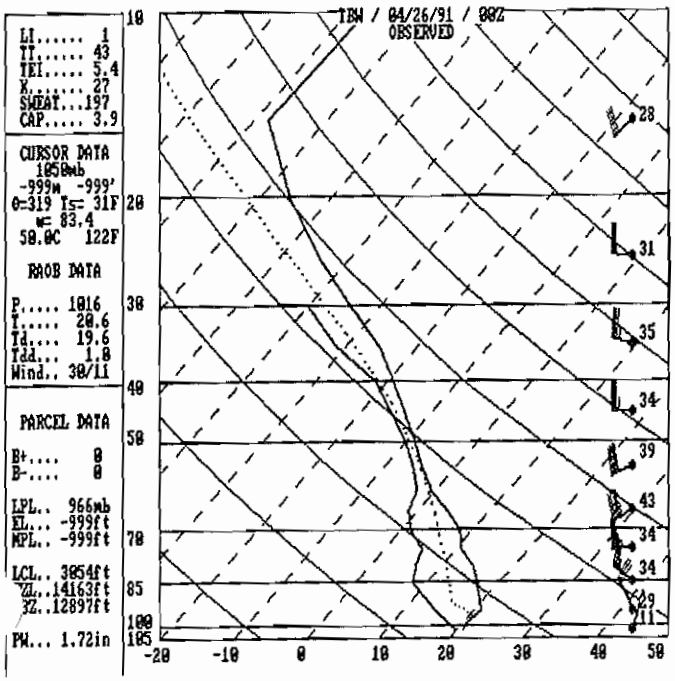


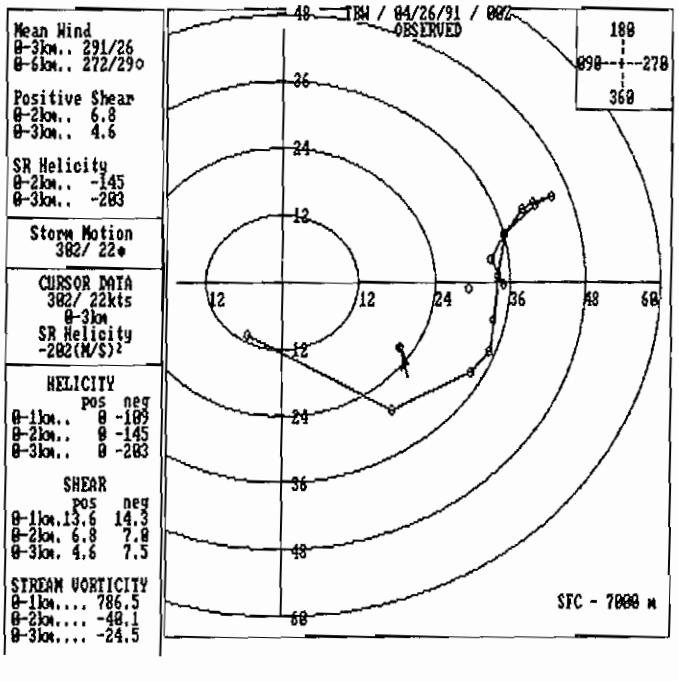



PRESSRR
PRESSRR
WSHRT
P0A:SFC PLT 3H
V18ZTh25APR91

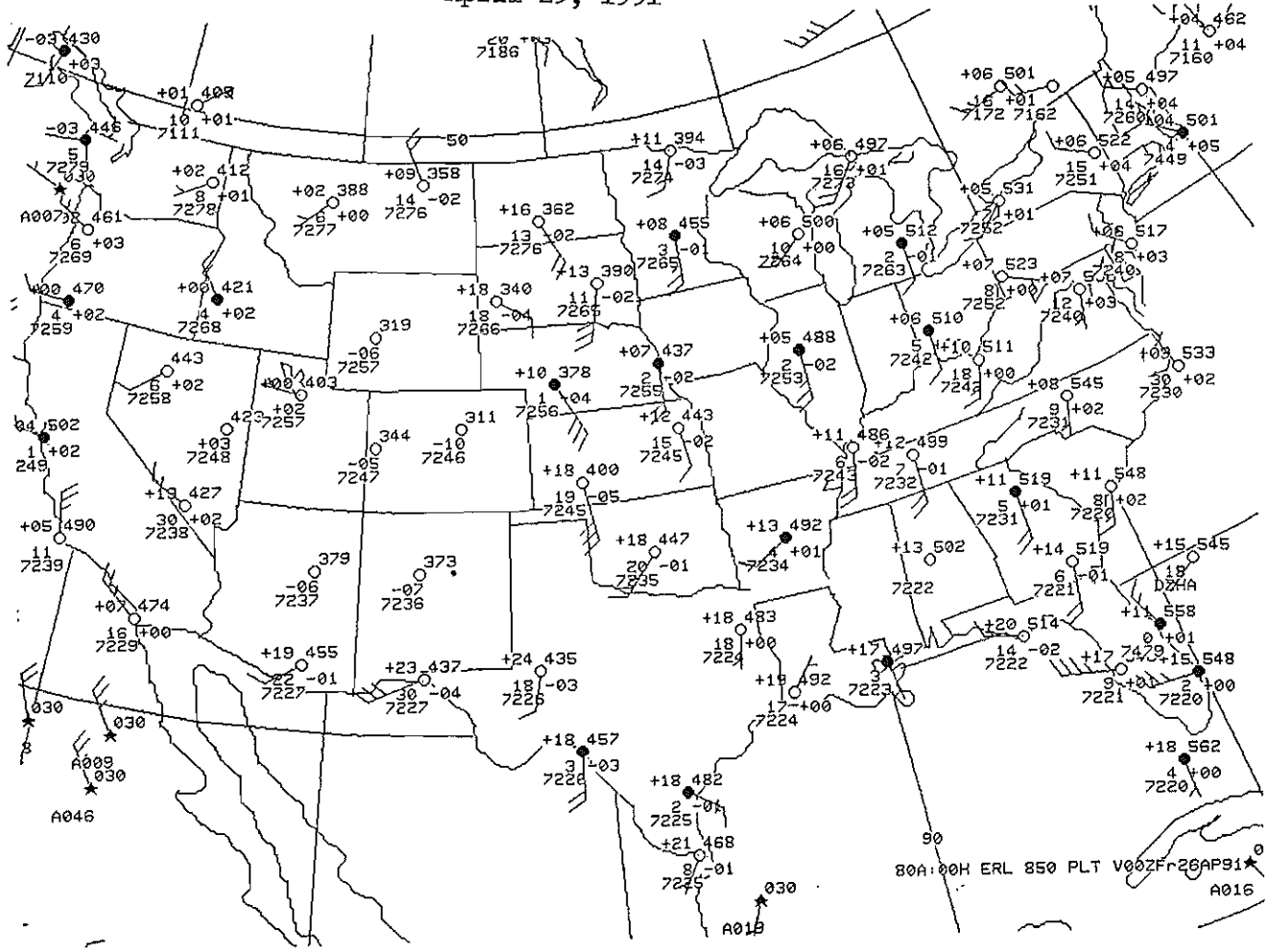

PRESSRR
P0A:SFC PLT 3H
V21ZTh25APR91

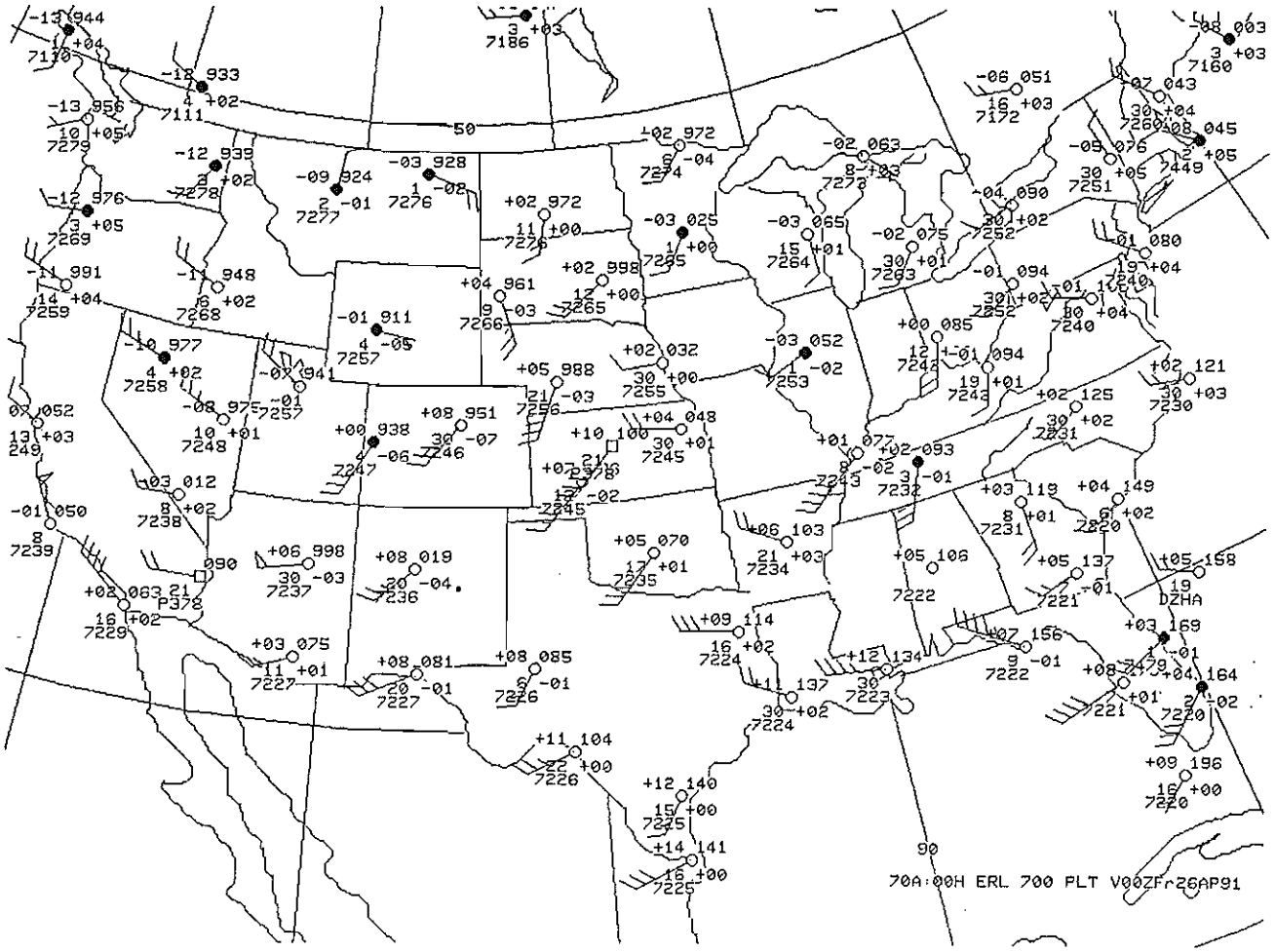

P0A:SFC PLT 3H
V00ZFr26AP91

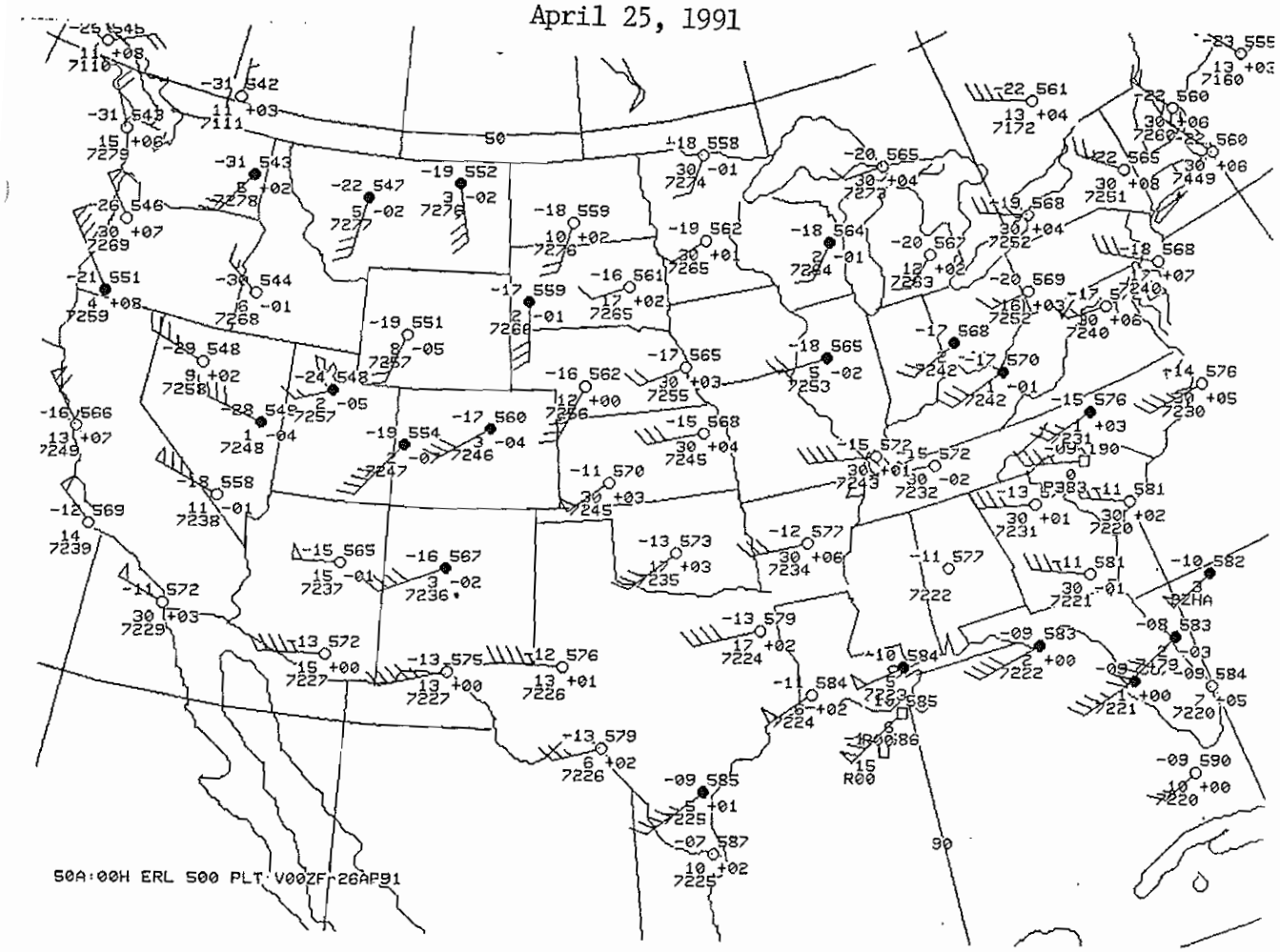

LI..... 1
TT..... 43
TEI..... 5.4
K..... 27
SWEAT...197
CAP..... 3.9
CURSOR DATA
1050mb
-999m -999'
θ=319 Ts= 31F
w= 83.4
50.0C 122F
RAOB DATA
P..... 1016
T..... 20.6
Td.... 19.6
Tdd... 1.8
Wind.. 30/11
PARCEL DATA
B+.... 0
B-.... 0
LPL.. 966mb
EL... -999ft
MPL.. -999ft
LCL.. 3854ft
ZL..14163ft
ΔZ..12897ft
PW... 1.72in
TBW / 04/26/91 / 00Z
OBSERVED
-20 -10 0 10 20 30 40 50

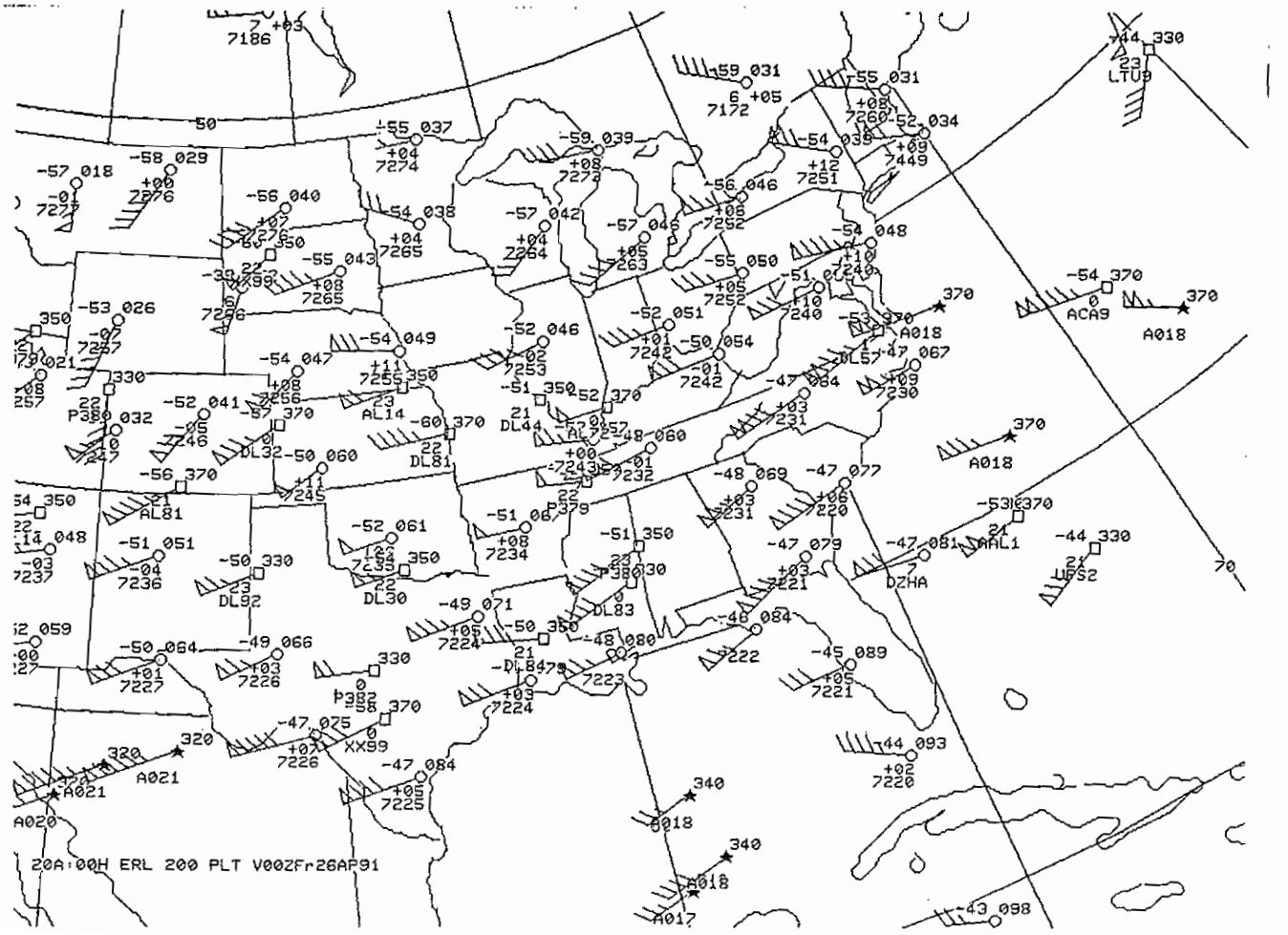

Mean Wind
0-3km.. 291/26
0-6km.. 272/29
Positive Shear
0-2km.. 6.8
0-3km.. 4.6
SR Helicity
0-2km.. -145
0-3km.. -203
Storm Motion
302/ 22
CURSOR DATA
302/ 22kts
0-3km
SR Helicity
-202(M/S)²
HELICITY
pos neg
0-1km.. 0 -109
0-2km.. 0 -145
0-3km.. 0 -203
SHEAR
pos neg
0-1km.13.6 14.3
0-2km. 6.8 7.8
0-3km. 4.6 7.5
STREAM VORTICITY
0-1km.... 786.5
0-2km.... -48.1
0-3km.... -24.5
TBW / 04/26/91 / 00Z
OBSERVED
SFC - 7000 M

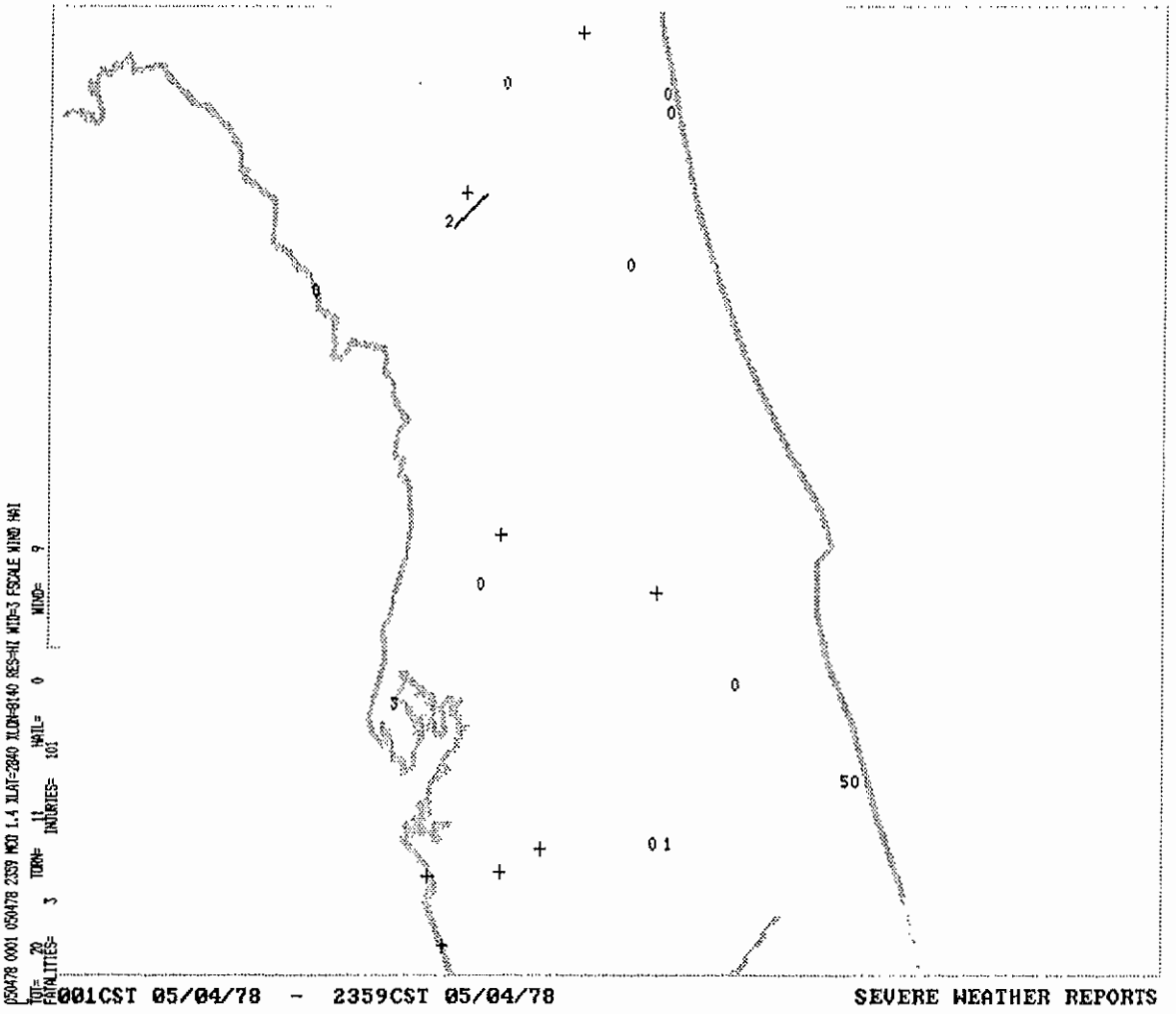
April 25, 1991

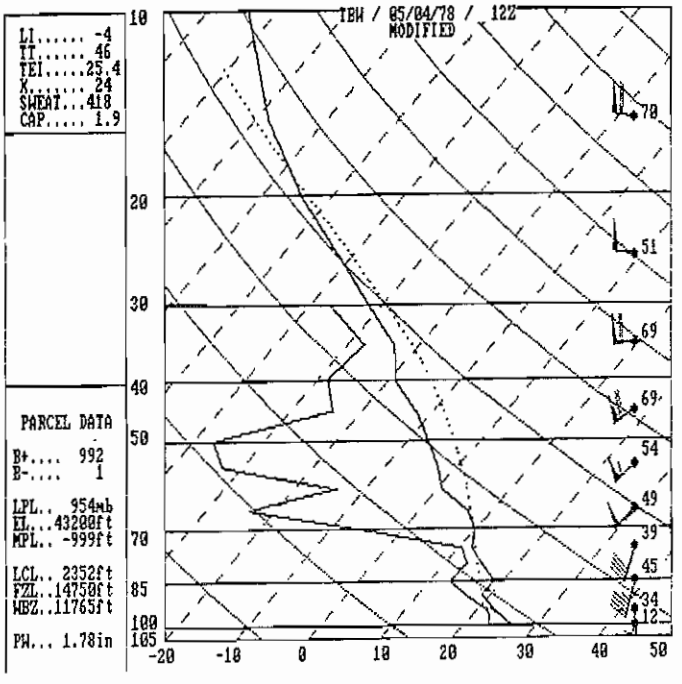


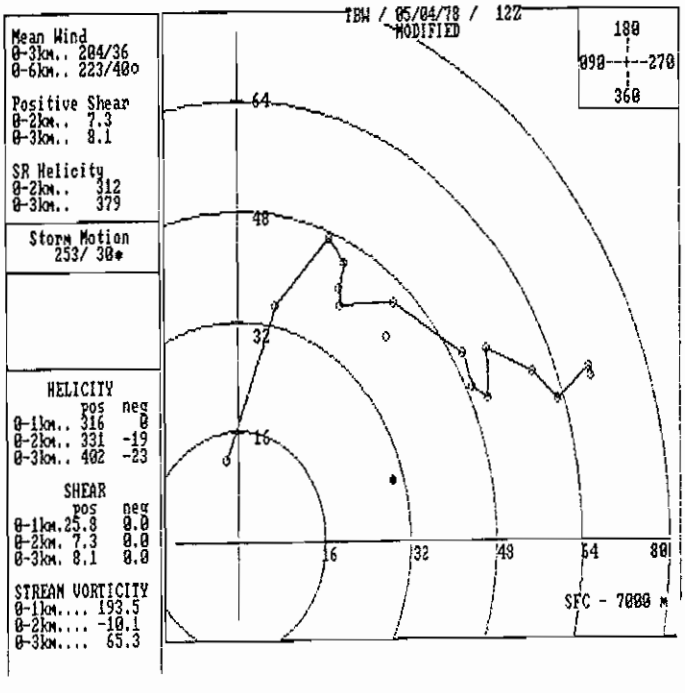


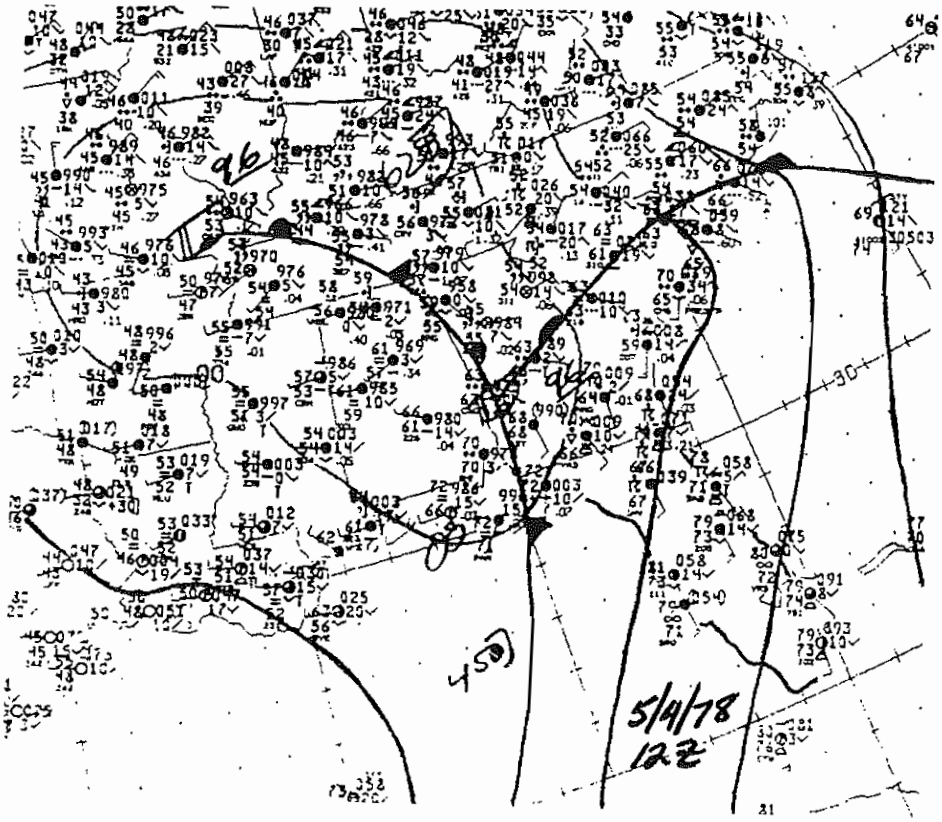

50A:00H ERL 500 PLT V00ZFr26AP91

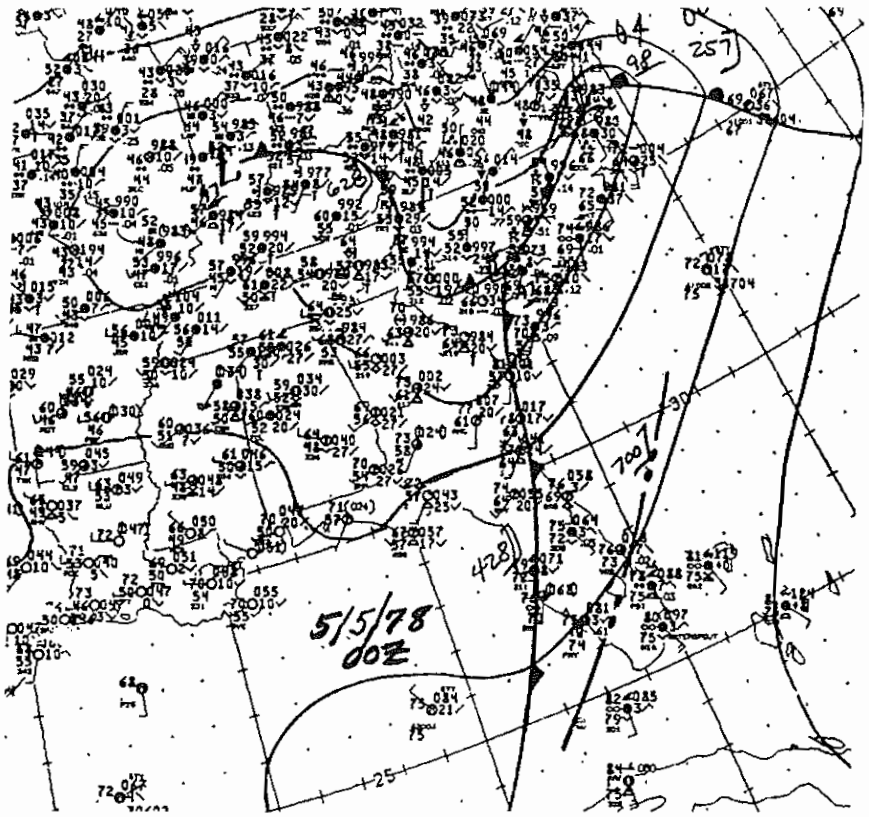

20A:00H ERL 200 PLT V00ZFr26AP91

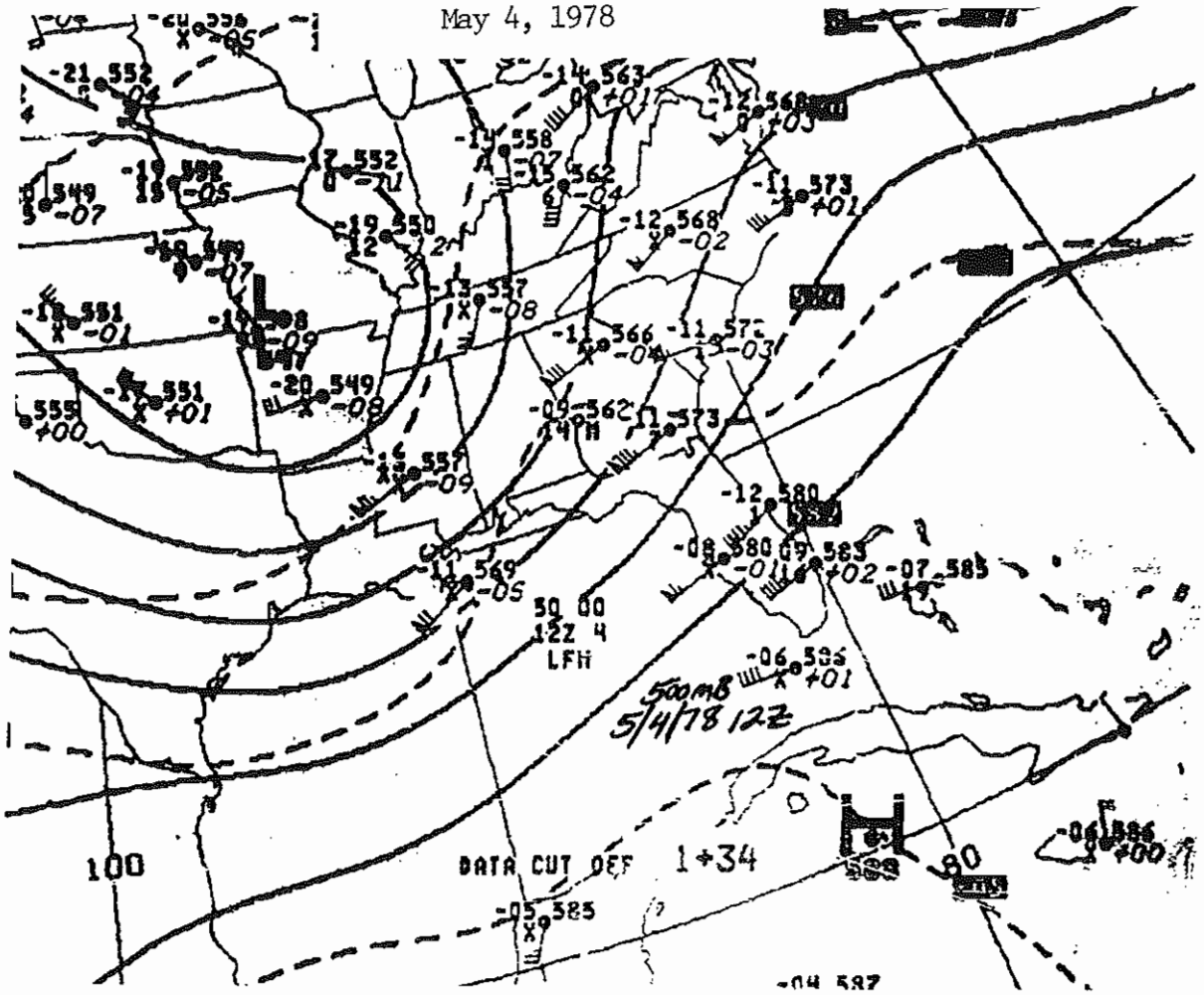

050478 0001 050478 2359 MCD 1.4 XLAT=3940 XLON=0140 RES=NI WID=3 FSCALE WIND HAI
TOT= 20 FATALITIES= 3 TORN= 11 INJURIES= 101 HAIL= 0 WIND= 9
0001CST 05/04/78 - 2359CST 05/04/78
SEVERE WEATHER REPORTS

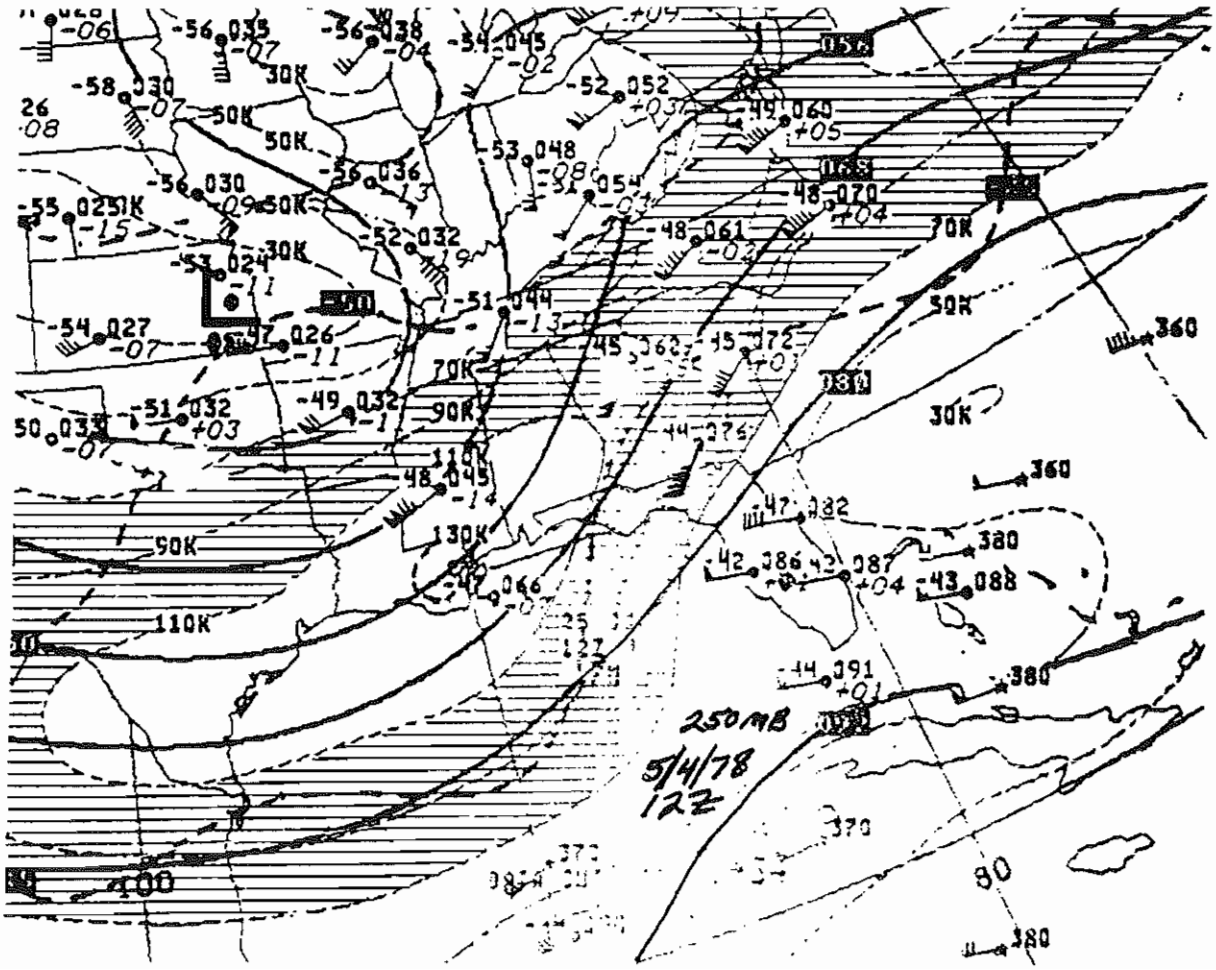

LI..... -4
TT..... 46
TEI.....25.4
X..... 24
SWEAT...418
CAP..... 1.9
PARCEL DATA
B+.... 992
B-.... 1
LPL.. 954mb
EL...43200ft
MPL.. -999ft
LCL.. 2352ft
FZL..14750ft
MBZ..11765ft
PW... 1.78in
TBW / 05/04/78 / 122Z
MODIFIED
-20 -10 0 10 20 30 40 50


Mean Wind
0-3km.. 284/36
0-6km.. 223/40
Positive Shear
0-2km.. 7.3
0-3km.. 8.1
SR Helicity
0-2km.. 312
0-3km.. 379
Storm Motion
253/ 30
HELICITY
pos neg
0-1km.. 316 0
0-2km.. 331 -19
0-3km.. 402 -23
SHEAR
pos neg
0-1km.. 25.8 0.0
0-2km.. 7.3 0.0
0-3km.. 8.1 0.0
STREAM VORTICITY
0-1km.... 193.5
0-2km.... -10.1
0-3km.... 65.3
TBW / 05/04/78 / 122Z
MODIFIED
180
090 270
360
64
48
32
16
SFC - 7000


5/4/78
12Z


5/5/78
00Z


500MB
5/4/78 12Z
DATA CUT OFF 1+34
LFH
12Z 4


250MB
5/4/78
12Z

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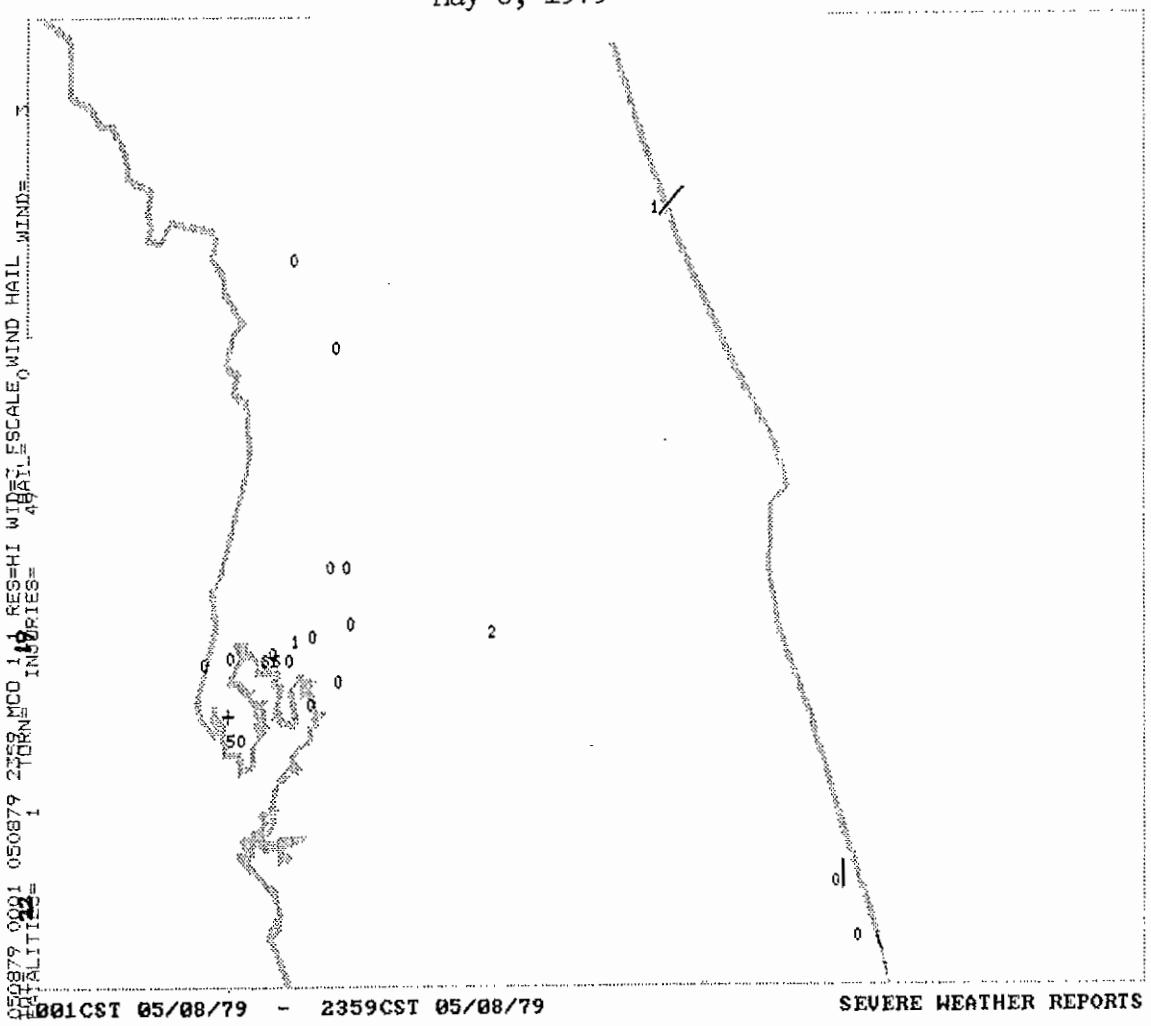
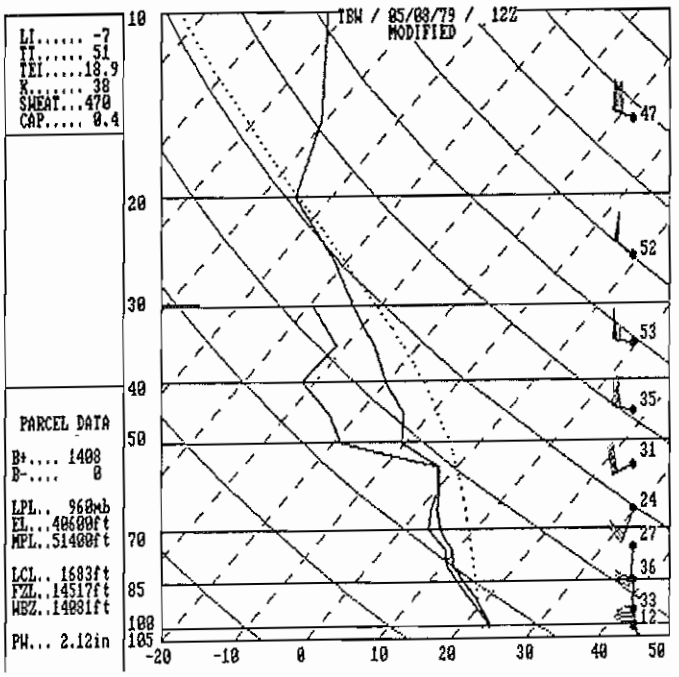
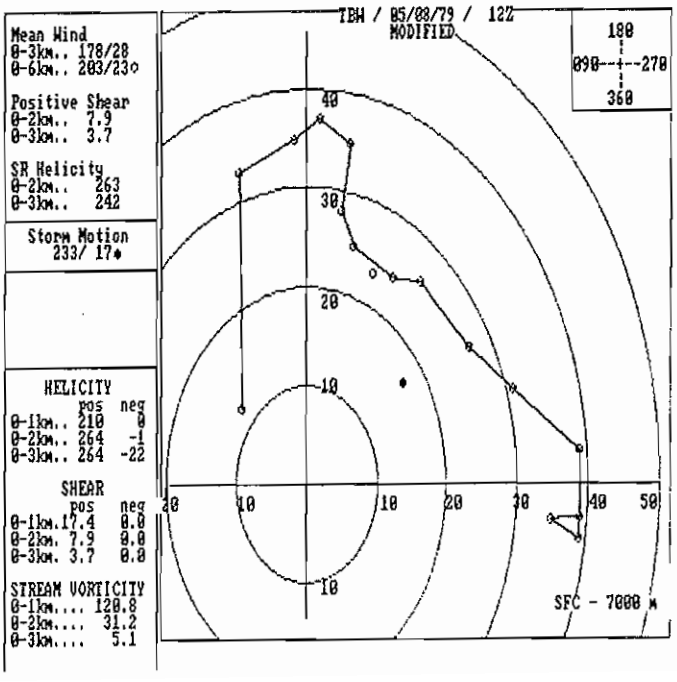
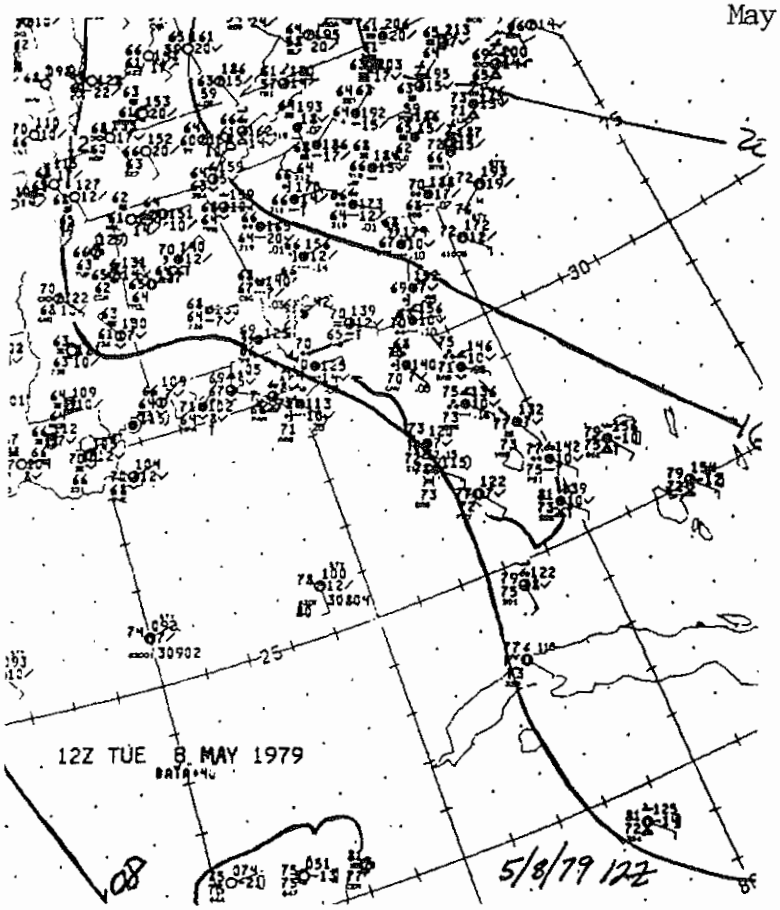
May 8, 1979

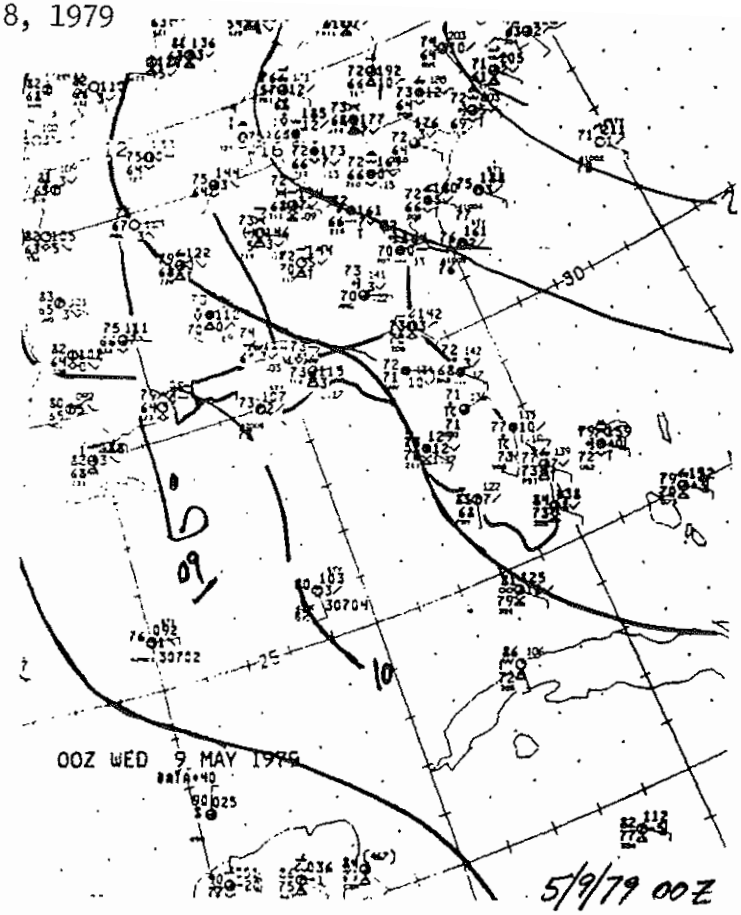

050879 0001 050879 2359 MCO 1.1 RES=HI WID=3 ESCALE WIND HAIL WIND= 3
TORN= INJURIES= HAIL= 0
001CST 05/08/79 - 2359CST 05/08/79
SEVERE WEATHER REPORTS

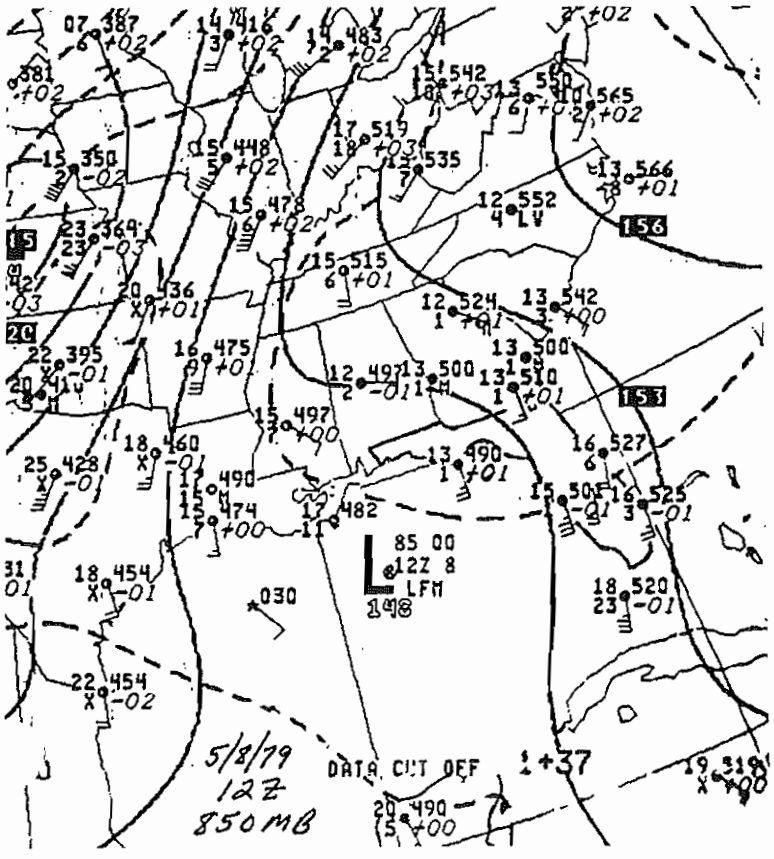

TBW / 05/08/79 / 12Z
MODIFIED
LI..... -7
TT..... 51
TEI.....18.9
K..... 38
SWEAT...470
CAP..... 0.4
PARCEL DATA
B+.... 1408
B-.... 0
LPL.. 960mb
EL...40600ft
MPL..51400ft
LCL.. 1683ft
FZL..14517ft
WBZ..14081ft
PW... 2.12in

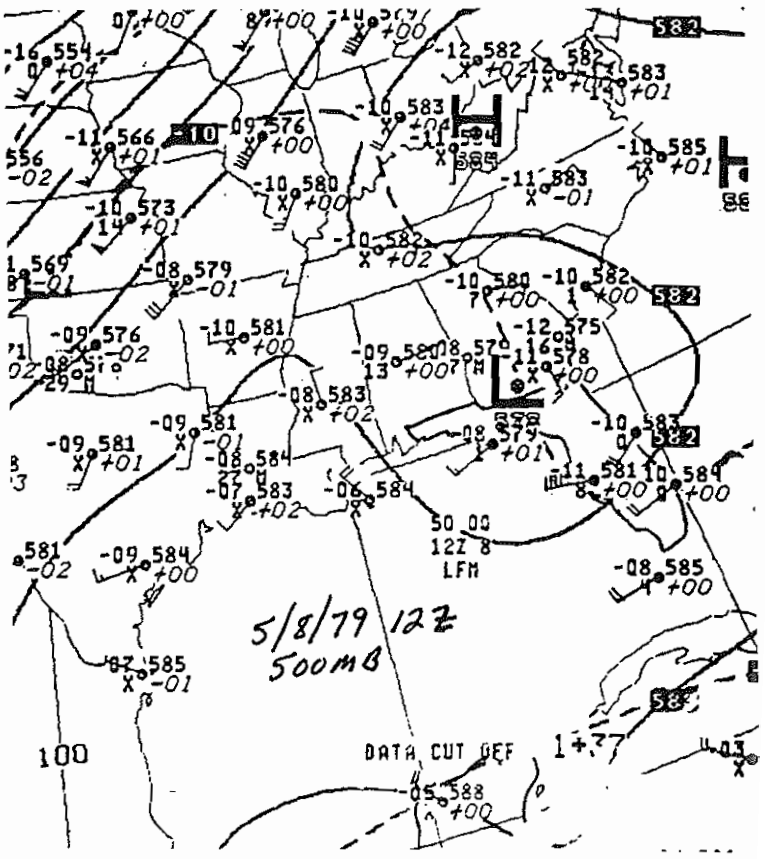

TBW / 05/08/79 / 12Z
MODIFIED
Mean Wind
0-3km.. 178/28
0-6km.. 203/23
Positive Shear
0-2km.. 7.9
0-3km.. 3.7
SR Helicity
0-2km.. 263
0-3km.. 242
Storm Motion
233/ 17
HELICITY
pos neg
0-1km.. 210 0
0-2km.. 264 -1
0-3km.. 264 -22
SHEAR
pos neg
0-1km.17.4 0.0
0-2km. 7.9 0.0
0-3km. 3.7 0.0
STREAM VORTICITY
0-1km.... 120.8
0-2km.... 31.2
0-3km.... 5.1
SFC - 7000 m

May 8, 1979

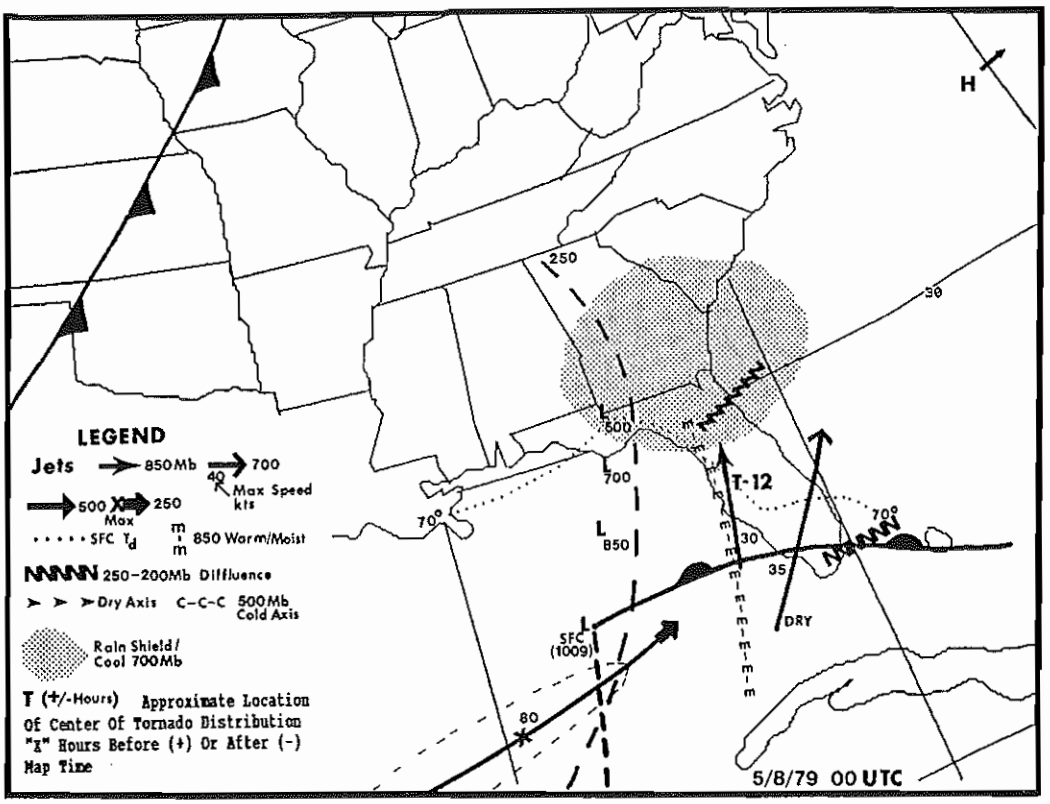

12Z TUE 8 MAY 1979
5/8/79 12Z


00Z WED 9 MAY 1979
5/9/79 00Z

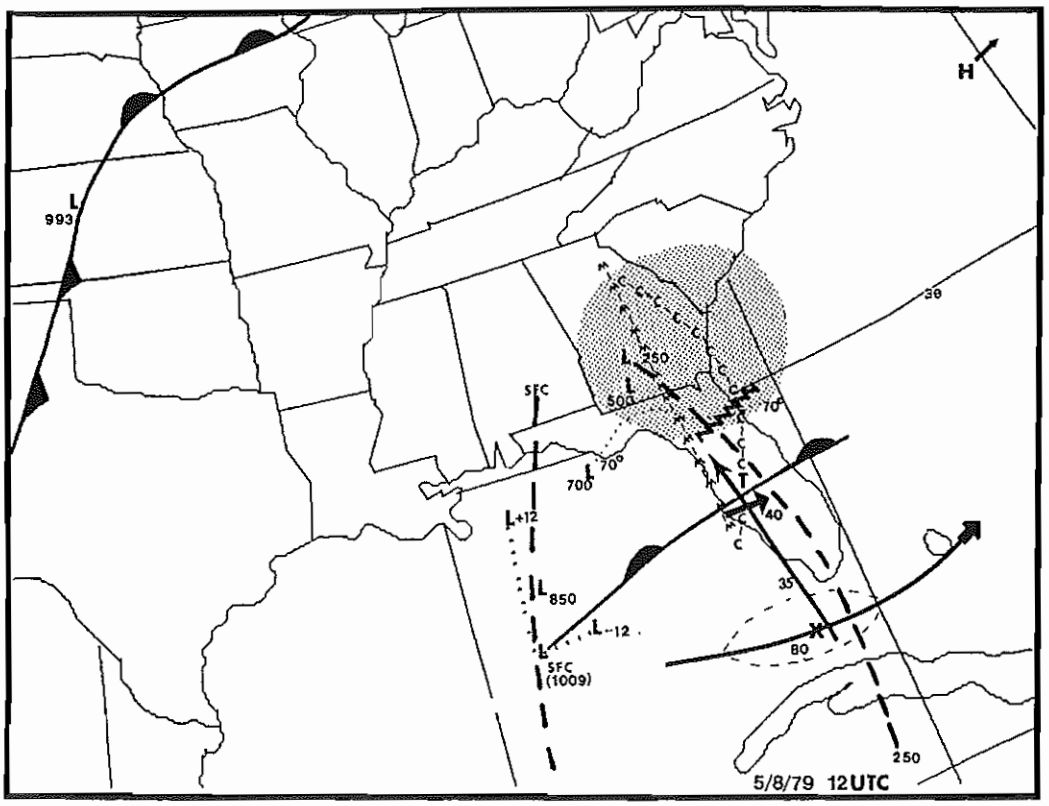

5/8/79
12Z
850MB
DATA CUT OFF


5/8/79 12Z
500MB
DATA CUT OFF

May 8, 1979



(From Hagemeyer and Matney 1993b)



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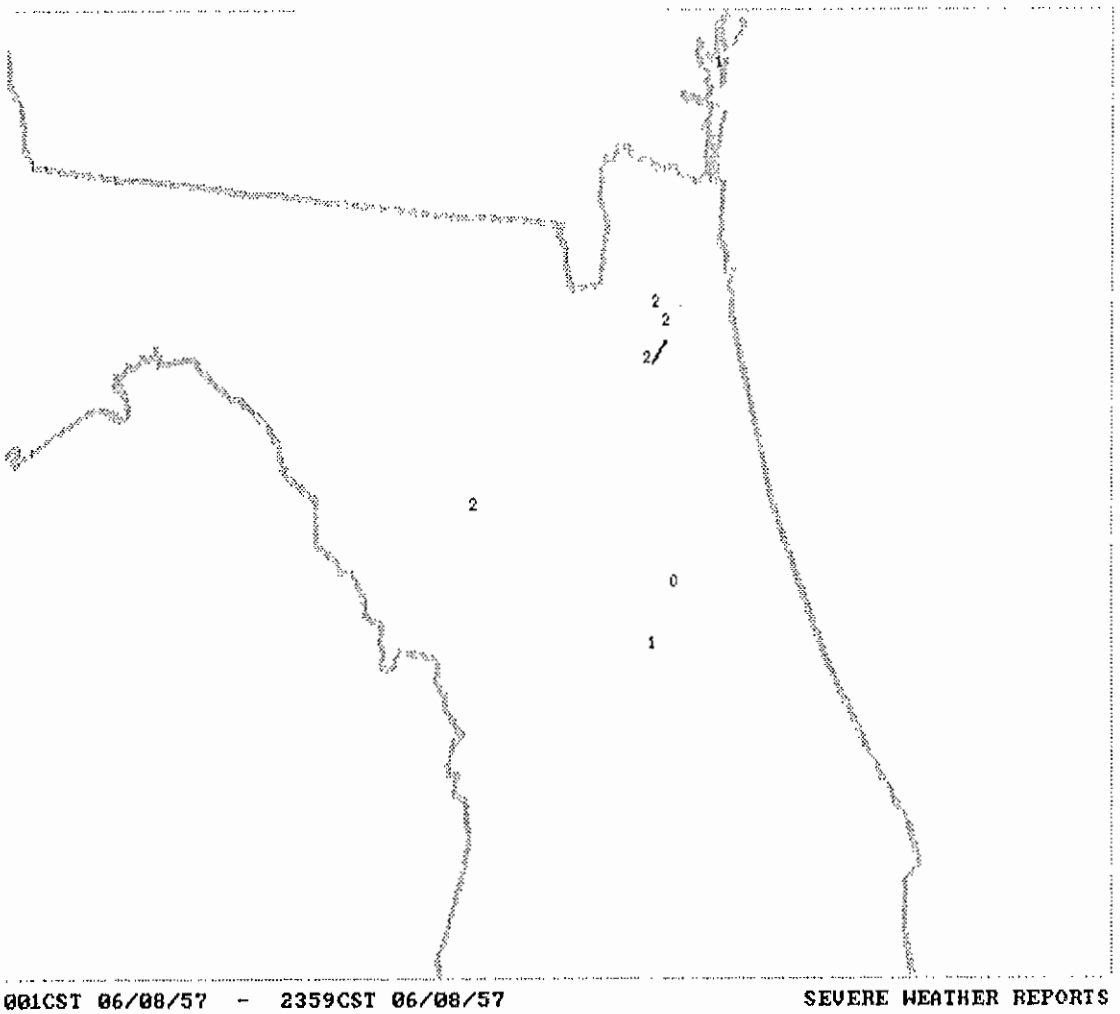
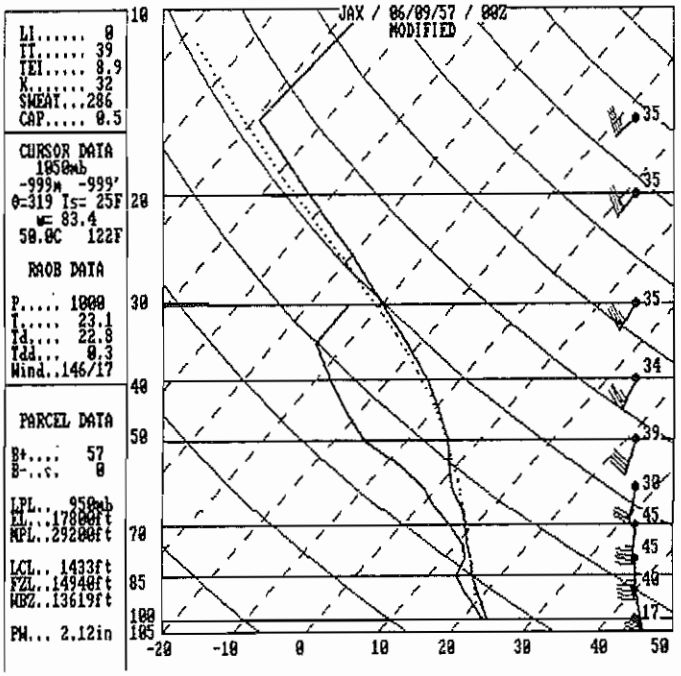
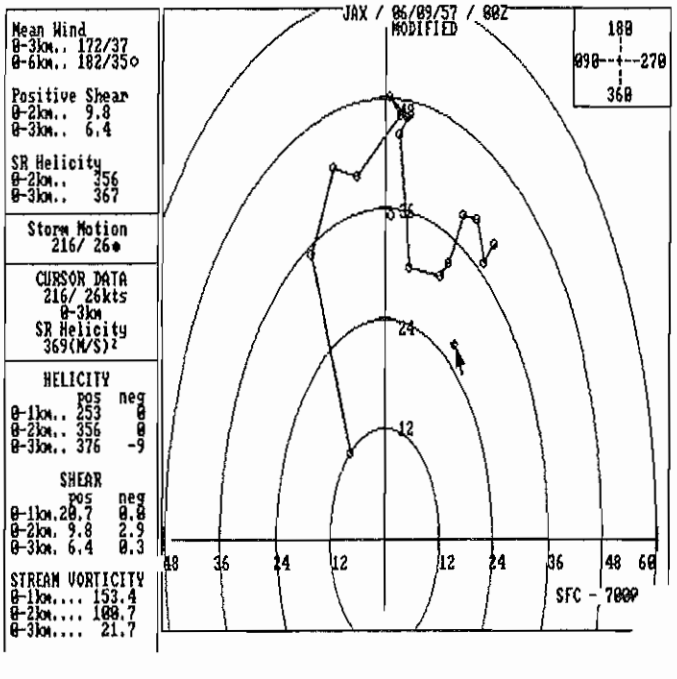

001CST 06/08/57 - 2359CST 06/08/57
SEVERE WEATHER REPORTS


JAX / 06/09/57 / 00Z
MODIFIED
LI..... 0
TT..... 39
TEI..... 8.9
K..... 32
SWEAT...286
CAP..... 0.5
CURSOR DATA
1050mb
-999m -999'
θ=319 Ts= 25F
w= 83.4
50.0C 122F
RAOB DATA
P..... 1000
T..... 23.1
Td.... 22.8
Tdd... 0.3
Wind..146/17
PARCEL DATA
B+.... 57
B-..... 0
LPL.. 950mb
LFC..17800ft
MPL..29200ft
LCL.. 1433ft
FZL..14940ft
MBZ..13619ft
PW... 2.12in


JAX / 06/09/57 / 00Z
MODIFIED
Mean Wind
0-3km.. 172/37
0-6km.. 182/35
Positive Shear
0-2km.. 9.8
0-3km.. 6.4
SR Helicity
0-2km.. 356
0-3km.. 367
Storm Motion
216/ 26
CURSOR DATA
216/ 26kts
0-3km
SR Helicity
369(M/S)²
HELICITY
pos neg
0-1km.. 253 0
0-2km.. 356 0
0-3km.. 376 -9
SHEAR
pos neg
0-1km.20.7 0.0
0-2km. 9.8 0.0
0-3km. 6.4 0.3
STREAM VORTICITY
0-1km.... 153.4
0-2km.... 108.7
0-3km.... 21.7
SFC - 7000

82

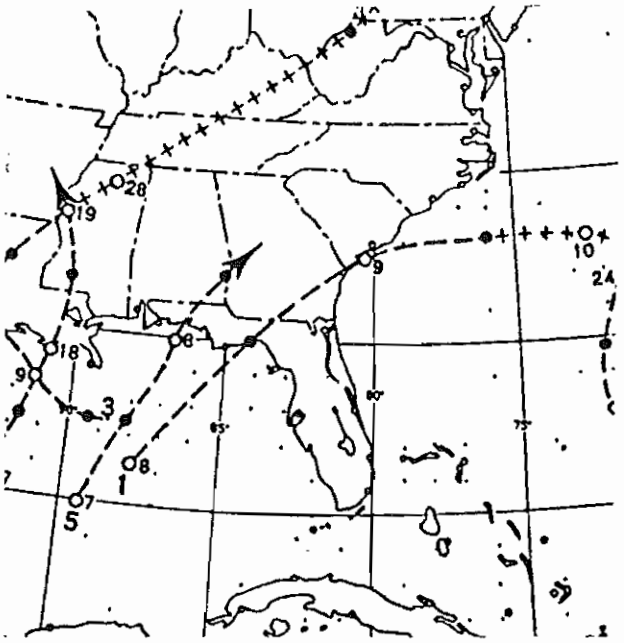
THE HURRICANE SEASON OF 1957

PAUL L. MOORE AND STAFF
Weather Bureau Office, Miami, Fla.

Tropical Storm (unnamed), June 8–14.—Pressures were abnormally low over the southwestern Gulf of Mexico and Yucatan area on June 7 but lack of upper-air wind observations from Mexico made the amount of circulation uncertain. However, late on the 7th and early on the 8th it became evident that a tropical depression existed. It moved rather rapidly northeastward with some deepening but little organization and crossed the Florida coastline in Apalachee Bay during the early evening. Two ships, one about 150 to 200 miles southeast of the center and later another 100 to 150 miles west of the center, reported winds of 45 knots. However, over coastal areas all strong winds were on the east side of the storm. Exposed places along the coast from Sarasota to north of Cedar Keys, Fla., experienced winds of 40 m. p. h. or more and tides 2 to 3 feet above normal with some damage. The storm weakened as it moved inland but set off an active frontal wave after moving off the Georgia coast on the 9th. Late on the 9th when the storm became extratropical off the Atlantic coast, ship reports indicated winds up to 65 knots.

Exceptionally heavy rain attended passage of this storm, particularly in Suwannee and all adjacent counties; 48-hour amounts of nearly 15 inches at official stations and some unofficial amounts as high as 19 inches. There was considerable damage to field and truck crops, particularly to tobacco and watermelons. Between 100 and 200 families were evacuated near Perry, Fla. According to the Meteorologist in Charge at Jacksonville, at least nine tornadoes or damaging wind storms were reported in northeastern Florida on the afternoon and evening of the 8th and another tornado over Jekyll Island in southeastern Georgia. No deaths were reported from these tornadoes and the damage and injuries were small.

One small craft capsized in the Gulf of Mexico and five of the seven persons aboard were apparently drowned. Damage in northwestern Florida from sea and rainfall flooding from the mouth of the Suwannee River to Port St. Joe was estimated at $30,000 and damage from tidal action along the Florida west coast was about $10,000. Tornado damage is estimated at $12,000. Therefore, total damage from this tropical storm was around $52,000 and there were five deaths.

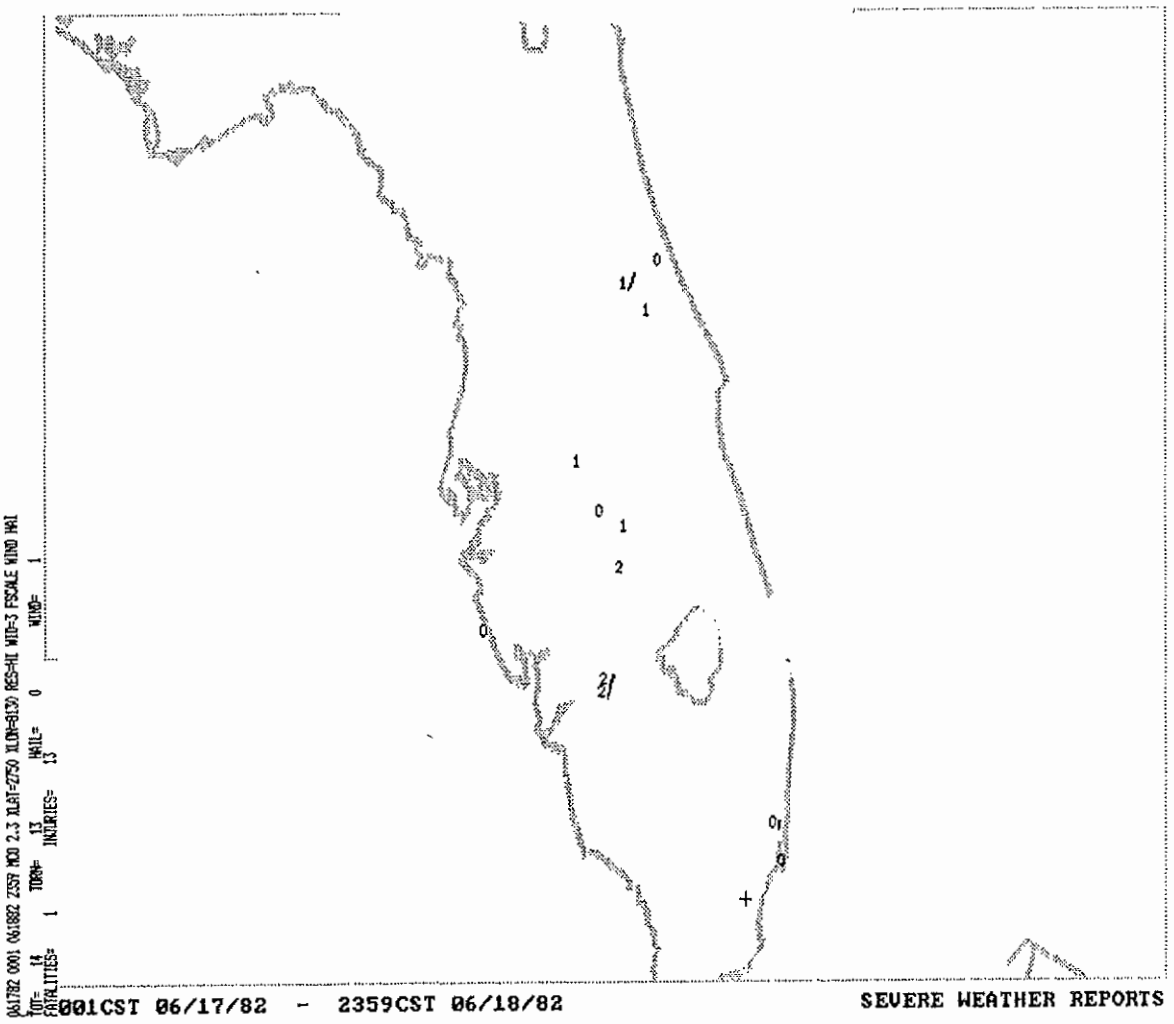


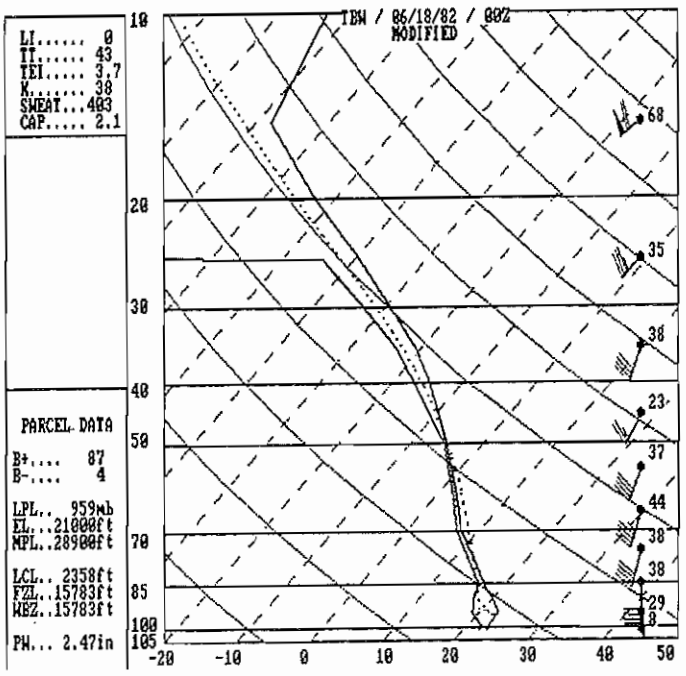
NORTH ATLANTIC TROPICAL STORMS
1957

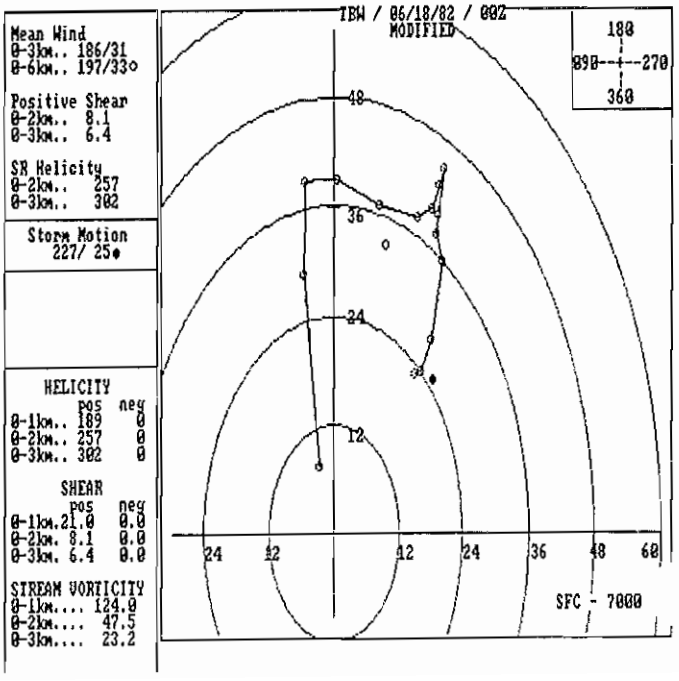
NUMBER	NAME	DATE
1 (T)	UNNAMED	June 8-14
2 (H)	AUDREY	June 25-26
3 (T)	BERTHA	Aug. 8-11
4 (H)	CARRIE	Sept. 2-24
5 (T)	DEBBIE	Sept. 7-8
6 (T)	ESTHER	Sept. 16-19
7 (H)	FRIEDA	Sept. 20-27
8 (T)	UNNAMED	Oct. 22-27

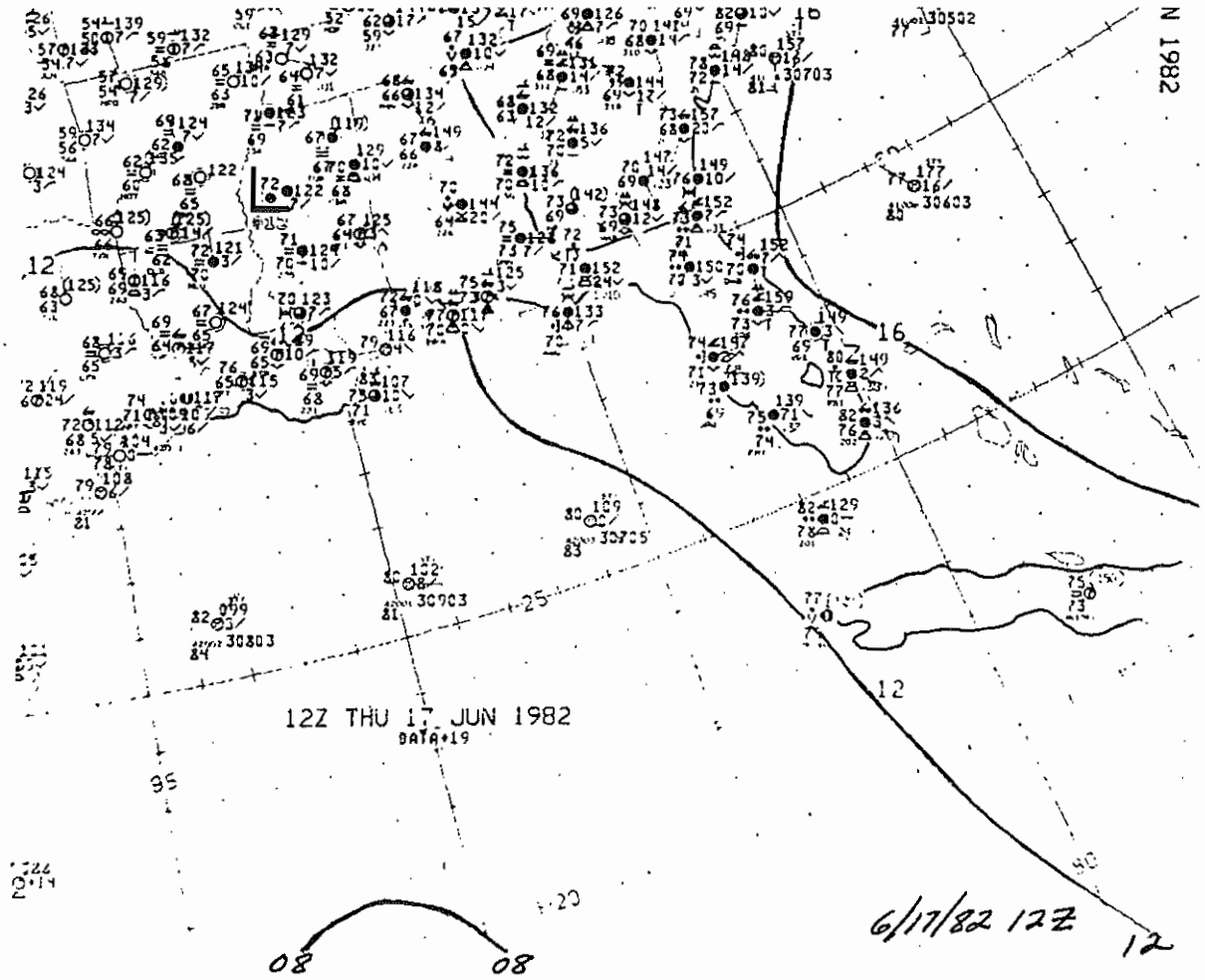
(T) TROPICAL STORM: Did not reach hurricane intensity.
(H) HURRICANE: Reached hurricane force at some point along its path.
..... Development Stage
— — — — — Tropical Storm Stage
———— Hurricane Stage
*+++++++++ Frontal Stage
O Position at 7:00 a.m., E.S.T. of date shown
● Position at 7:00 p.m., E.S.T.

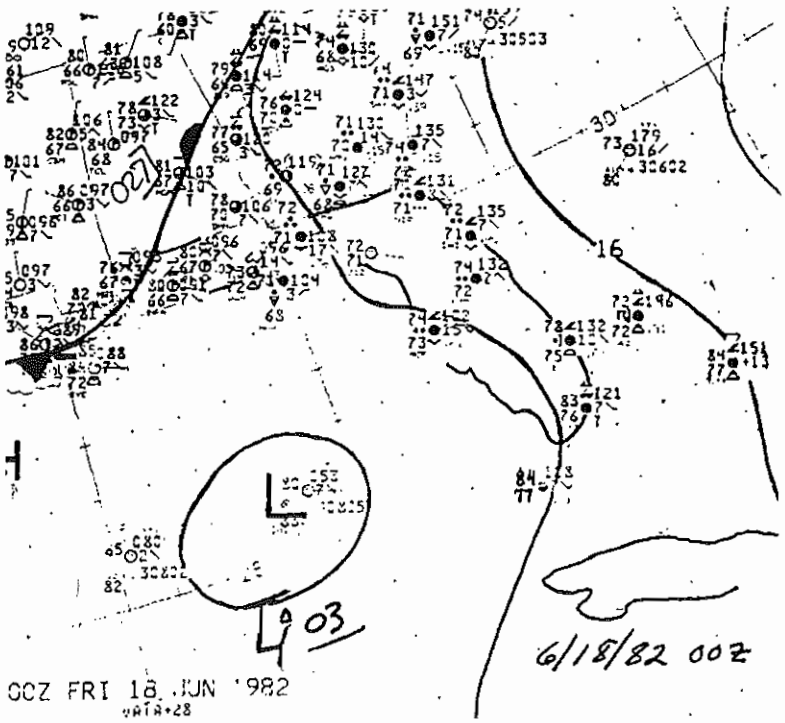
June 17-18, 1982








12Z THU 17 JUN 1982
DATA+19
6/17/82 12Z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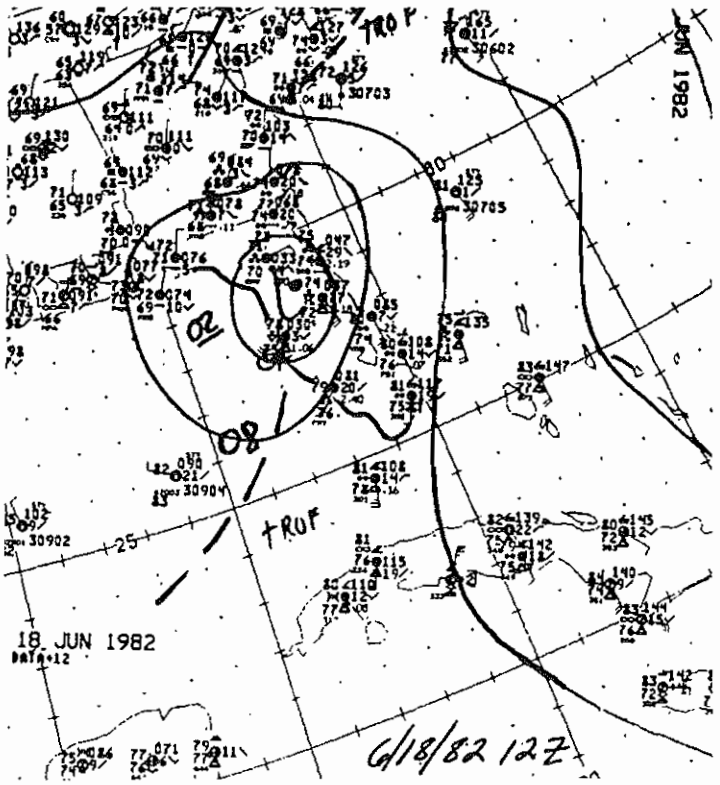
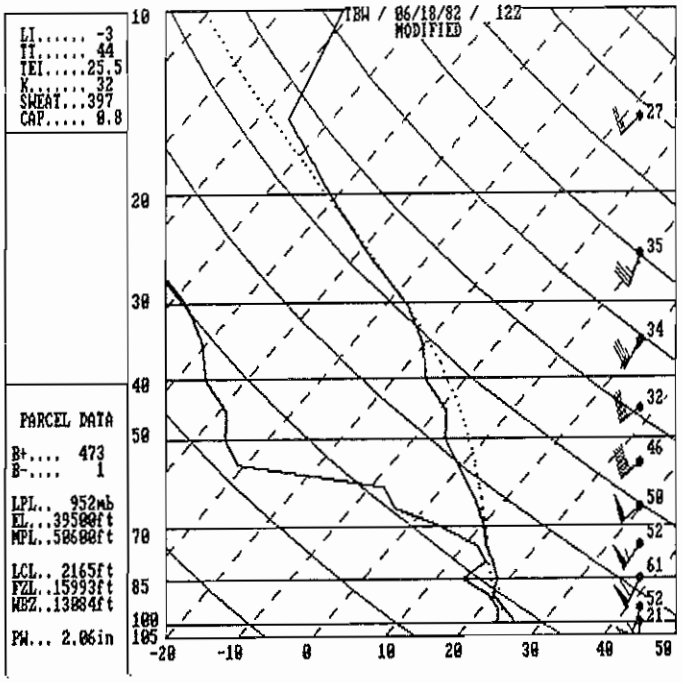
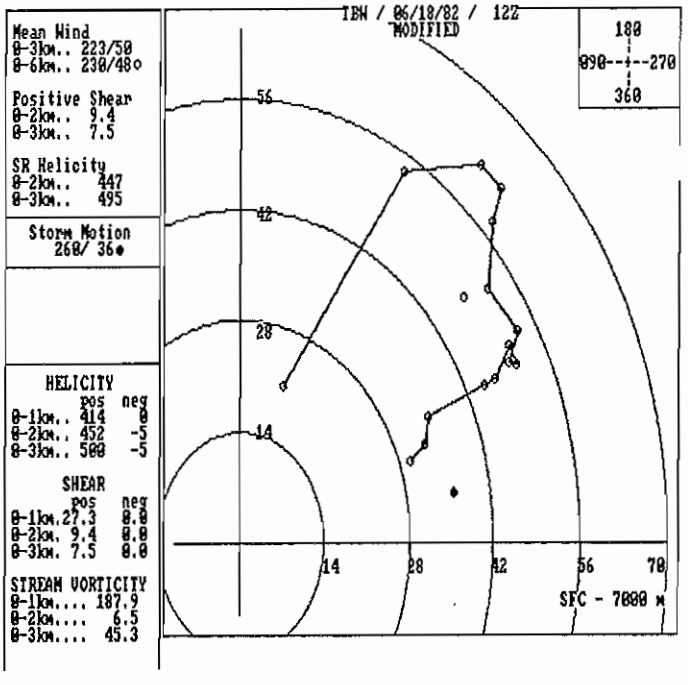
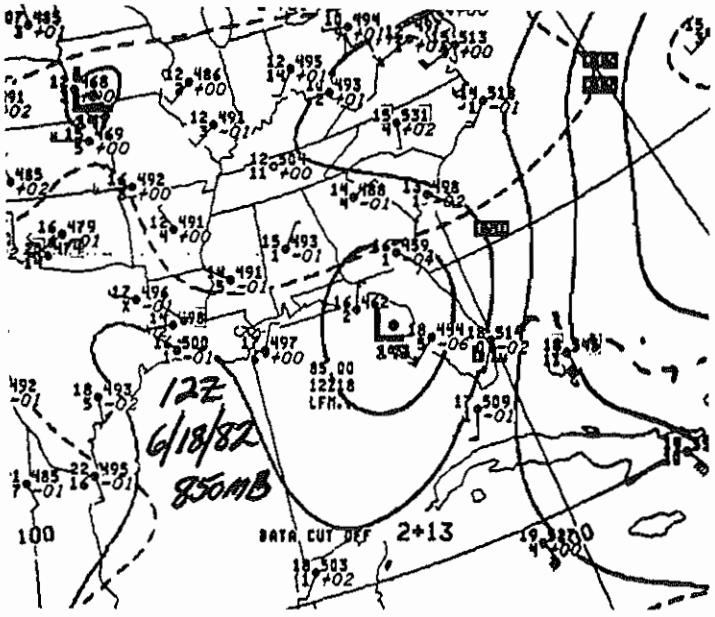
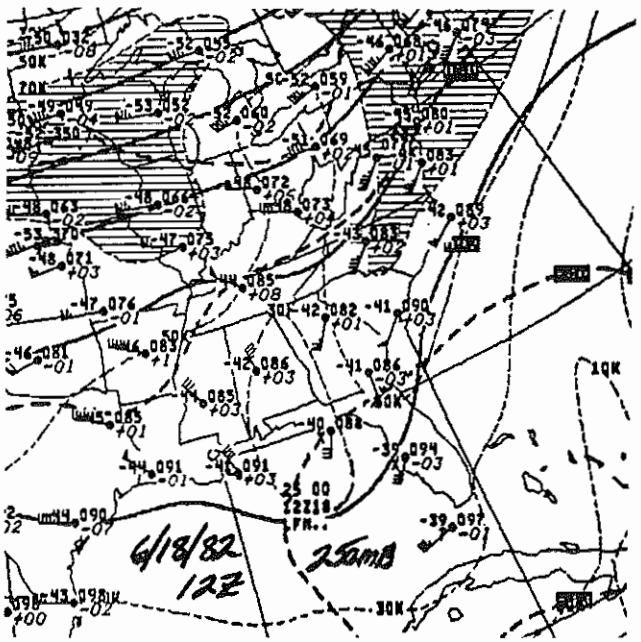
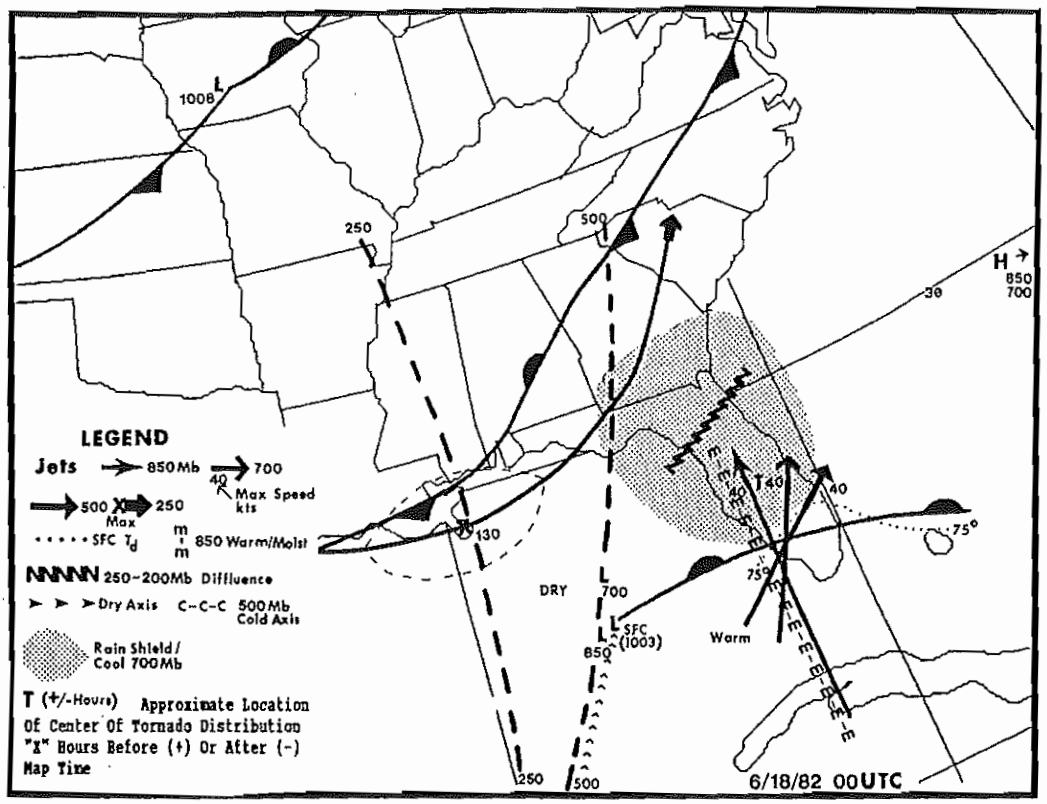

TROF
18 JUN 1982
DATA+12
6/18/82 12Z


LI..... -3
TT..... 44
TEI.....25.5
K..... 32
SWEAT...397
CAP..... 0.8
PARCEL DATA
B+.... 473
B-.... 1
LPL.. 952mb
EL...39500ft
MPL..50600ft
LCL.. 2165ft
FZL..15993ft
WBZ..13884ft
PW... 2.06in
IBW / 06/18/82 / 12Z
MODIFIED

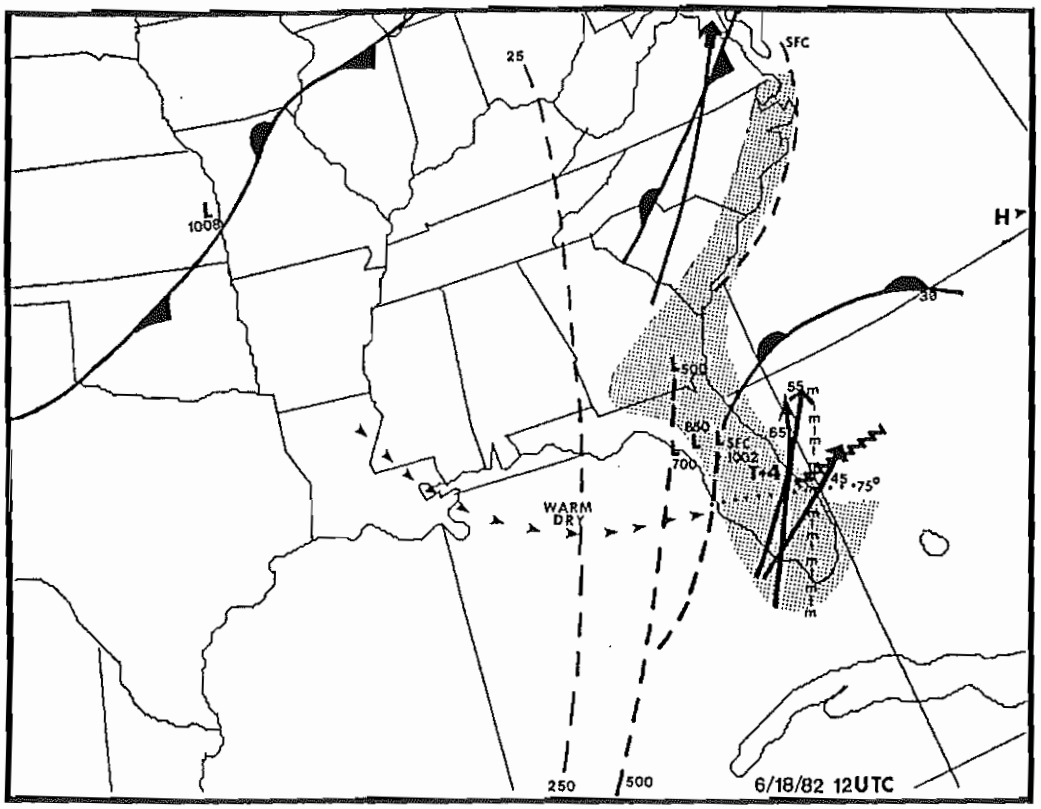

Mean Wind
0-3km.. 223/50
0-6km.. 230/48
Positive Shear
0-2km.. 9.4
0-3km.. 7.5
SR Helicity
0-2km.. 447
0-3km.. 495
Storm Motion
260/ 36
HELICITY
pos neg
0-1km.. 414 0
0-2km.. 452 -5
0-3km.. 500 -5
SHEAR
pos neg
0-1km. 27.3 0.0
0-2km. 9.4 0.0
0-3km. 7.5 0.0
STREAM VORTICITY
0-1km.... 187.9
0-2km.... 6.5
0-3km.... 45.3
IBW / 06/18/82 / 12Z
MODIFIED
SFC - 7000 M

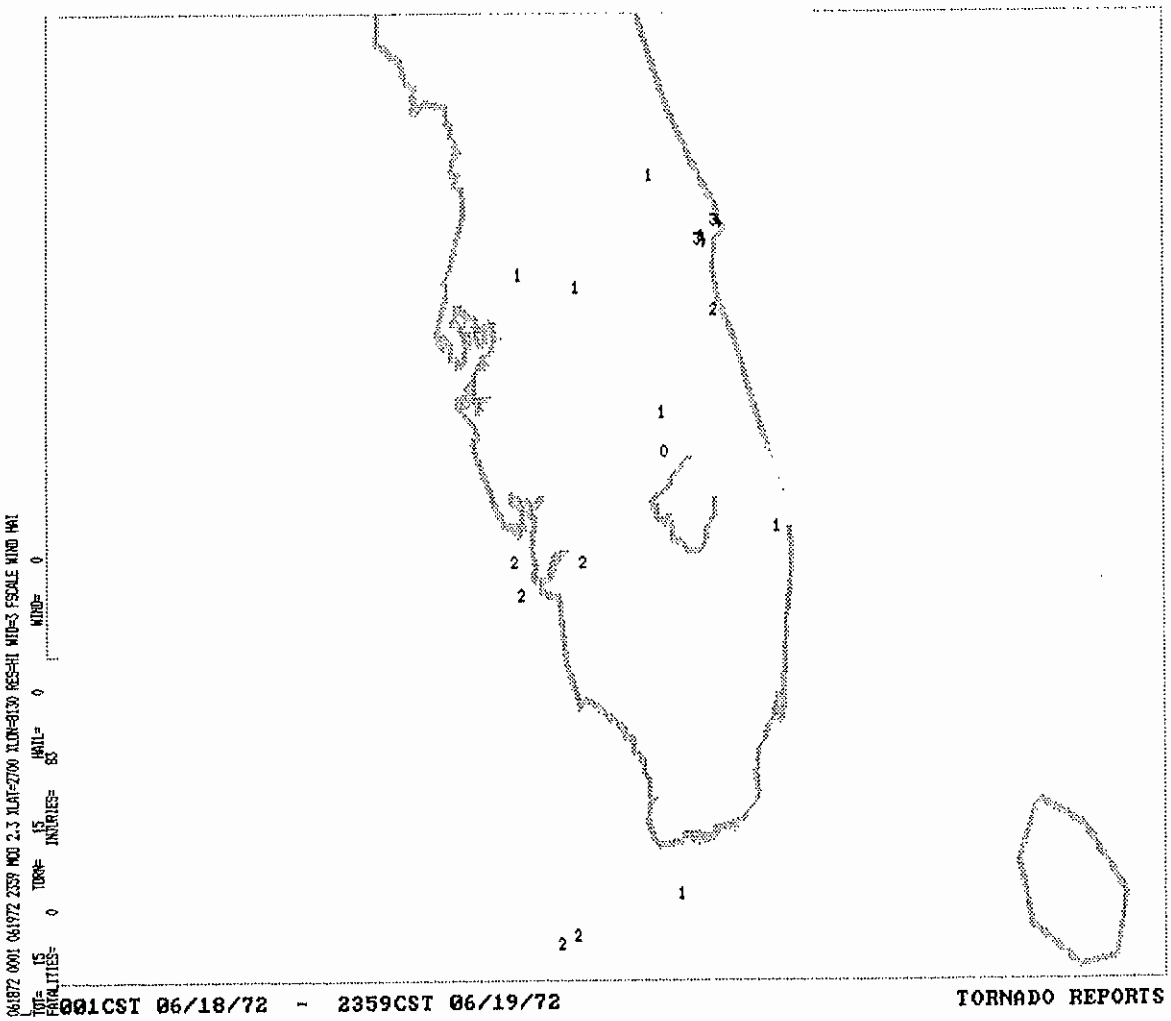

12Z
6/18/82
850MB
DATA CUT OFF
2+13


6/18/82
12Z
250MB



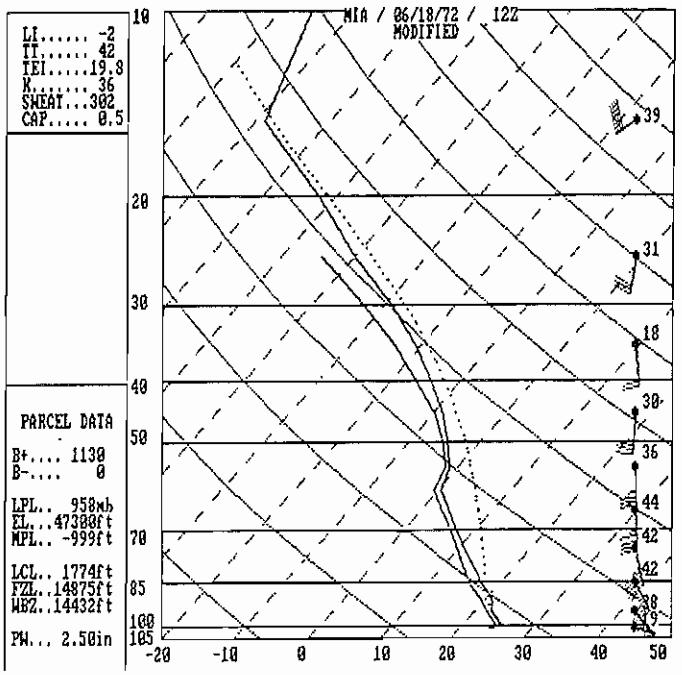
(From Hagemeyer and Matney 1993b)

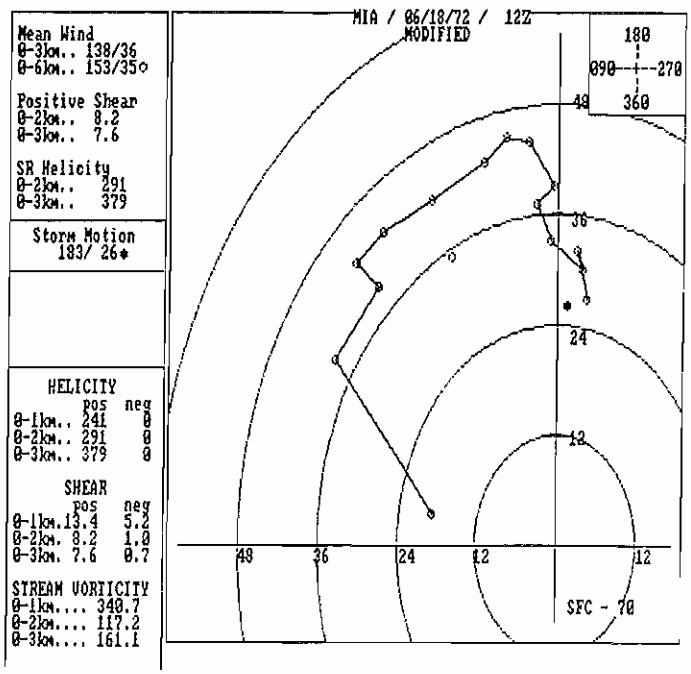


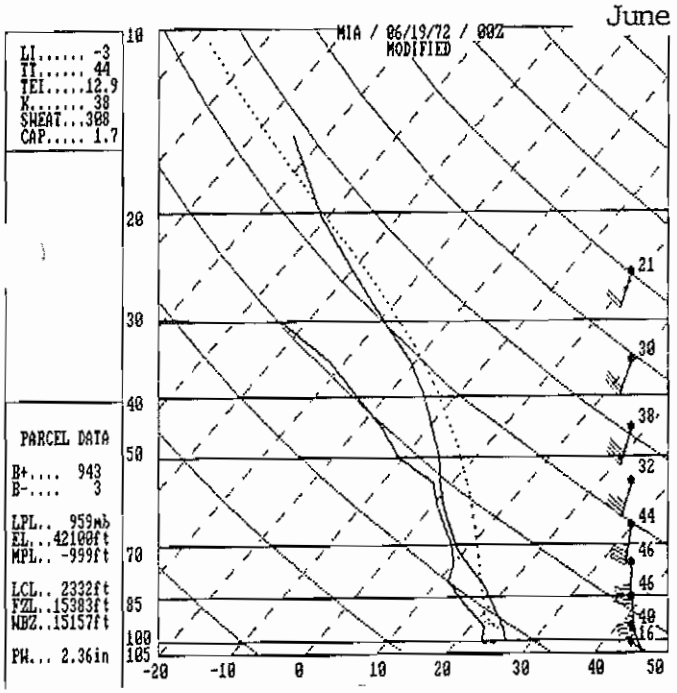


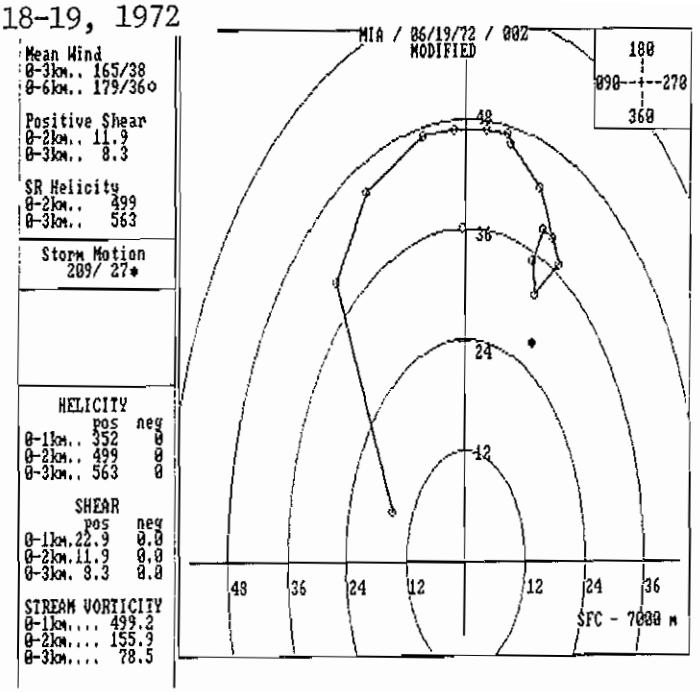
0001CST 06/18/72 - 2359CST 06/19/72

(See McCaul 1991 for additional information on buoyancy and shear characteristics of hurricane-tornado environments and many good references on the topic of hurricane-spawned tornadoes)

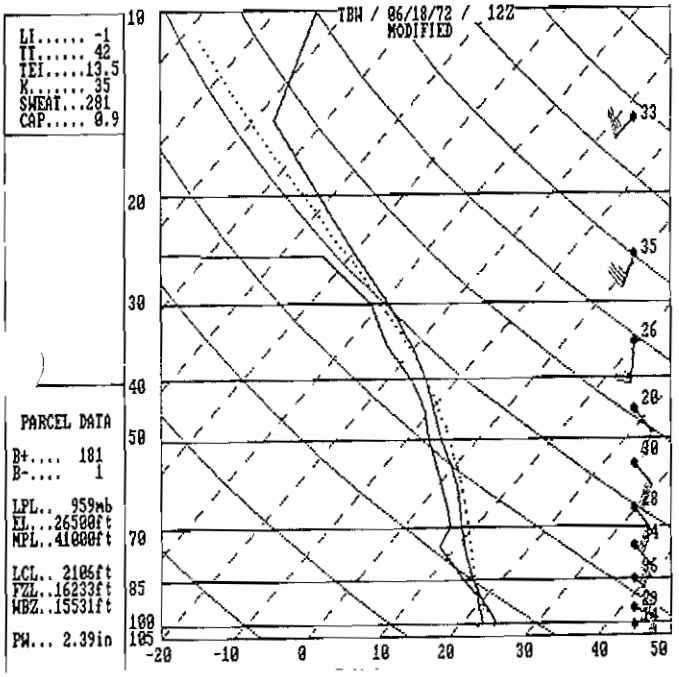


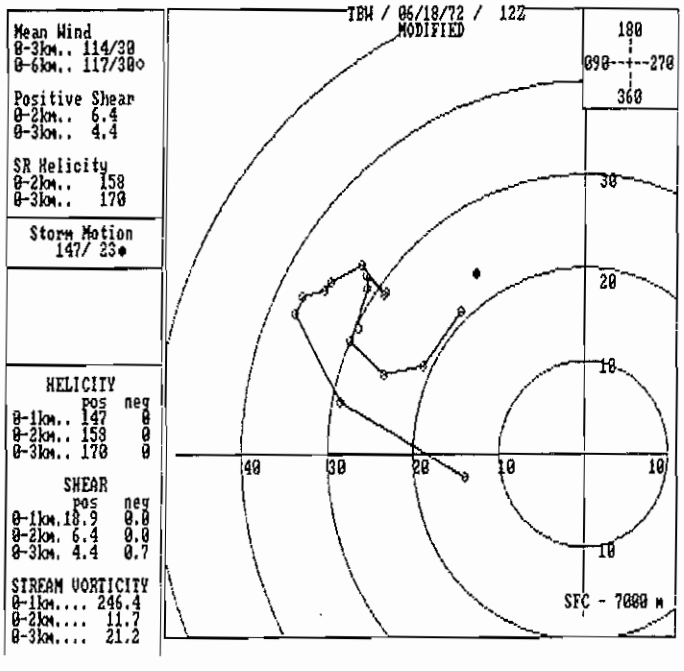



MIA / 06/19/72 / 00Z
MODIFIED
LI..... -3
TT..... 44
TEI.....12.9
K..... 38
SWEAT...308
CAP..... 1.7
PARCEL DATA
B+.... 943
B-.... 3
LPL.. 959mb
EL...42100ft
MPL.. -999ft
LCL.. 2332ft
FZL..15383ft
WBZ..15157ft
PW... 2.36in
-20 -10 0 10 20 30 40 50

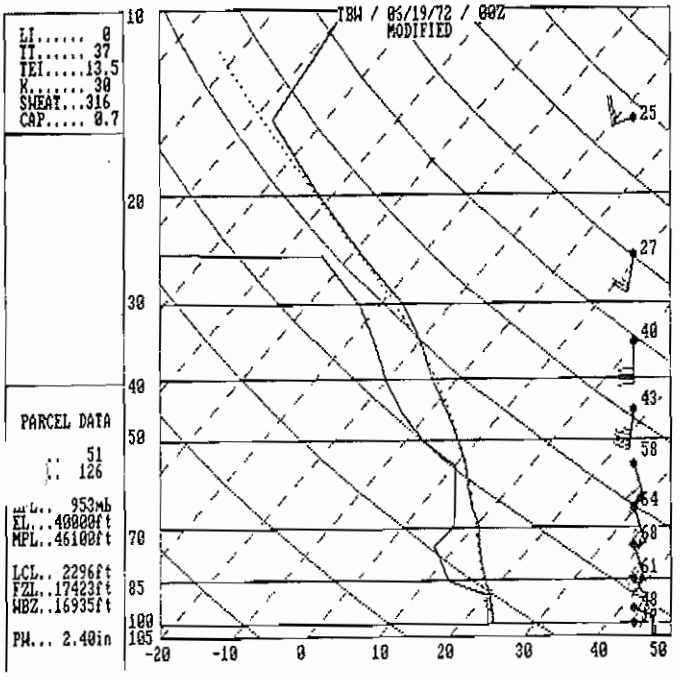

Mean Wind
0-3km.. 165/38
0-6km.. 179/36
Positive Shear
0-2km.. 11.9
0-3km.. 8.3
SR Helicity
0-2km.. 499
0-3km.. 563
Storm Motion
209/ 27
HELICITY
pos neg
0-1km.. 352 0
0-2km.. 499 0
0-3km.. 563 0
SHEAR
pos neg
0-1km.22.9 0.0
0-2km.11.9 0.0
0-3km. 8.3 0.0
STREAM VORTICITY
0-1km.... 499.2
0-2km.... 155.9
0-3km.... 78.5

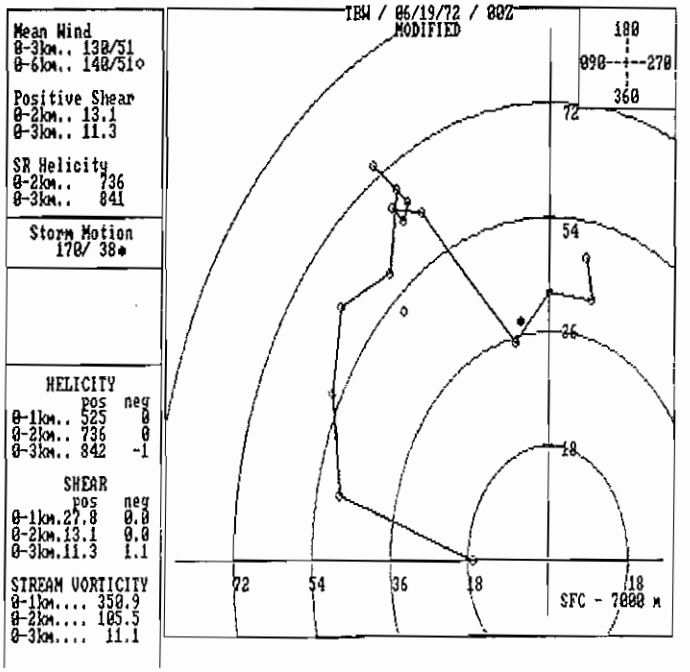
MIA / 06/19/72 / 00Z
MODIFIED
180
090
270
360
48
36
24
12
SFC - 7000 M


TBW / 06/18/72 / 12Z
MODIFIED
LI..... -1
TT..... 42
TEI.....13.5
K..... 35
SWEAT...281
CAP..... 0.9
PARCEL DATA
B+.... 181
B-.... 1
LPL.. 959mb
EL...26500ft
MPL..41000ft
LCL.. 2105ft
FZL..16233ft
WBZ..15531ft
PW... 2.39in
-20 -10 0 10 20 30 40 50


Mean Wind
0-3km.. 114/30
0-6km.. 117/30
Positive Shear
0-2km.. 6.4
0-3km.. 4.4
SR Helicity
0-2km.. 158
0-3km.. 170
Storm Motion
147/ 23
HELICITY
pos neg
0-1km.. 147 0
0-2km.. 158 0
0-3km.. 170 0
SHEAR
pos neg
0-1km.18.9 0.0
0-2km. 6.4 0.0
0-3km. 4.4 0.7
STREAM VORTICITY
0-1km.... 246.4
0-2km.... 11.7
0-3km.... 21.2

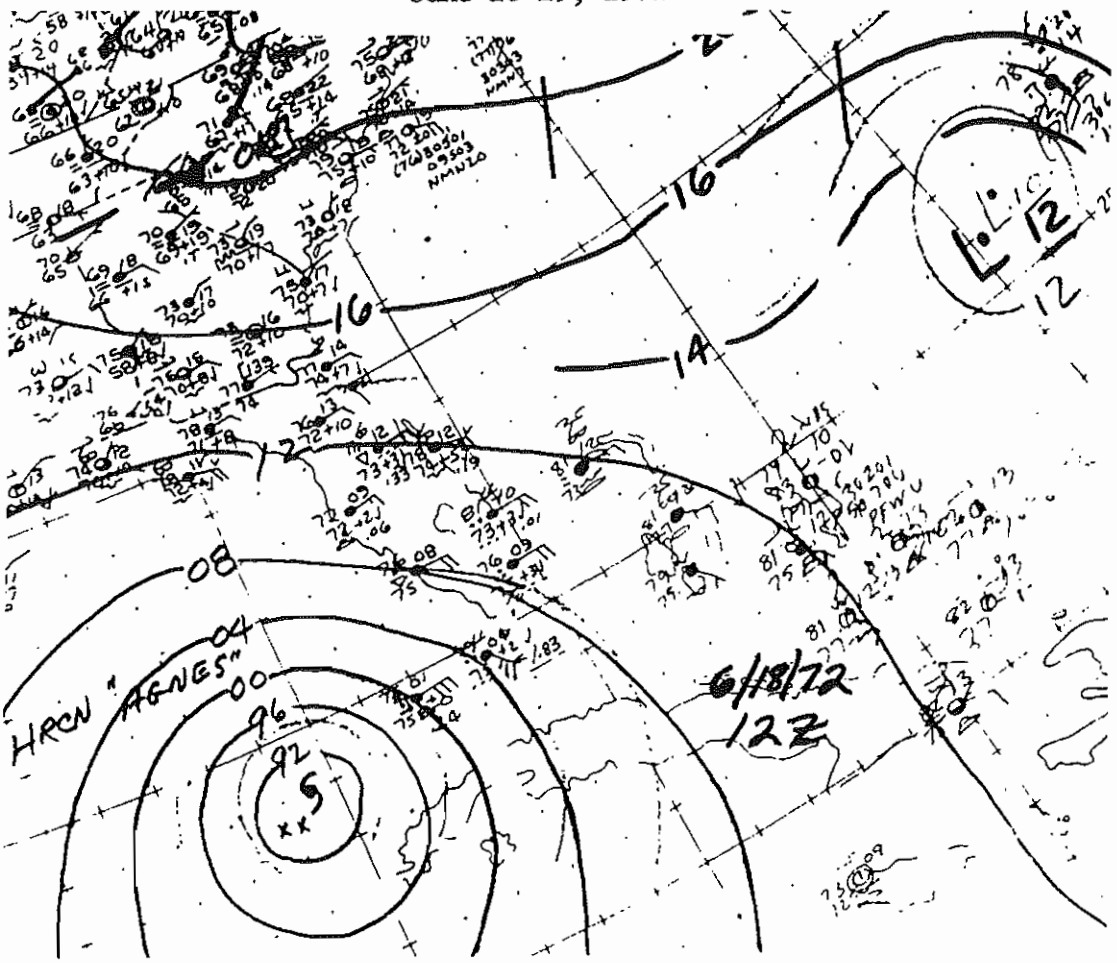
TBW / 06/18/72 / 12Z
MODIFIED
180
090
270
360
30
20
10
40
30
20
10
10
10
SFC - 7000 M

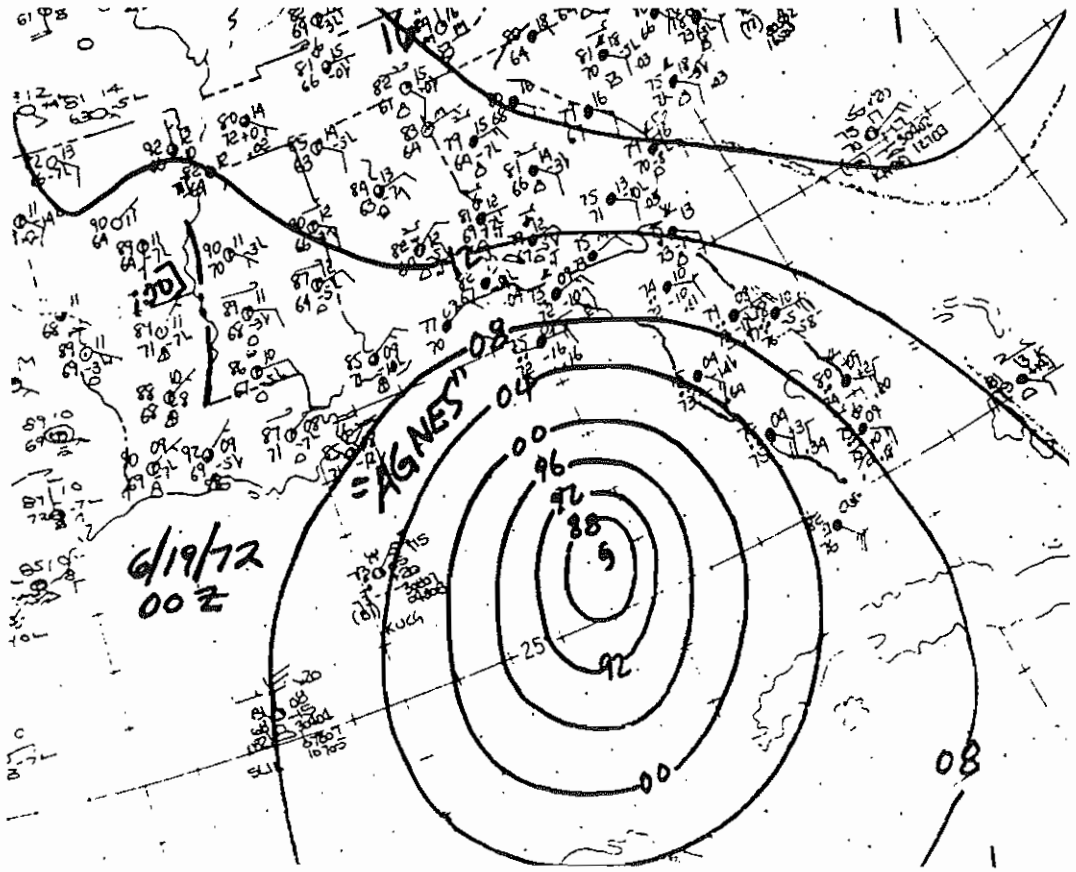

TBW / 06/19/72 / 00Z
MODIFIED
LI..... 0
TT..... 37
TEI.....13.5
K..... 30
SWEAT...316
CAP..... 0.7
PARCEL DATA
51
126
953mb
EL...40000ft
MPL..46100ft
LCL.. 2296ft
FZL..17423ft
WBZ..16935ft
PW... 2.40in
-20 -10 0 10 20 30 40 50

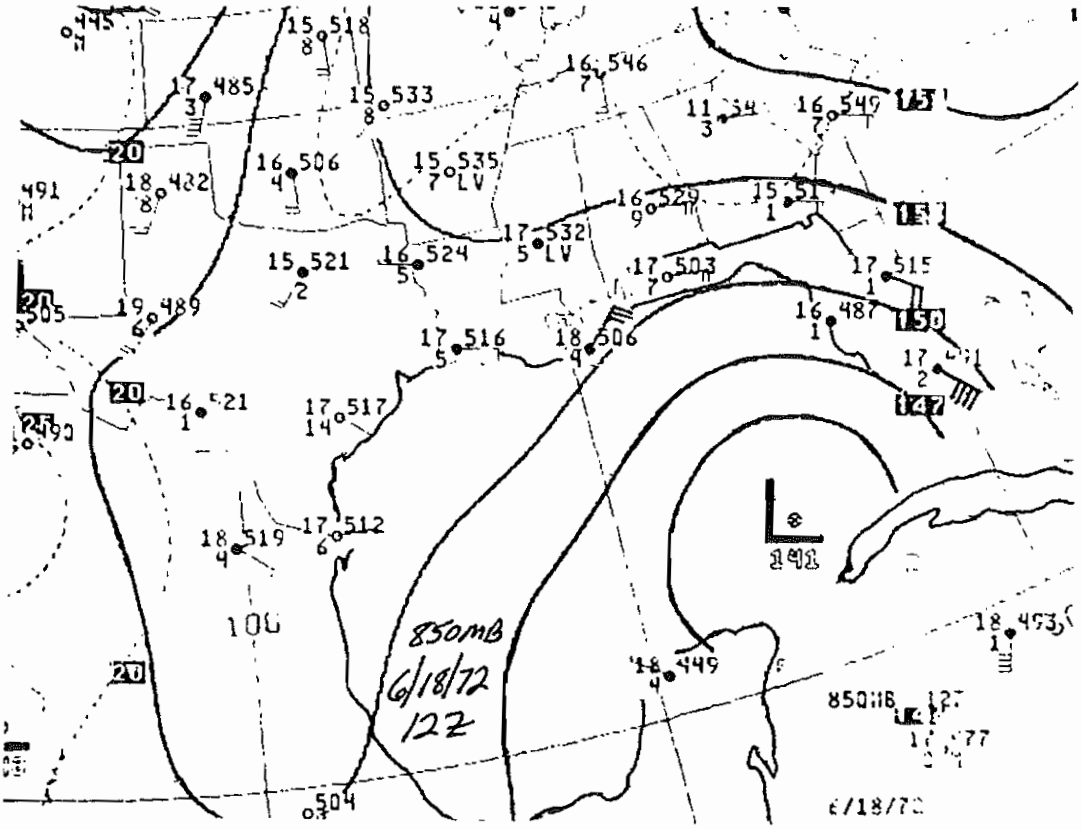

Mean Wind
0-3km.. 130/51
0-6km.. 140/51
Positive Shear
0-2km.. 13.1
0-3km.. 11.3
SR Helicity
0-2km.. 736
0-3km.. 841
Storm Motion
170/ 38
HELICITY
pos neg
0-1km.. 525 0
0-2km.. 736 0
0-3km.. 842 -1
SHEAR
pos neg
0-1km.27.8 0.0
0-2km.13.1 0.0
0-3km.11.3 1.1
STREAM VORTICITY
0-1km.... 350.9
0-2km.... 105.5
0-3km.... 11.1

TBW / 06/19/72 / 00Z
MODIFIED
180
090
270
360
72
54
36
18
72
54
36
18
18
SFC - 7000 M

June 18-19, 1972



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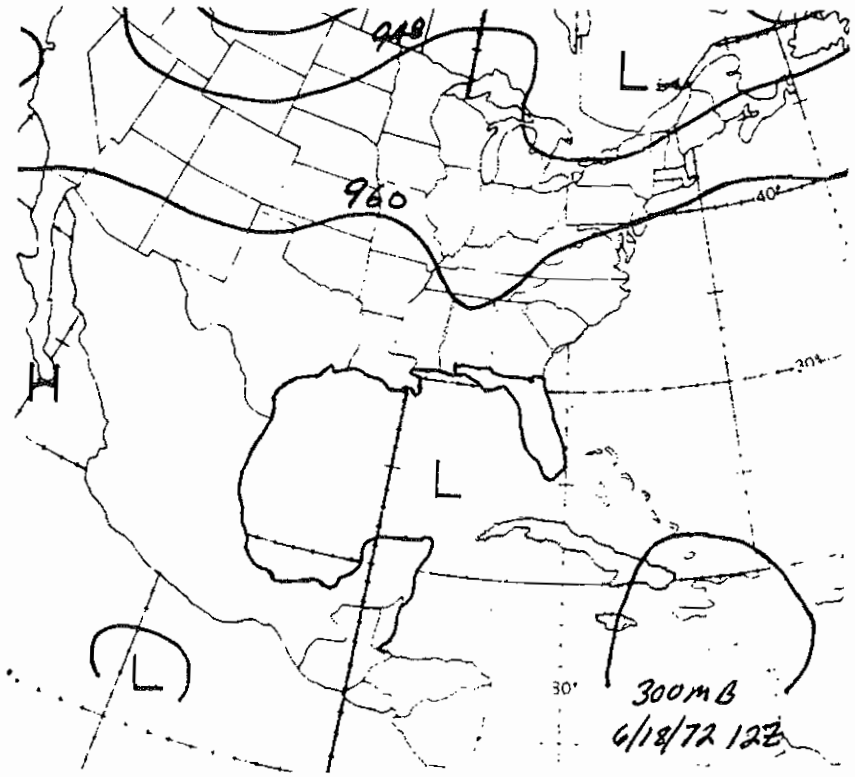
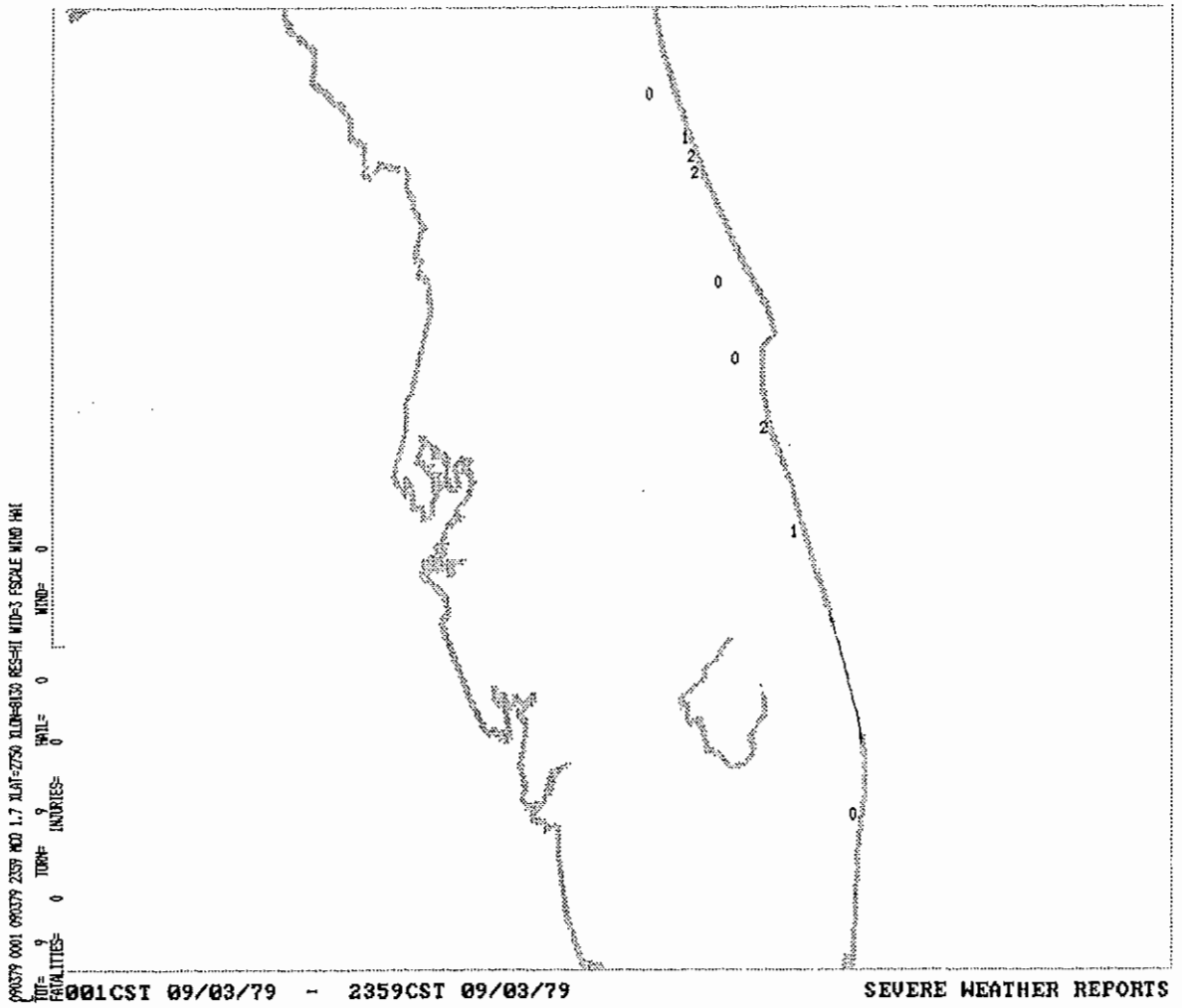
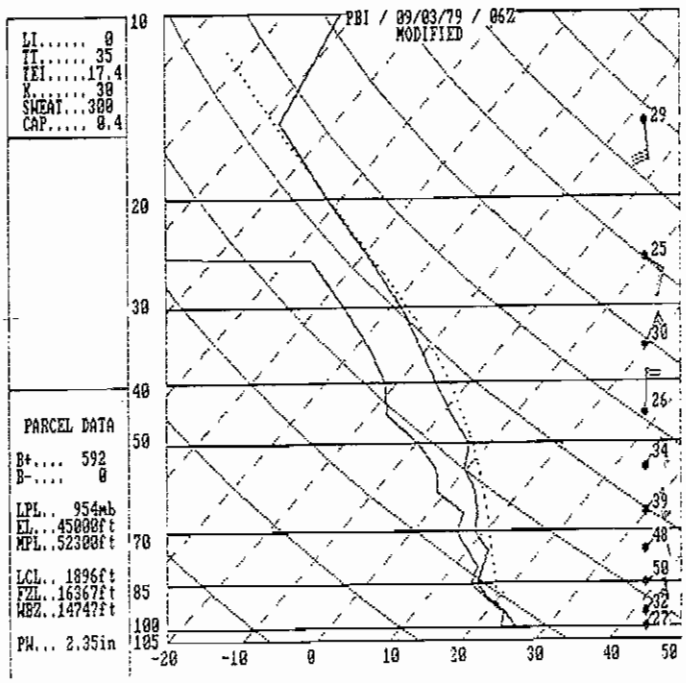
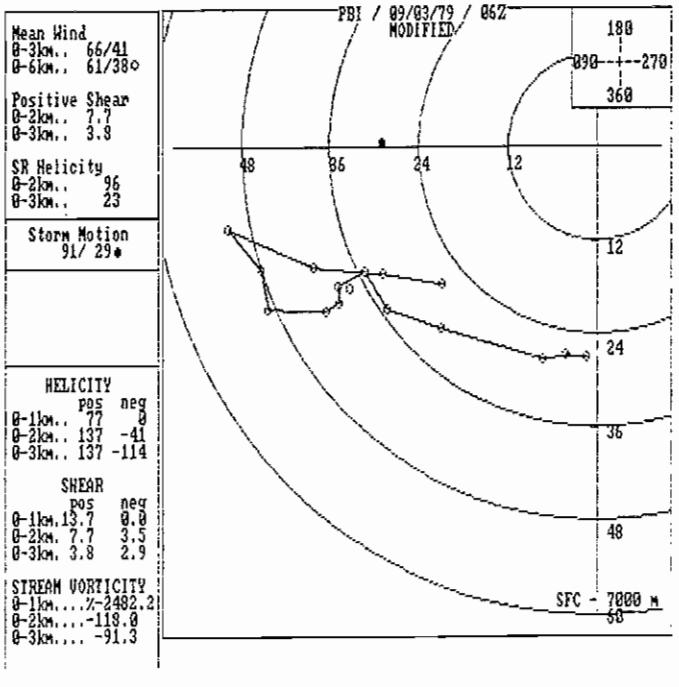
6/18/72
12Z

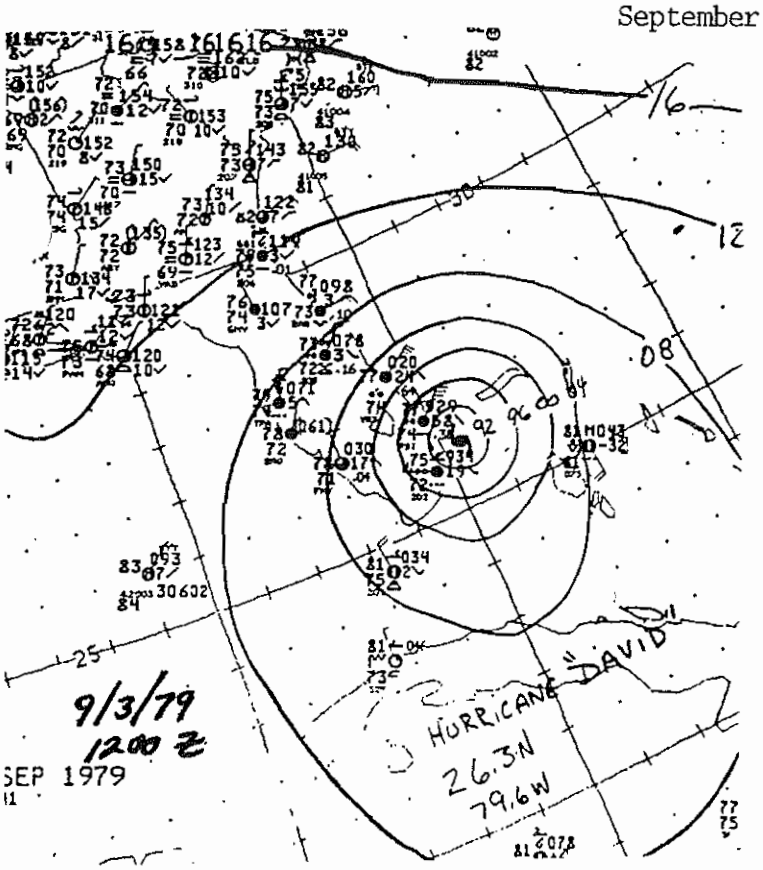

960
300MB
6/18/72 12Z

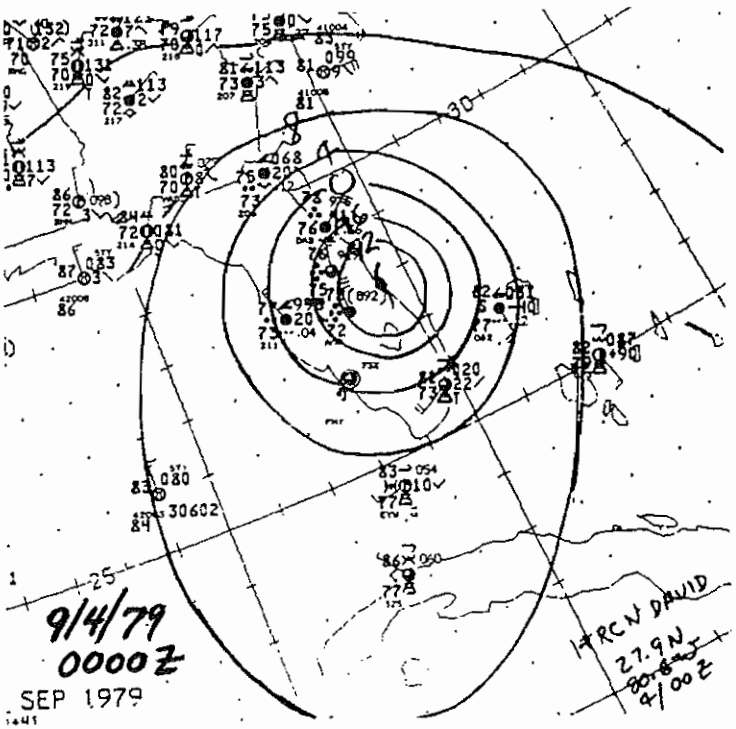


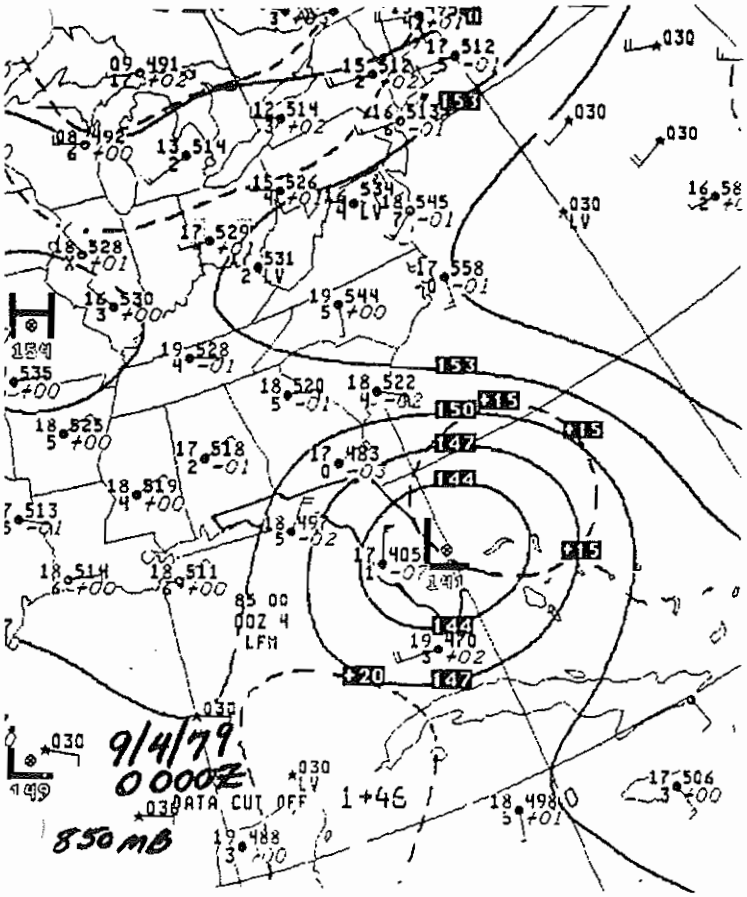
(See McCaul 1991 for additional information on buoyancy and shear characteristics of hurricane-tornado environments and many good references on the topic of hurricane-spawned tornadoes)

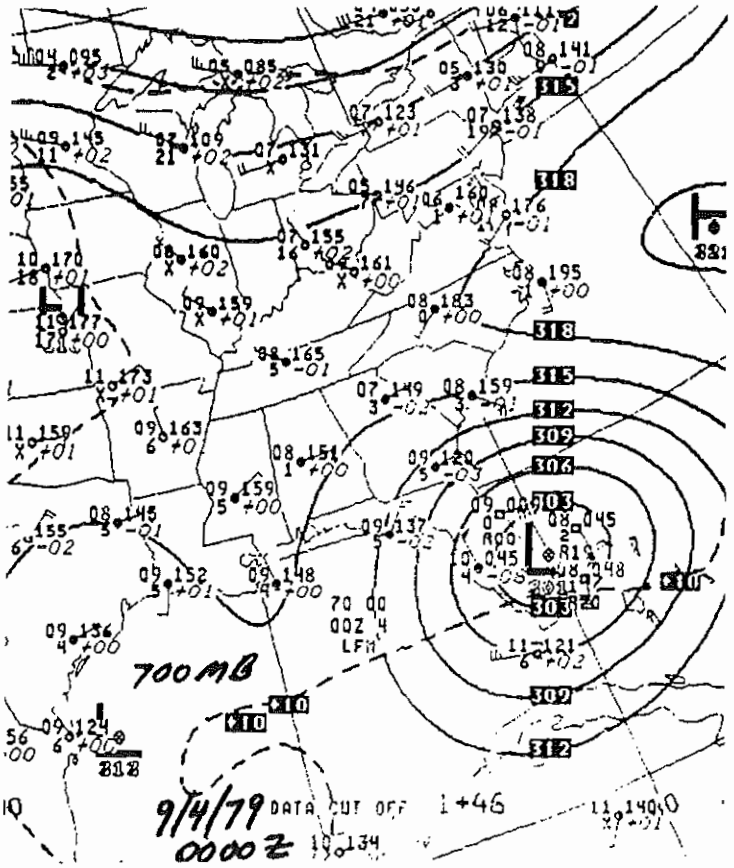





9/3/79
1200 Z
SEP 1979
HURRICANE "DAVID"
26.3N
79.6W


9/4/79
0000Z
SEP 1979
HRCN DAVID
27.9N


9/4/79
0000Z
850 MB
DATA CUT OFF
1+46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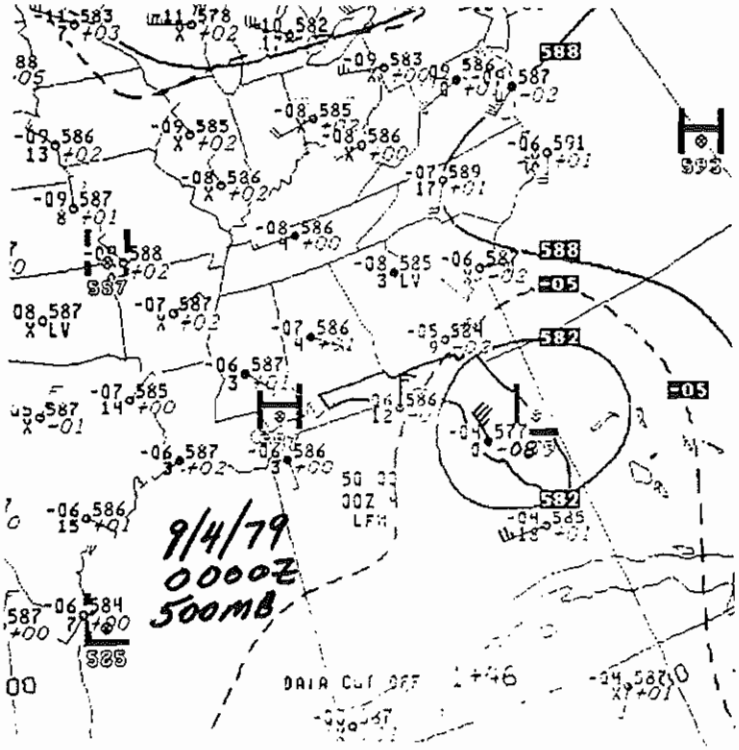
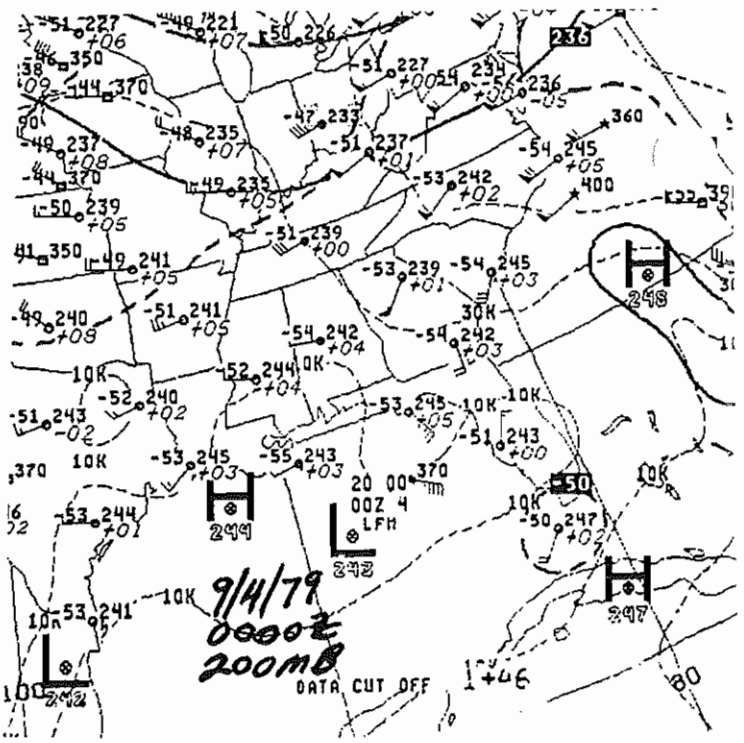
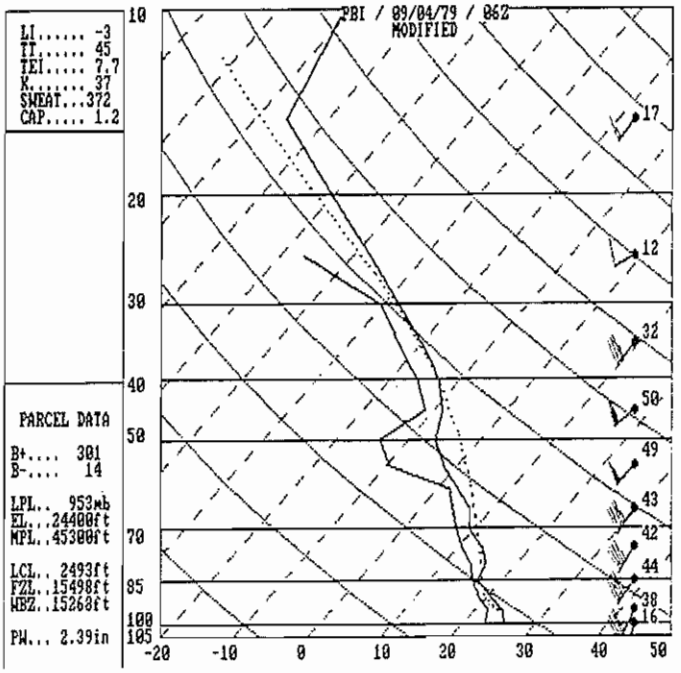
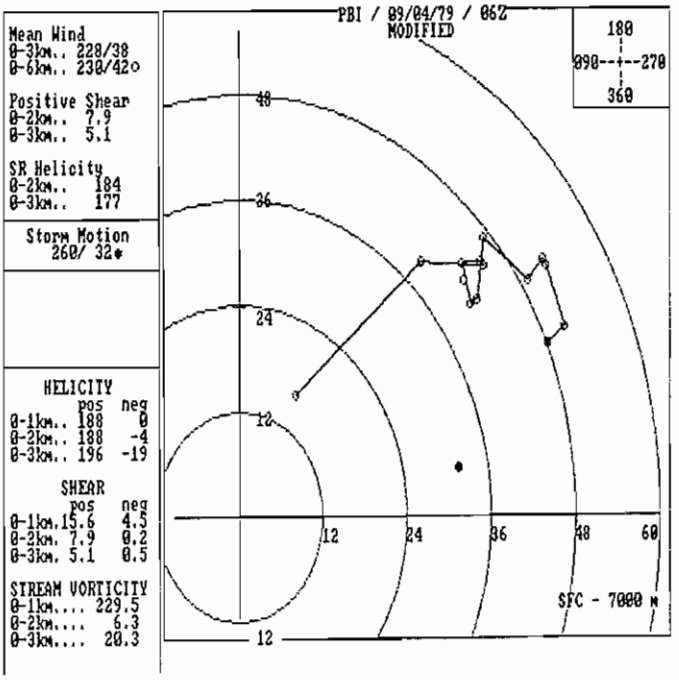
9/4/79
0000Z
DATA CUT OFF
1+46

September 3, 1979









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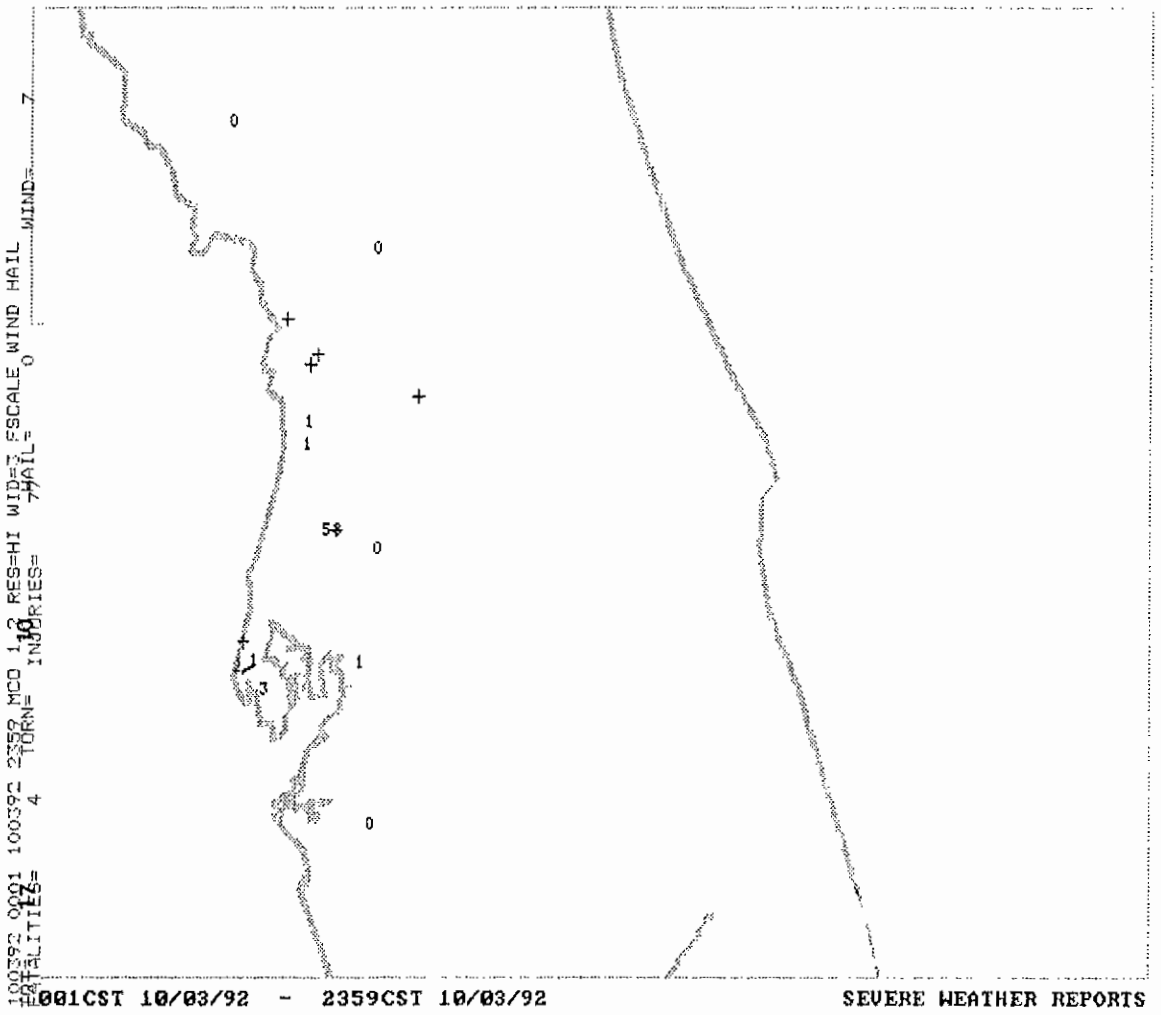
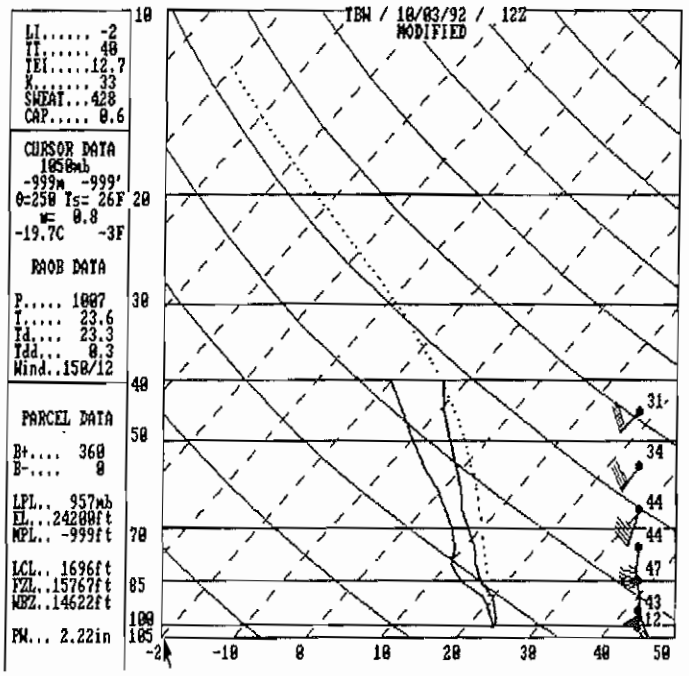
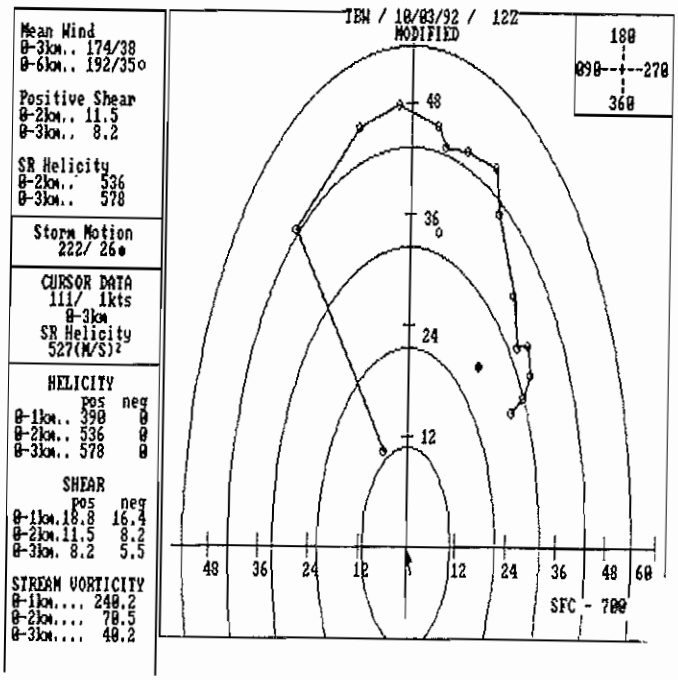
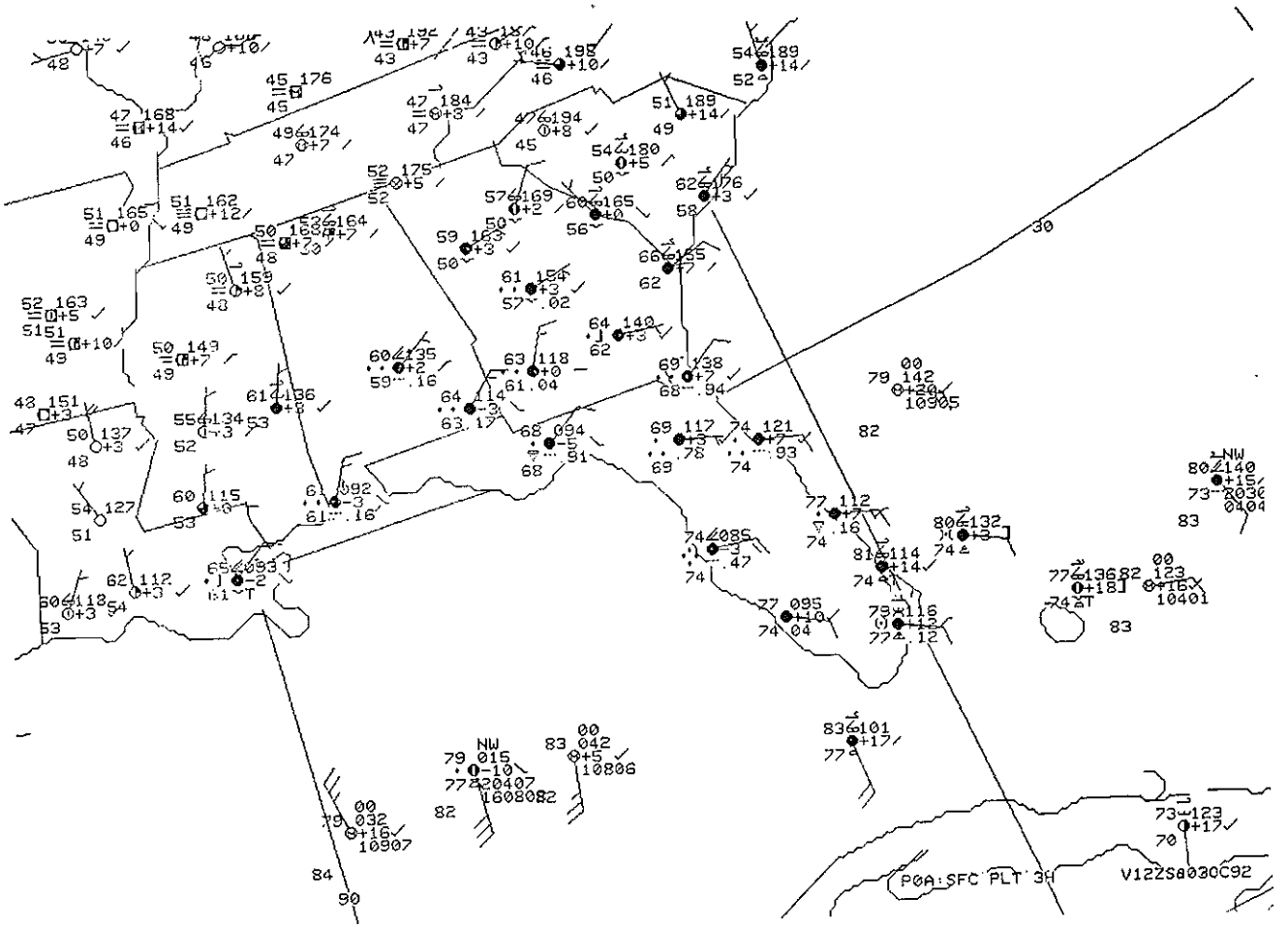


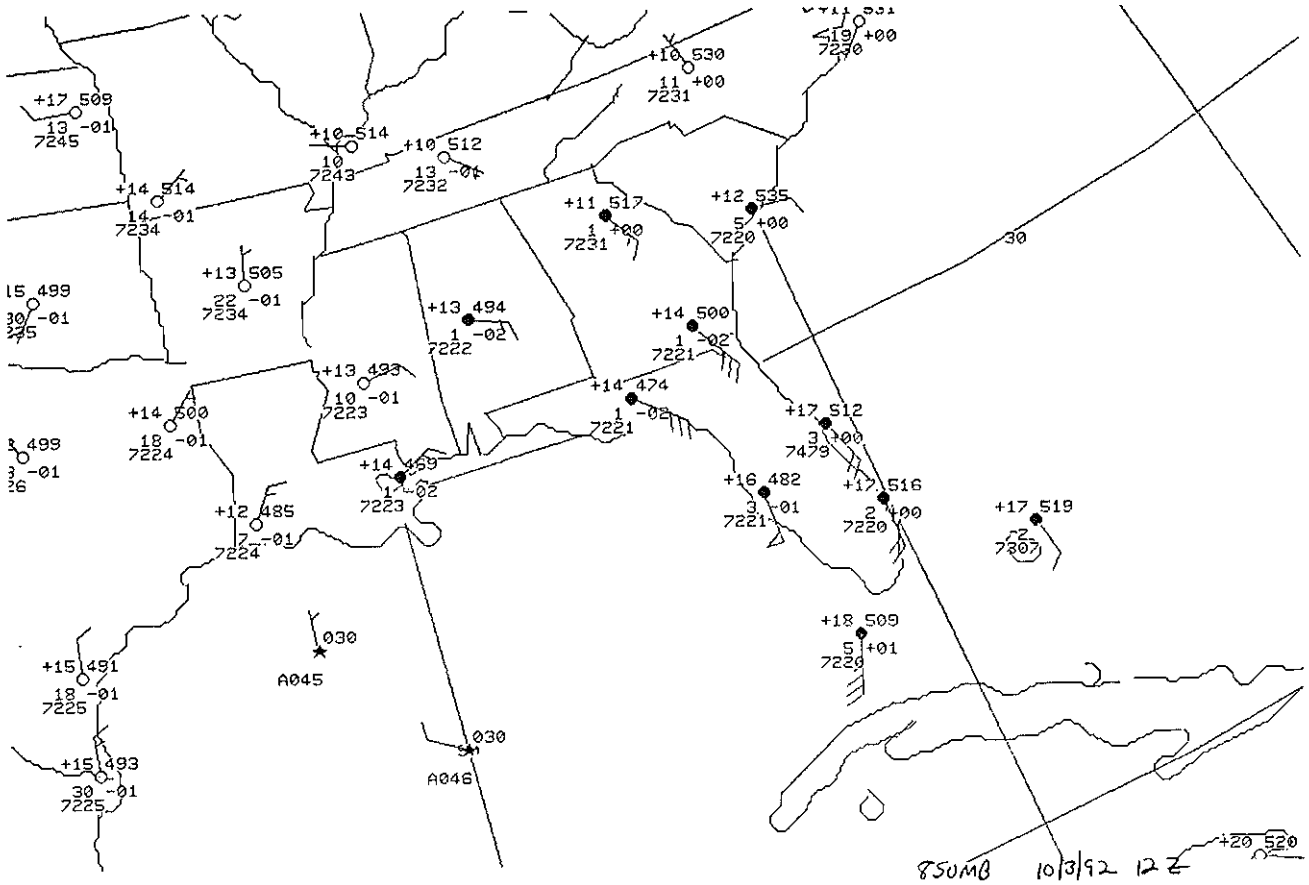
(See: NOAA Disaster Survey, Hagemeyer and Matney 1993b, Anthony 1993, and Davies 1993)



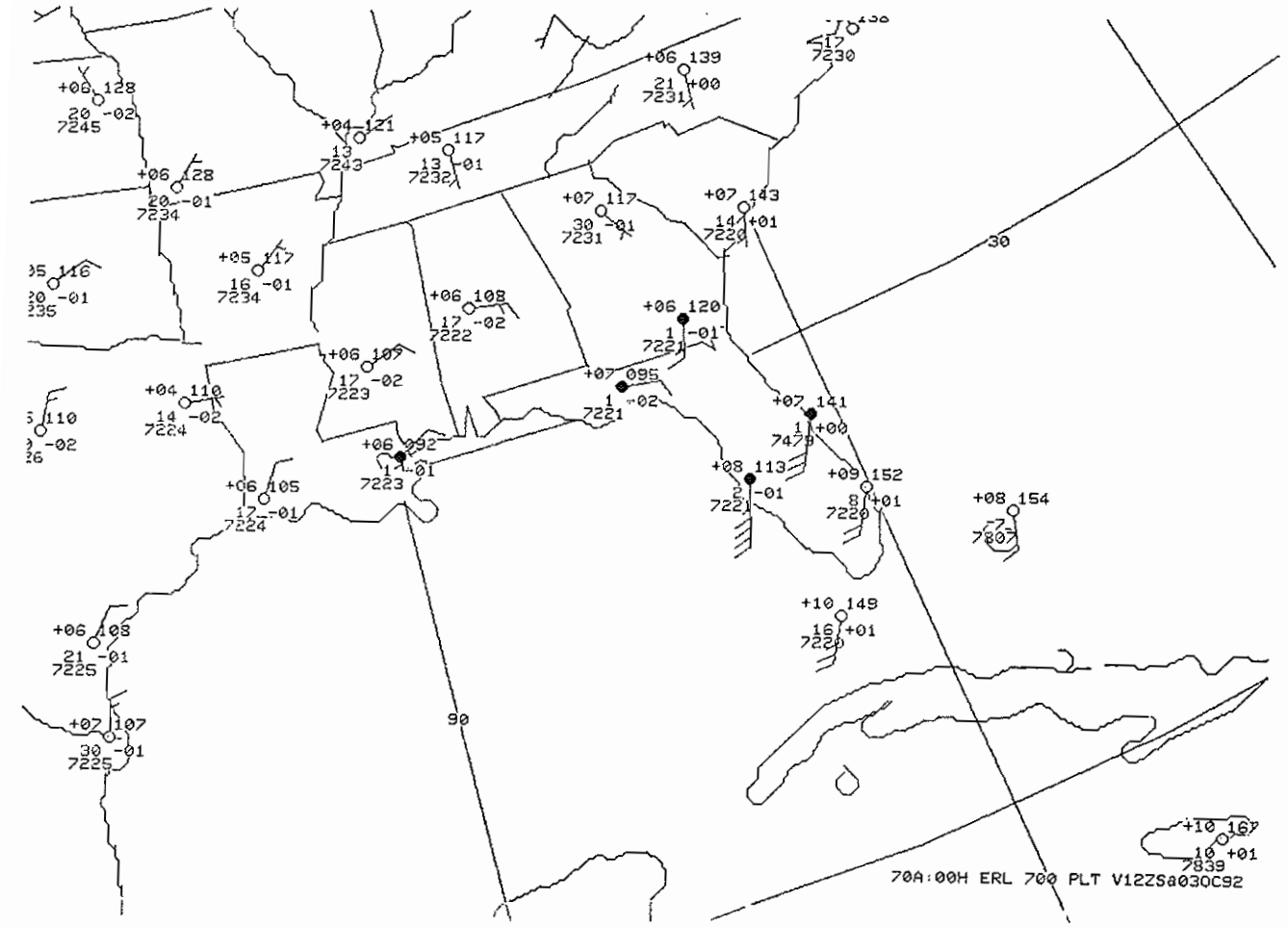


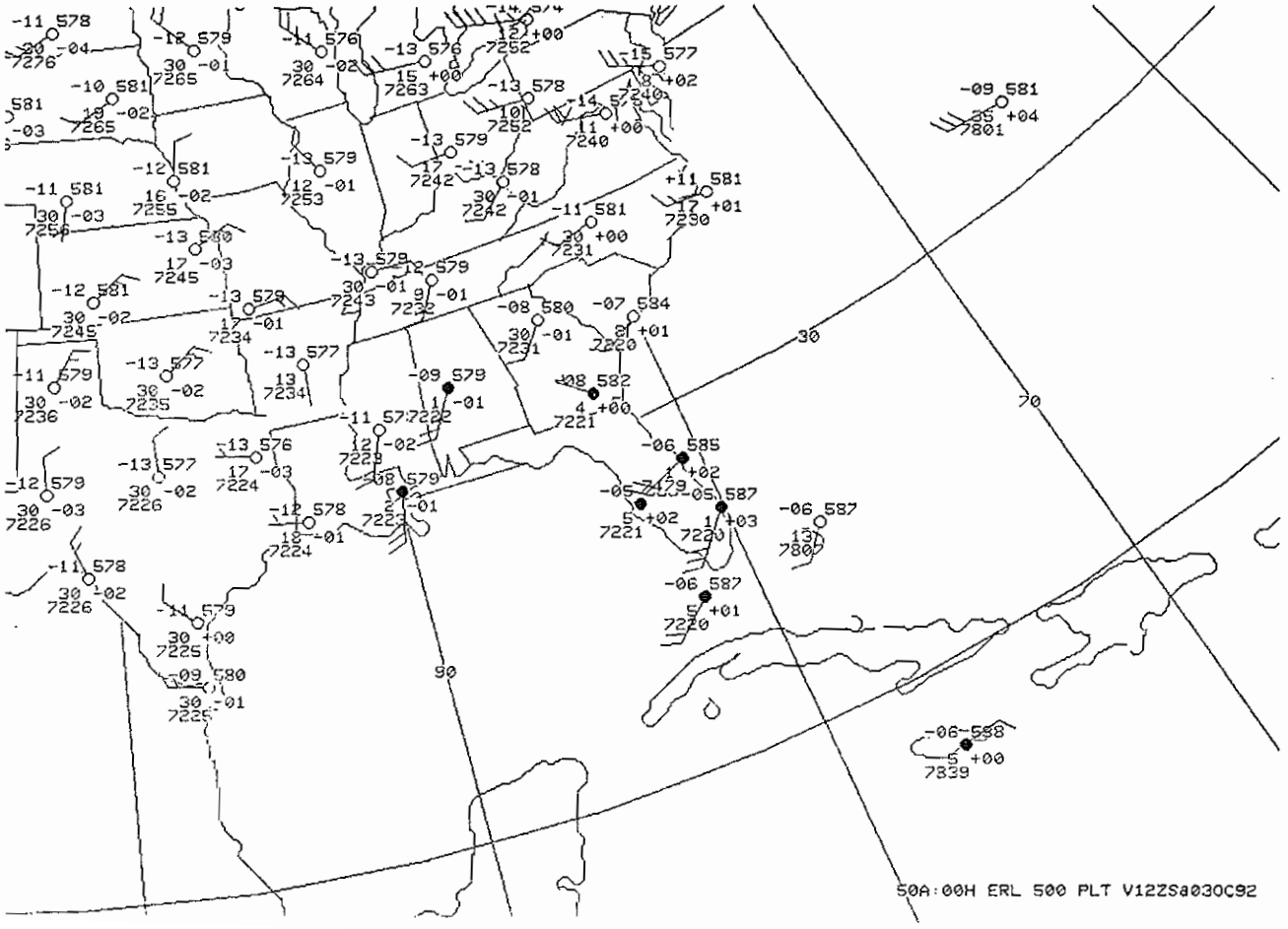
October 3, 1992

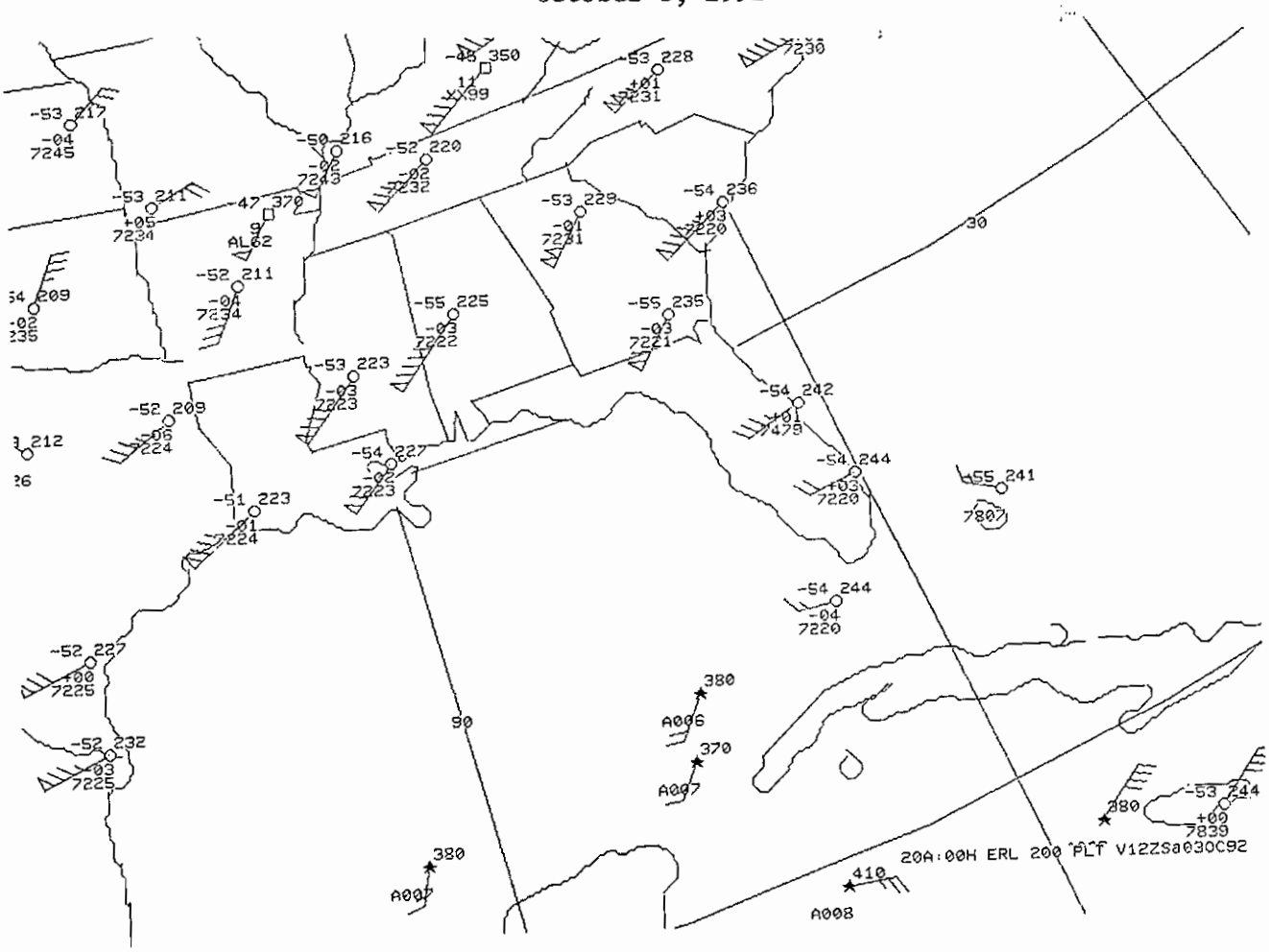




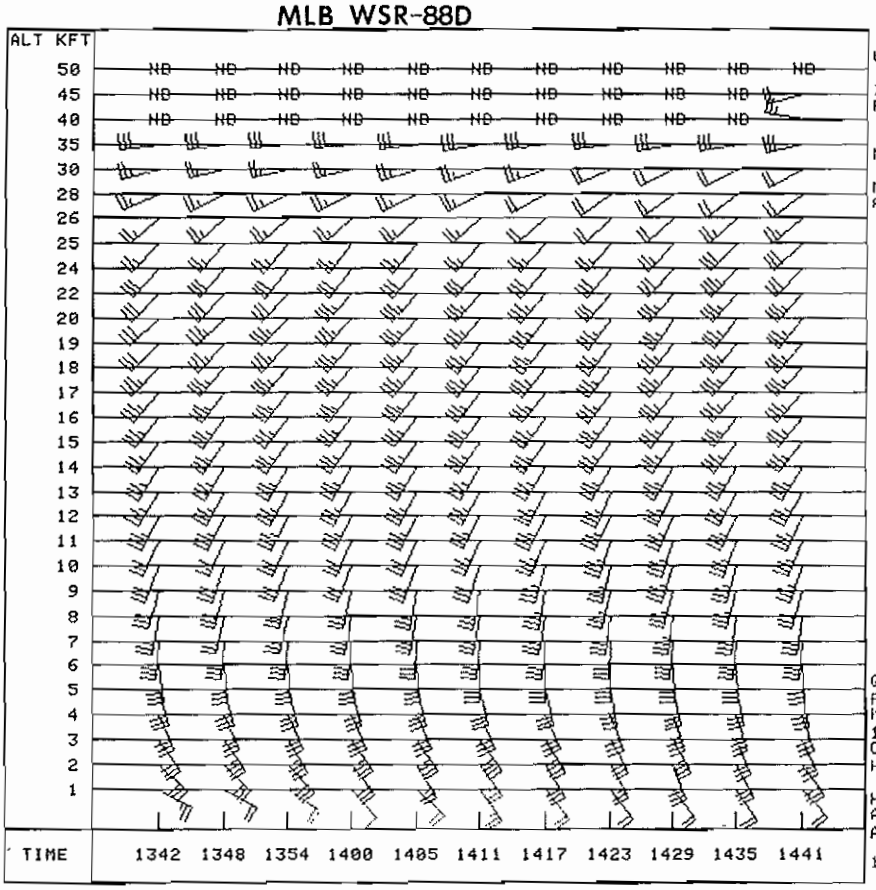
October 3, 1992







MLB WSR-88D



VAD WIND PROFILE
48 VWP
10/03/92 14:41
RDA:KMLB 28/06/46N
116 FT 80/39/14W

MODE A / 21

MAX=217 DEG 35 KT
ALT: 15000 FT

0 KT RMS
4
8
12
16

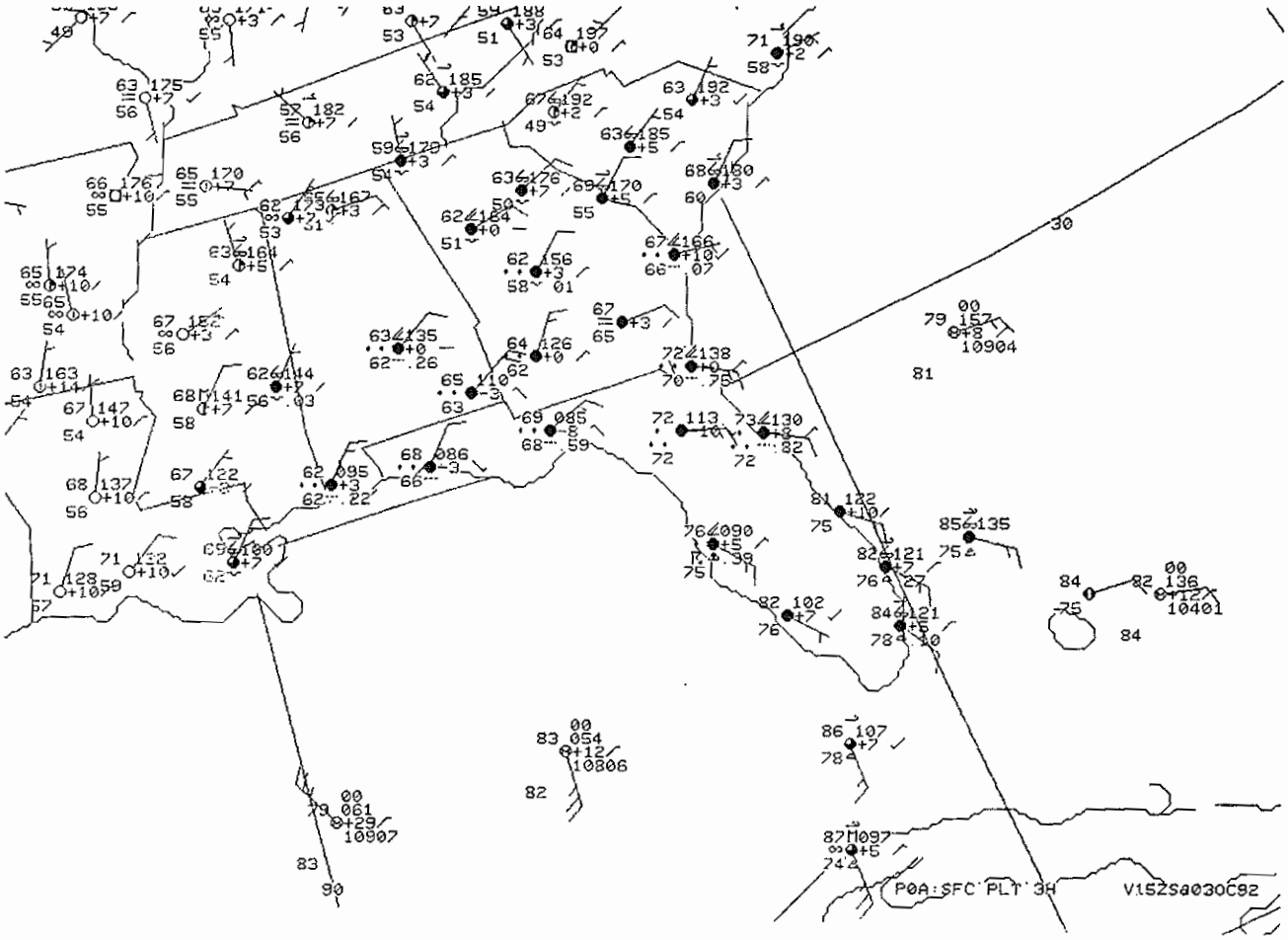
FL= 1 COM=1

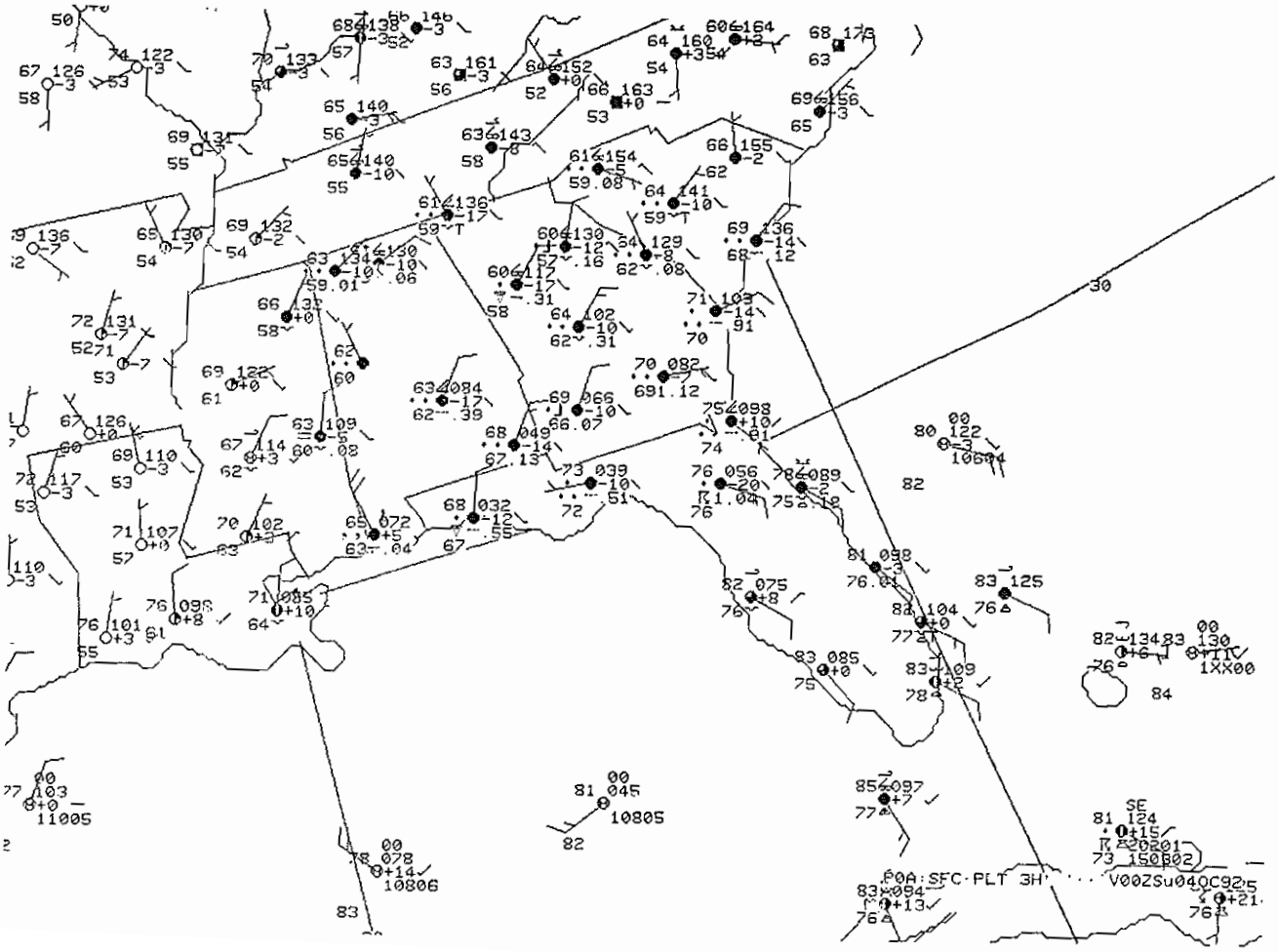
Q15 R 2333 R
PROD RCVD: V RPS
KMLB 2333 54 9.9
10/2329 DELTA SYS
CAL = 0.50 DBZ
HARDCOPY

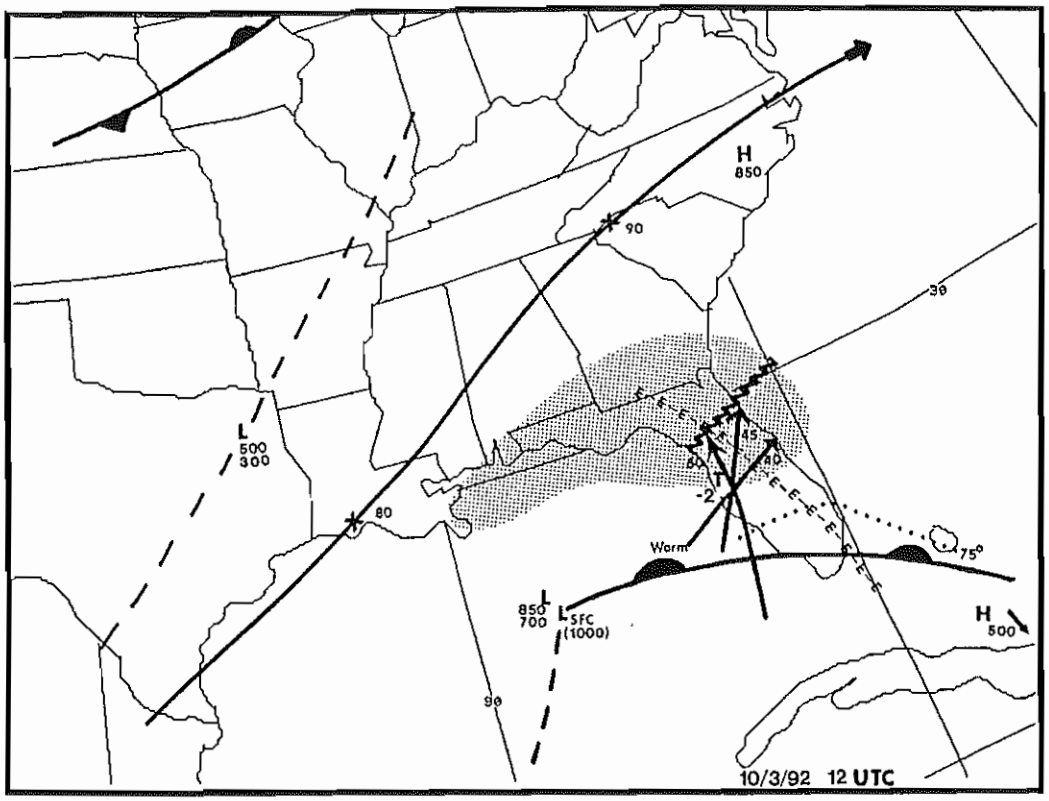
HARDCOPY REQUEST
ACCEPTED
ALERTS:

1) GU GT 2) GU GP

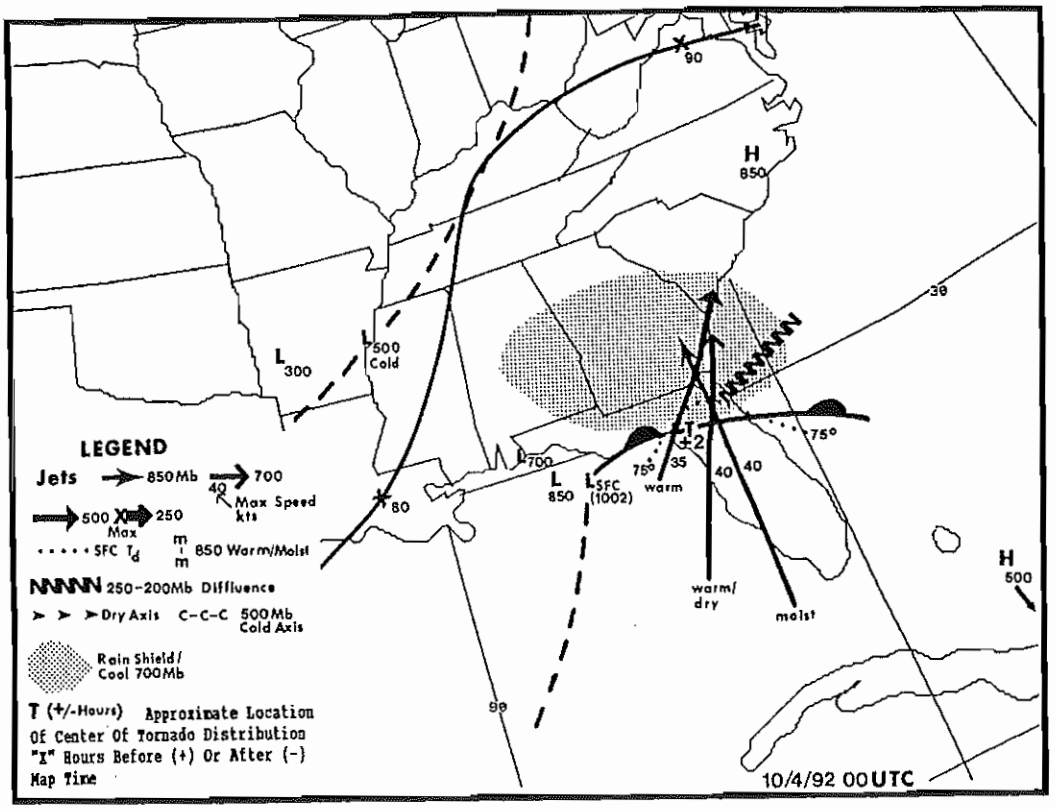
October 3, 1992

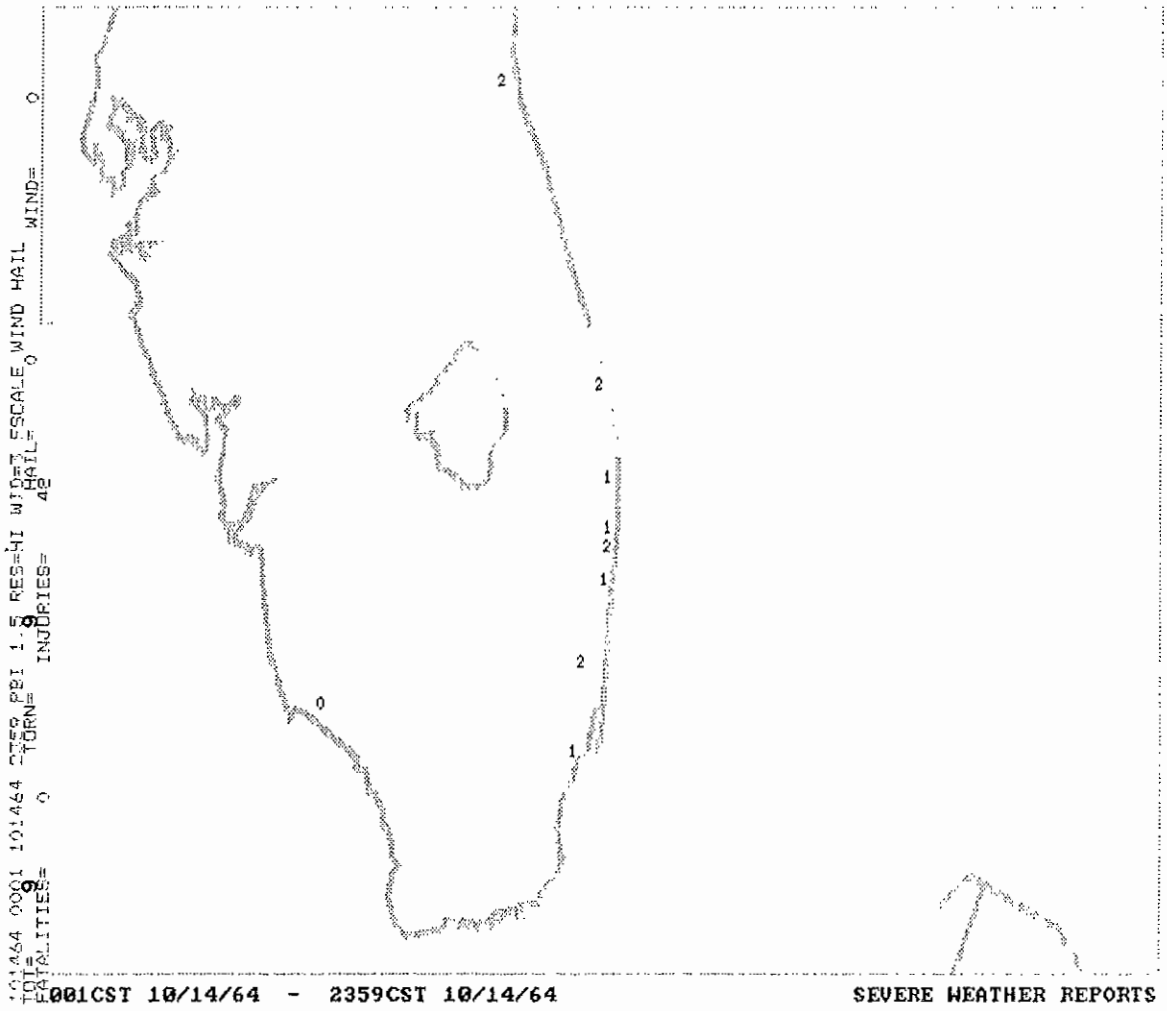




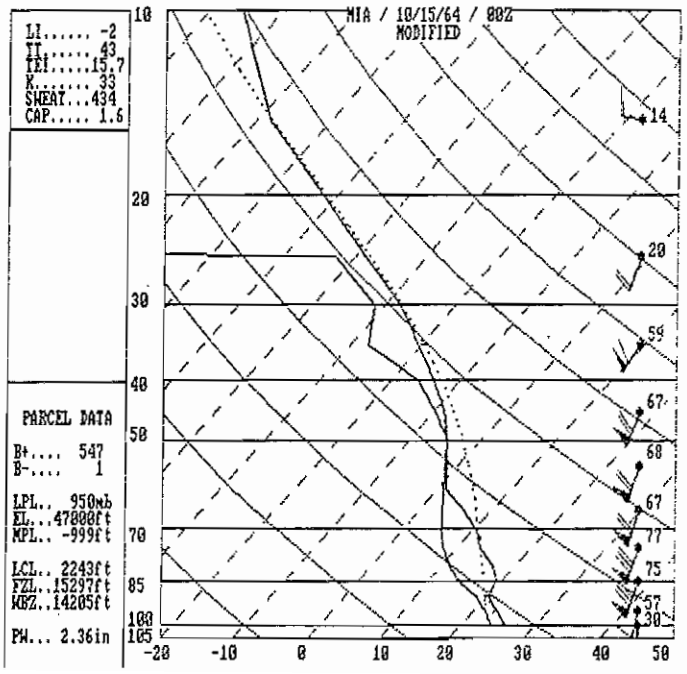


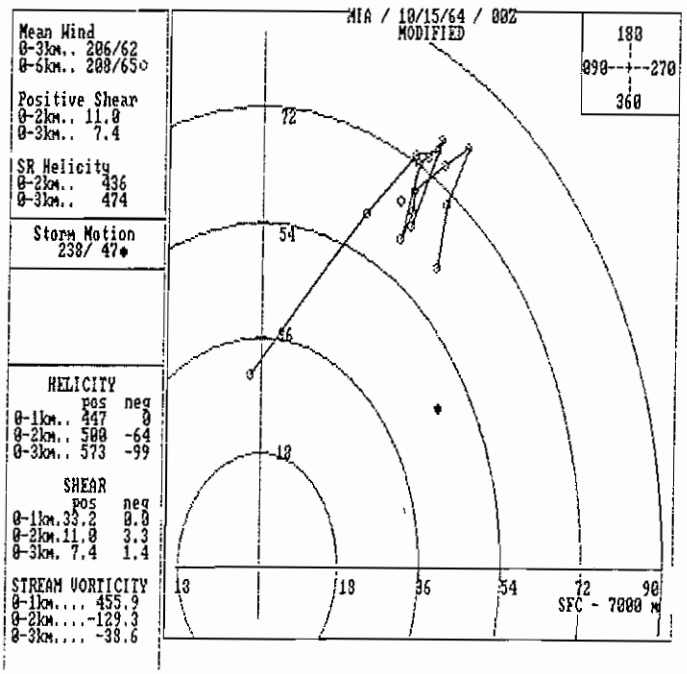
(From Hagemeyer and Matney 1993b)



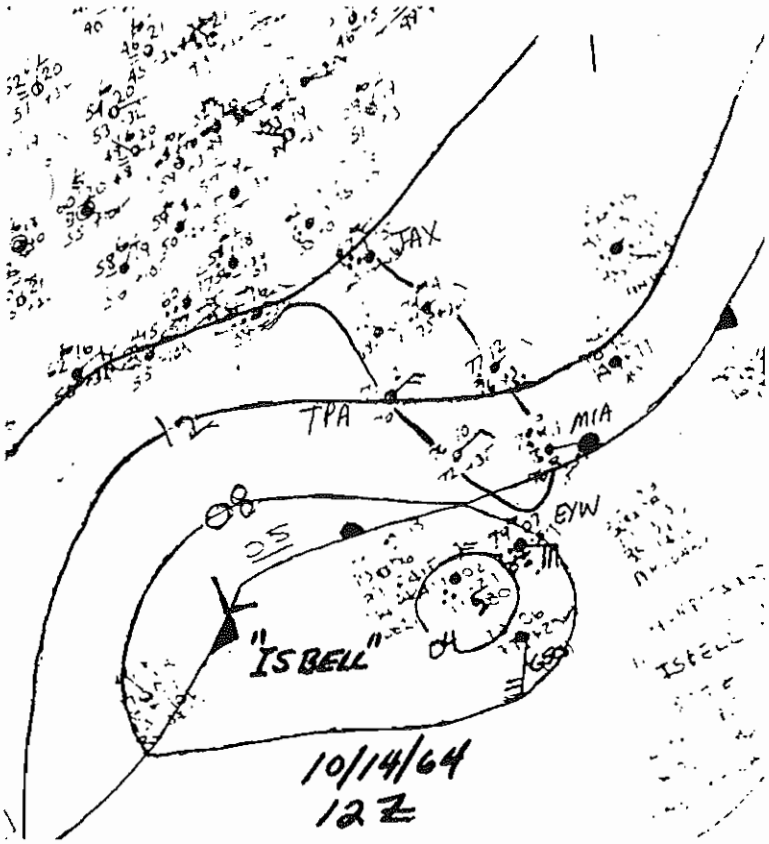


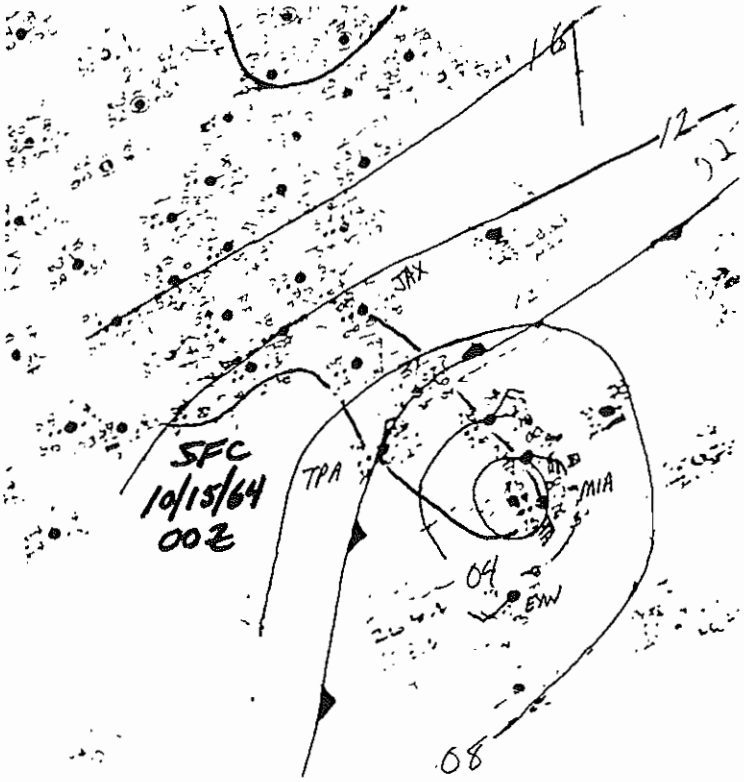
(See McCaul 1991 for additional information on buoyancy and shear characteristics of hurricane-tornado environments and many good references on the topic of hurricane-spawned tornadoes)

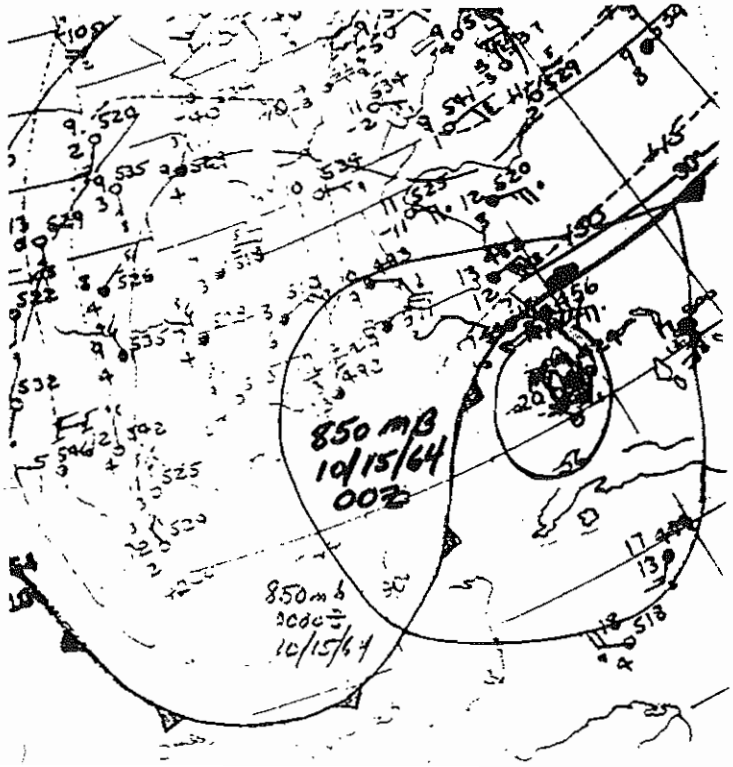


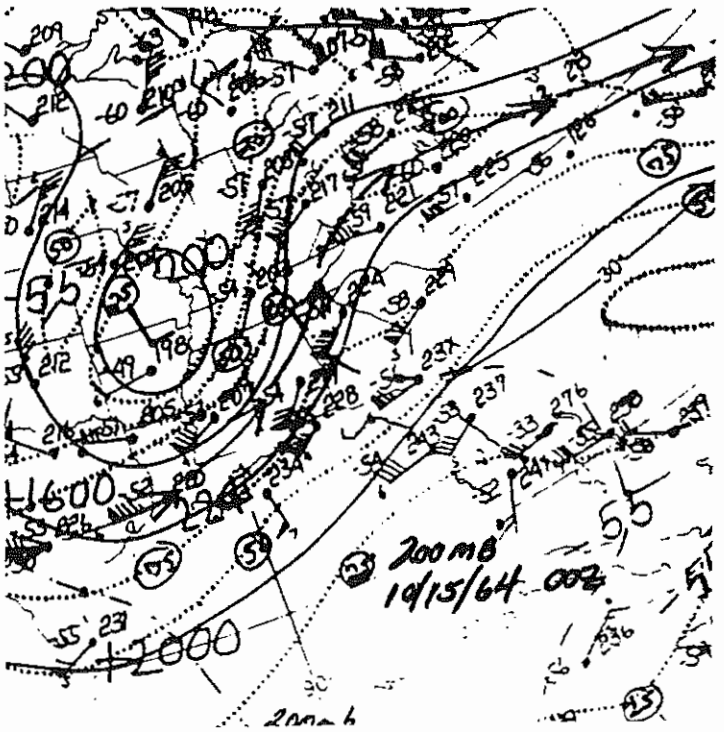


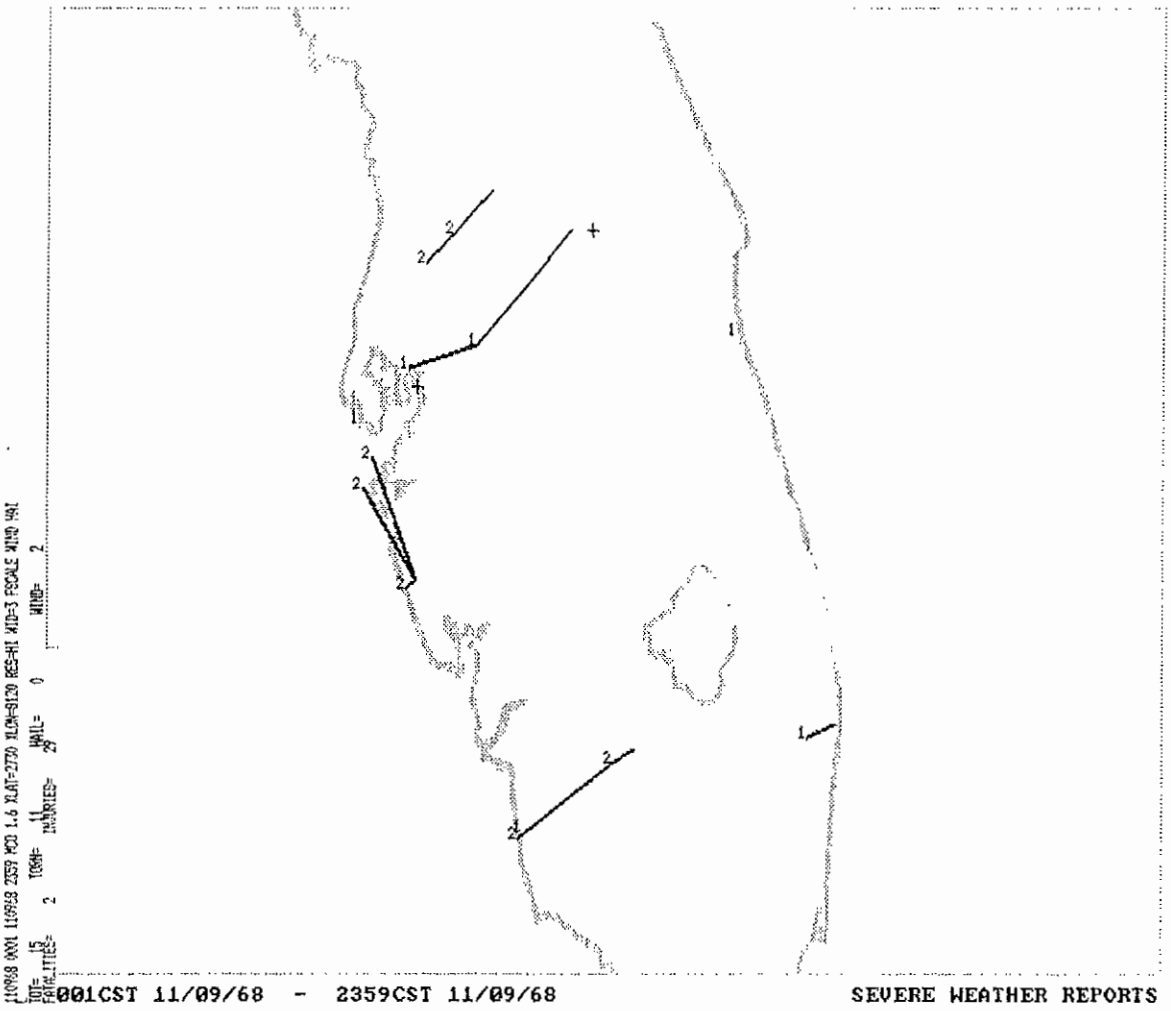
October 14, 1964

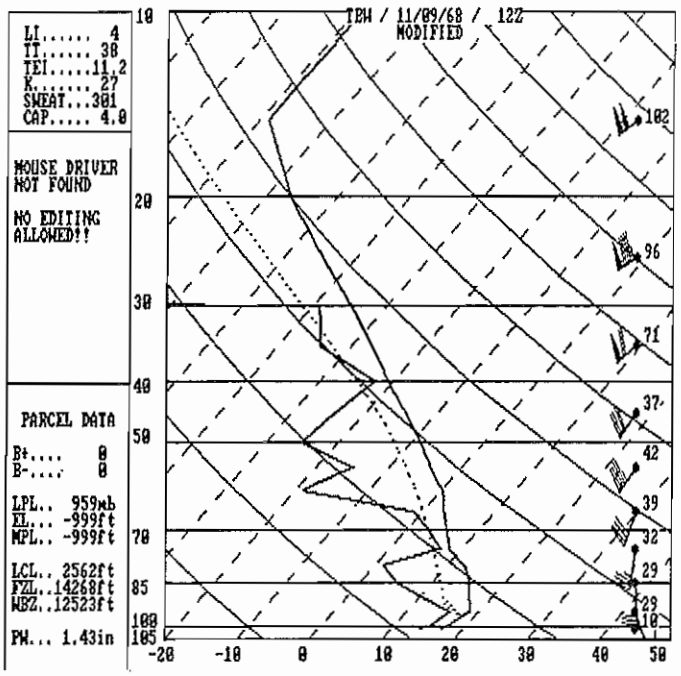


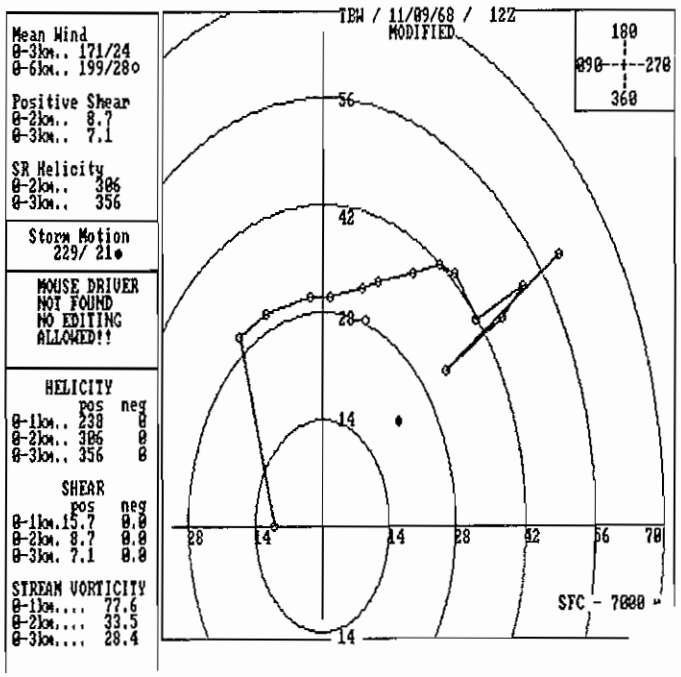


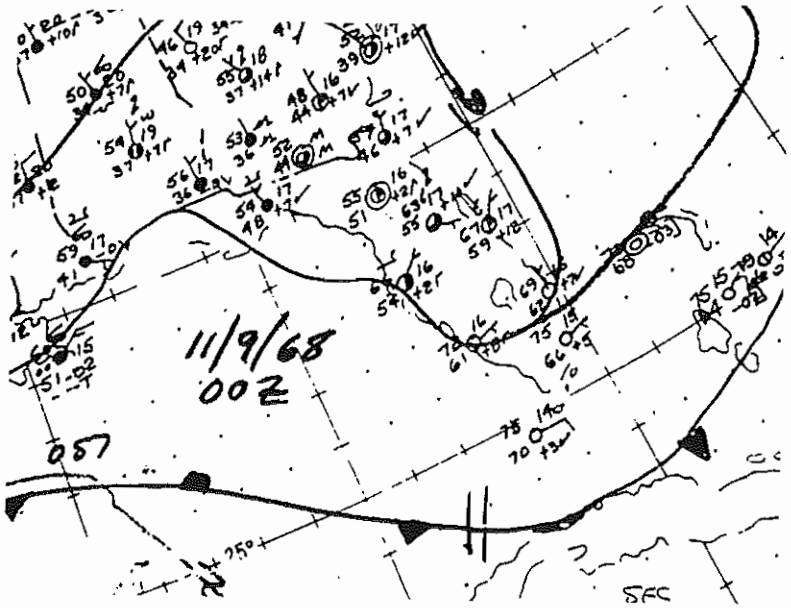


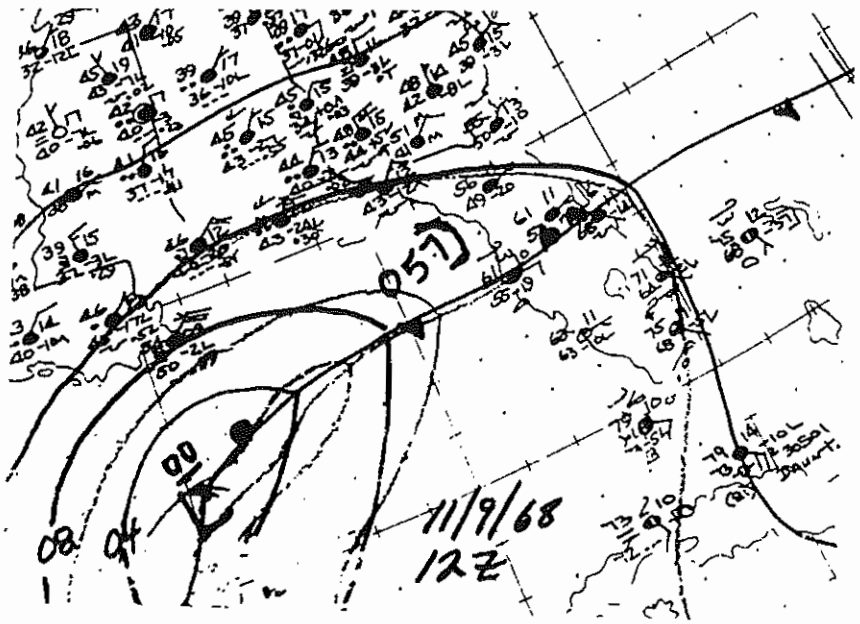


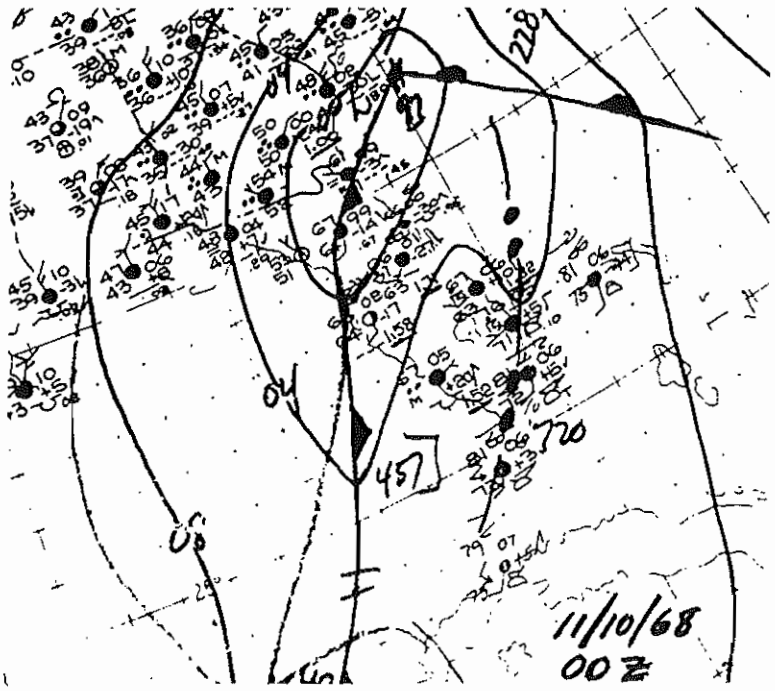

001CST 11/09/68 - 2359CST 11/09/68
SEVERE WEATHER REPORTS

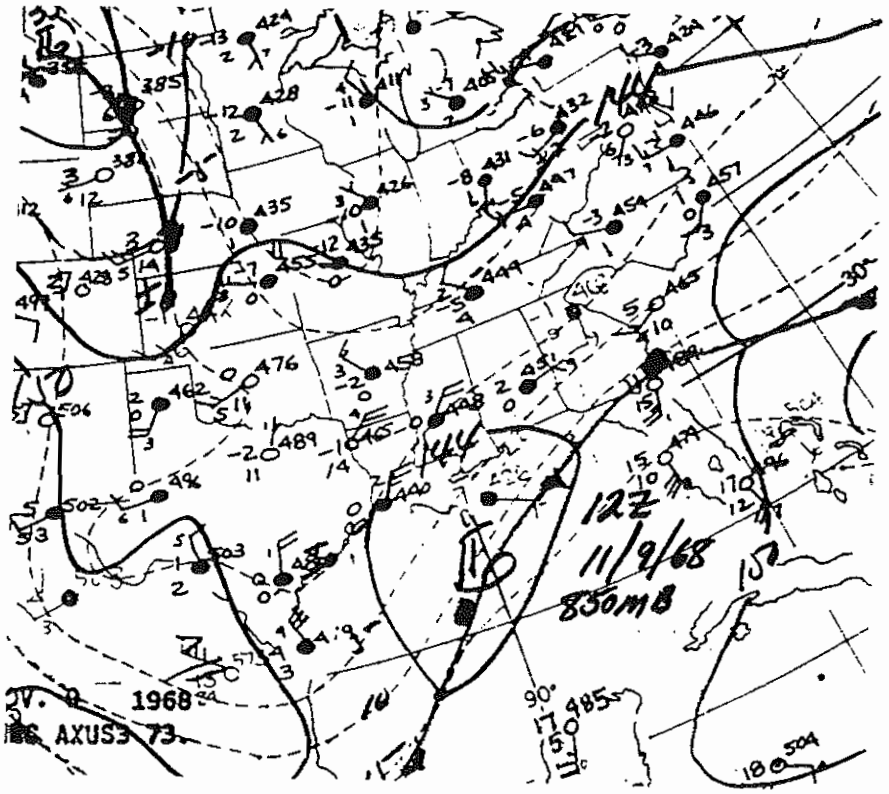

LI..... 4
TT..... 38
TEI.....11.2
K..... 27
SWEAT...301
CAP..... 4.0
MOUSE DRIVER NOT FOUND
NO EDITING ALLOWED!!
PARCEL DATA
LPL.. 959mb
EL... -999ft
MPL.. -999ft
LCL.. 2562ft
FZL..14268ft
WBZ..12523ft
PW... 1.43in
TEW / 11/09/68 / 122
MODIFIED

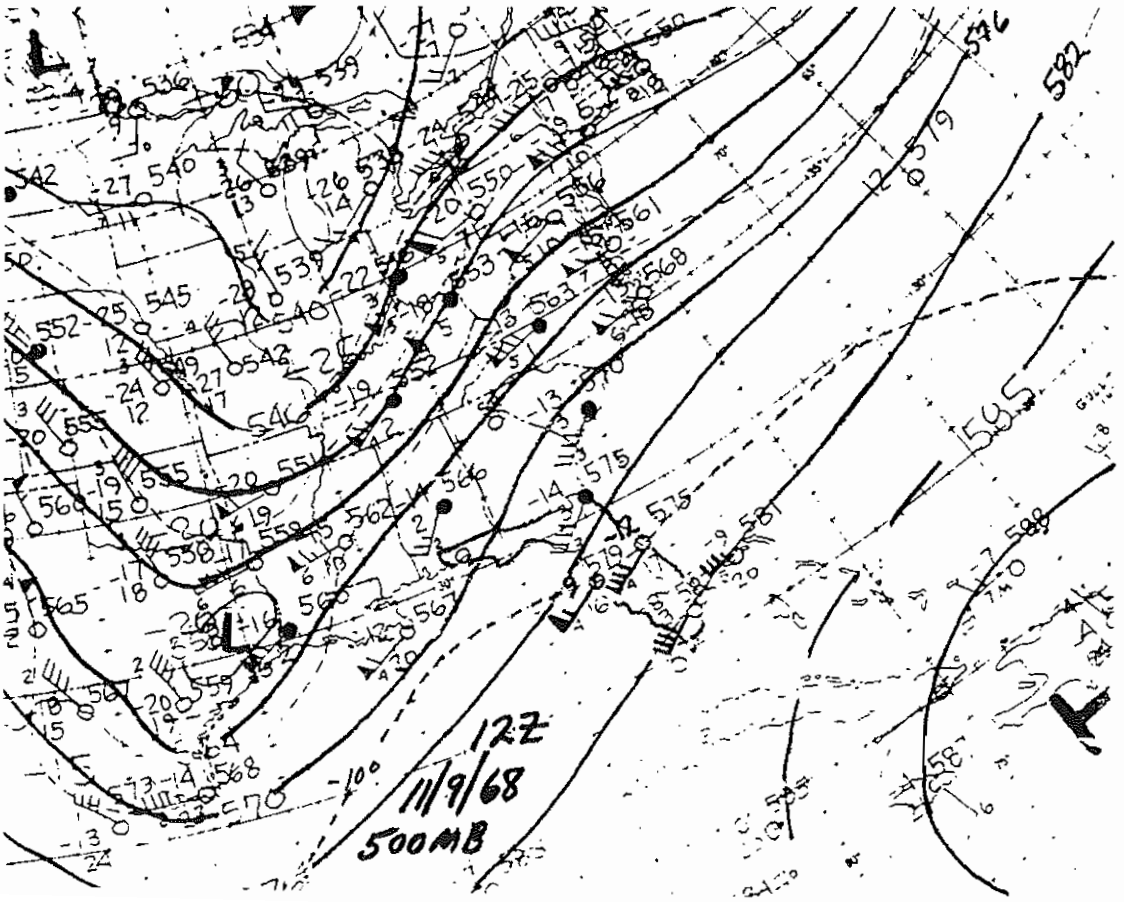

Mean Wind
0-3km.. 171/24
0-6km.. 199/28
Positive Shear
0-2km.. 8.7
0-3km.. 7.1
SR Helicity
0-2km.. 306
0-3km.. 356
Storm Motion
229/ 21
MOUSE DRIVER NOT FOUND
NO EDITING ALLOWED!!
HELICITY
pos neg
0-1km.. 238 0
0-2km.. 306 0
0-3km.. 356 0
SHEAR
pos neg
0-1km.15.7 0.0
0-2km. 8.7 0.0
0-3km. 7.1 0.0
STREAM VORTICITY
0-1km.... 77.6
0-2km.... 33.5
0-3km.... 28.4
TEW / 11/09/68 / 122
MODIFIED
SFC - 7000


11/9/68
00Z
057
SFC


057
11/9/68
12Z


228
457
11/10/68
00Z


12Z
11/9/68
850MB


12Z
11/9/68
500MB

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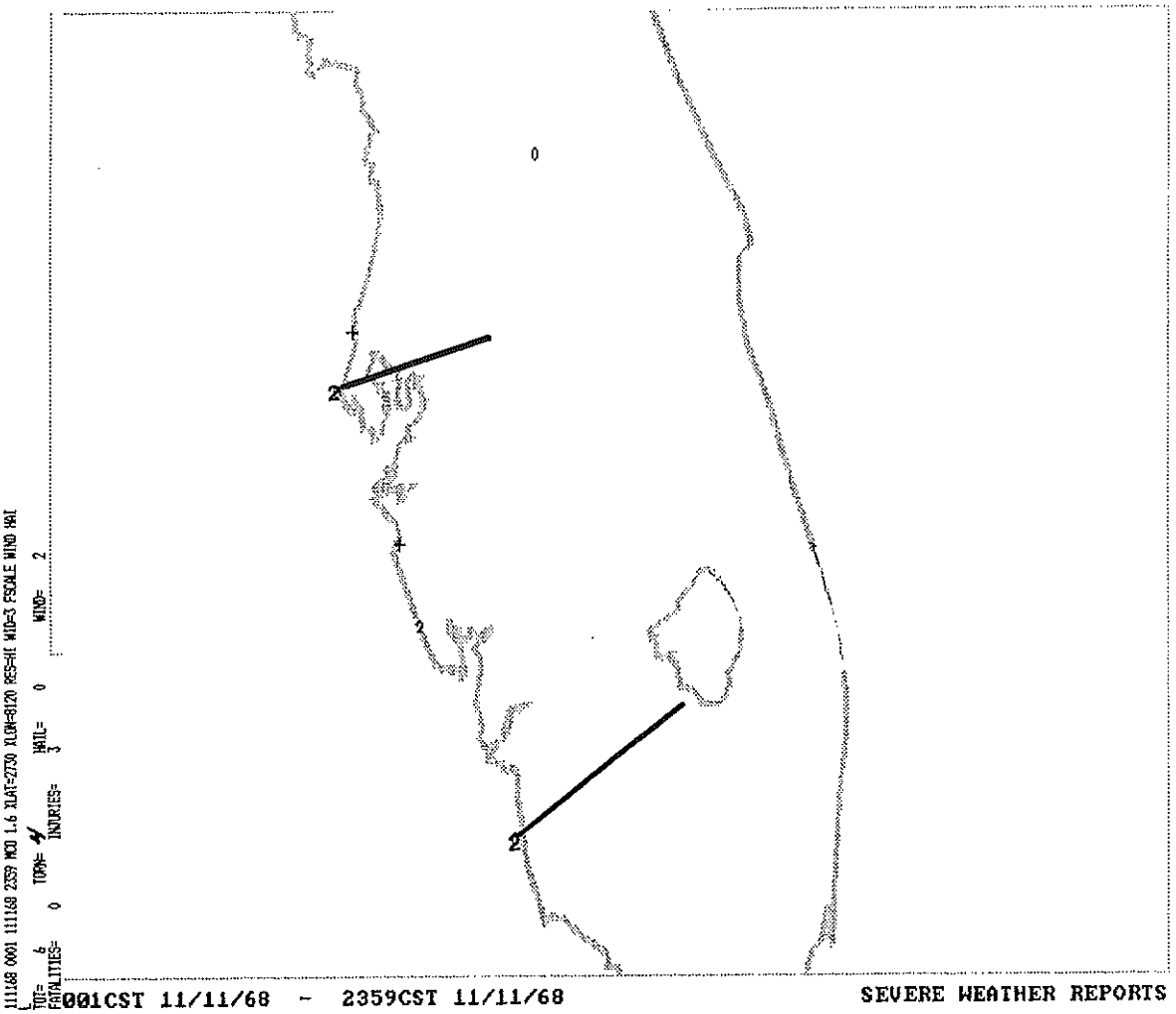
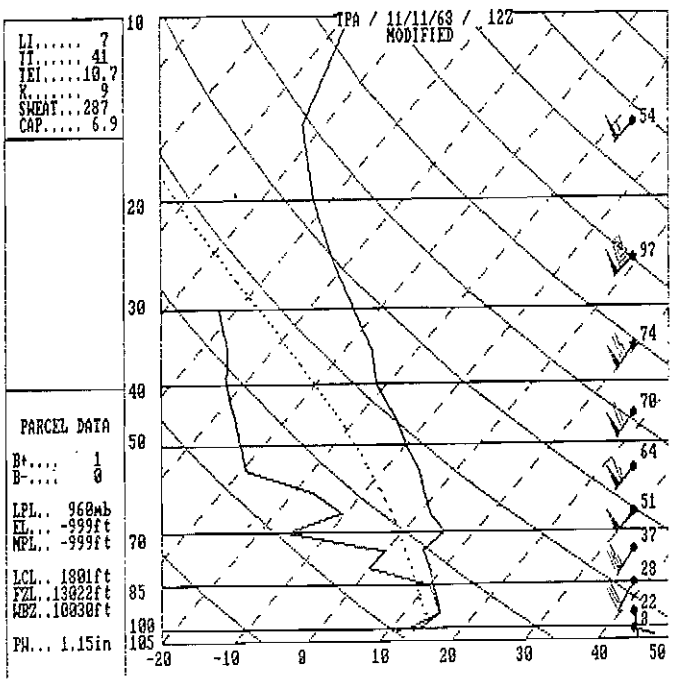
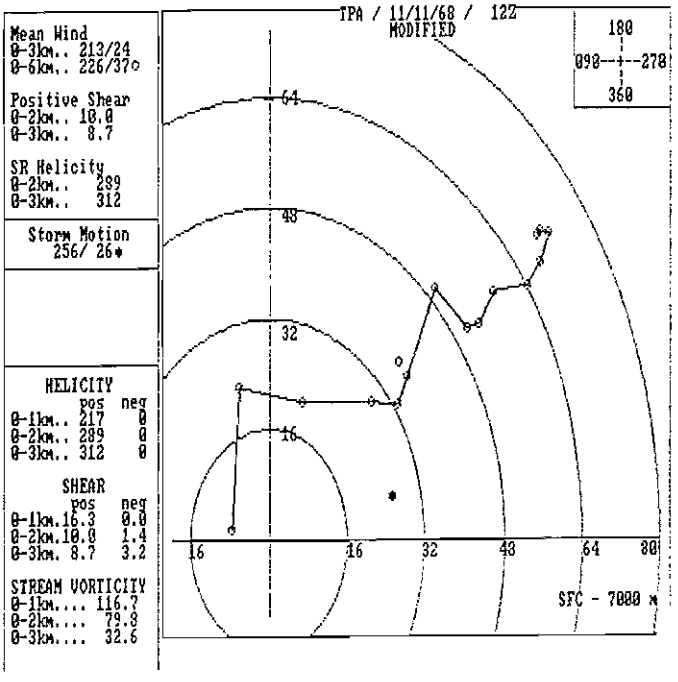
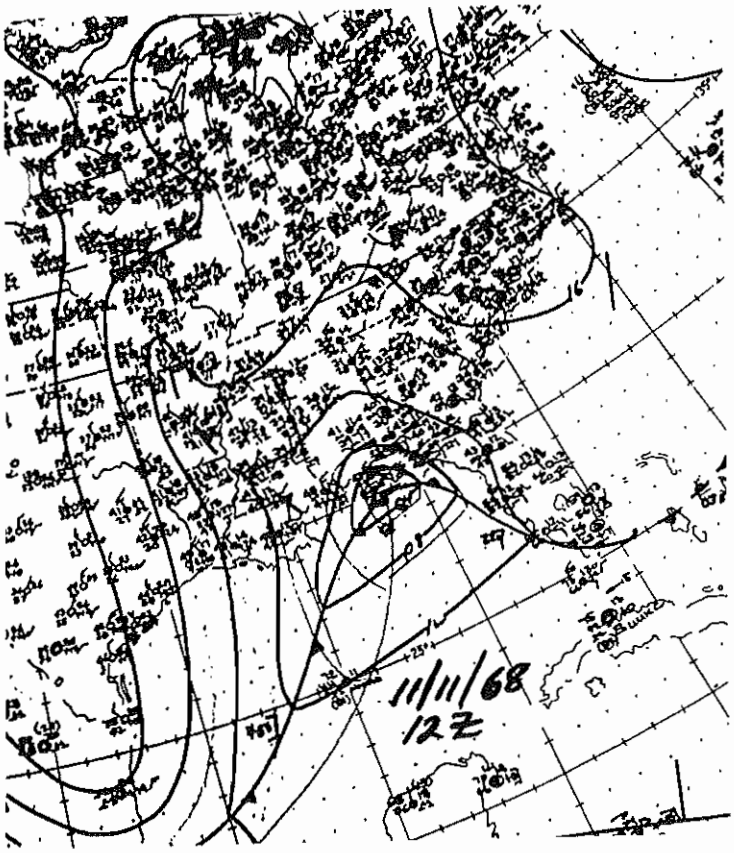
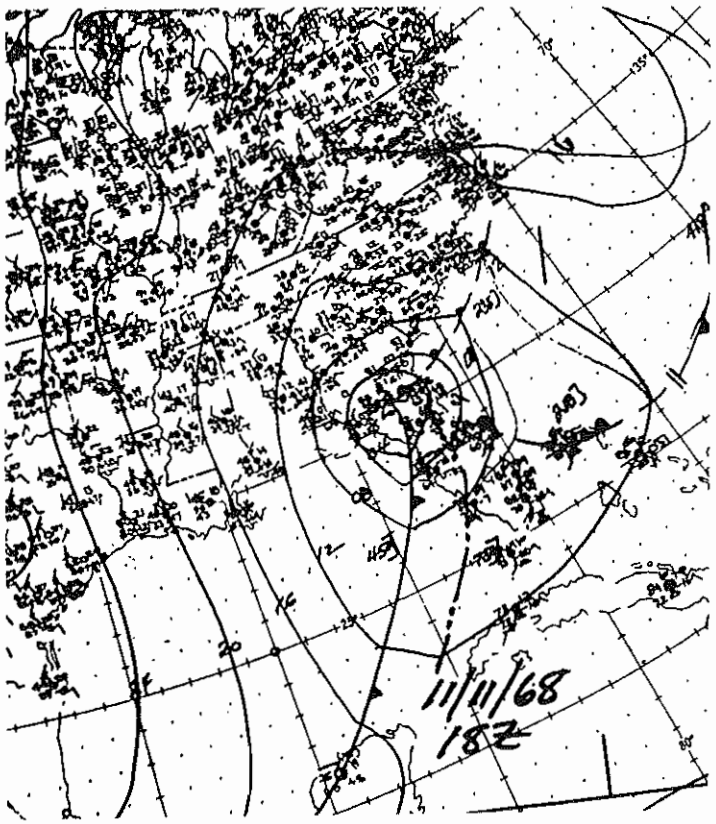
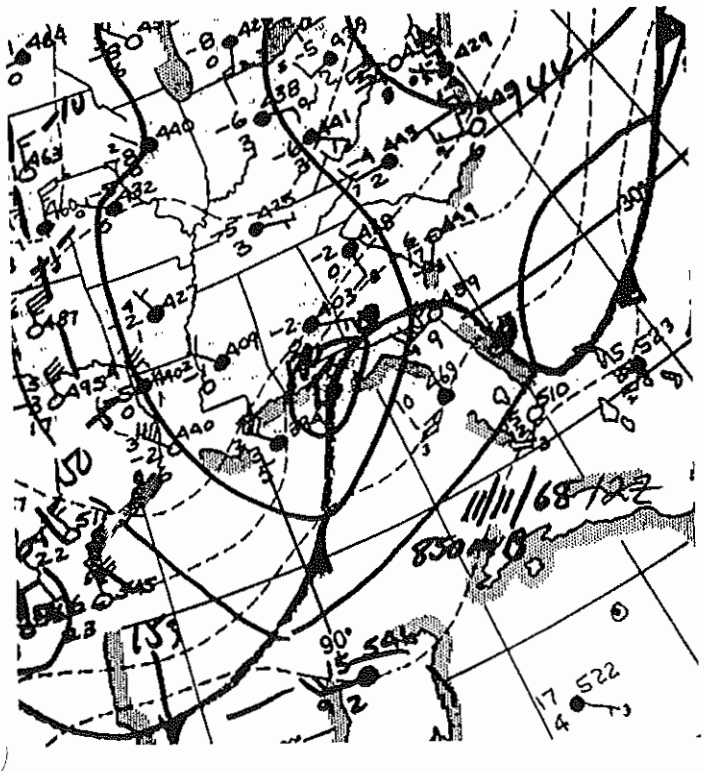

111168 0001 111168 2359 MOD 1.6 XLAT=2750 XLON=8120 RES=HI WIND=S FSCALE WIND HAI
TOR= 0 INJURIES= 3 HAIL= 0 WIND= 2
TOT= 6 FATALITIES= 0
0001CST 11/11/68 - 2359CST 11/11/68
SEVERE WEATHER REPORTS

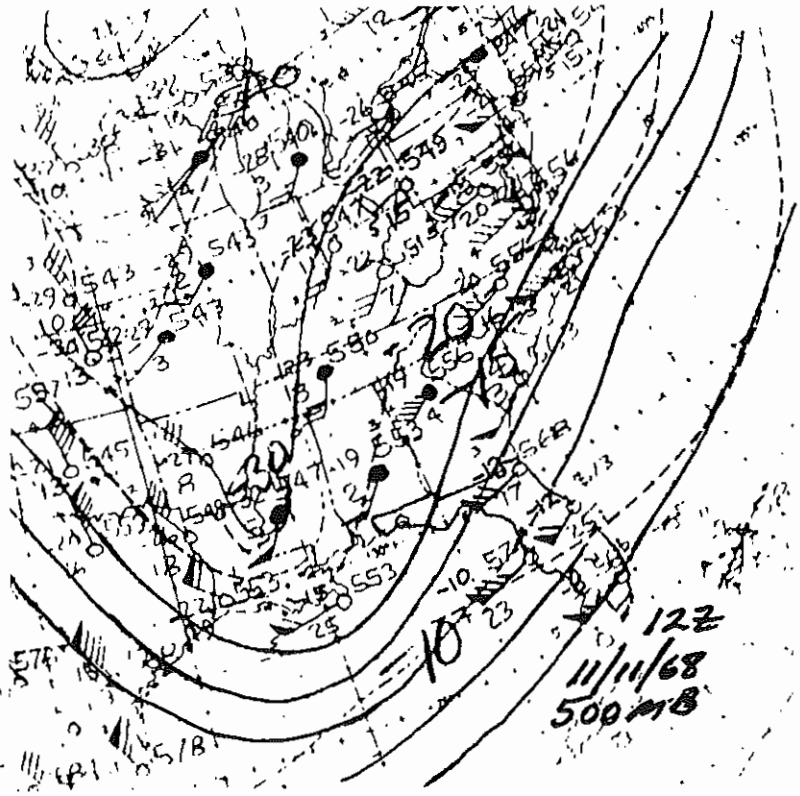

TPA / 11/11/68 / 122
MODIFIED
LI..... 7
TT..... 41
IEI.....10.7
K..... 9
SWEAT...287
CAP..... 6.9
PARCEL DATA
B+.... 1
B-.... 0
LPL.. 960mb
EL... -999ft
MPL.. -999ft
LCL.. 1801ft
FZL..13022ft
MBZ..10030ft
PW... 1.15in
54
97
74
70
64
51
37
28
22
8
-20 -10 0 10 20 30 40 50

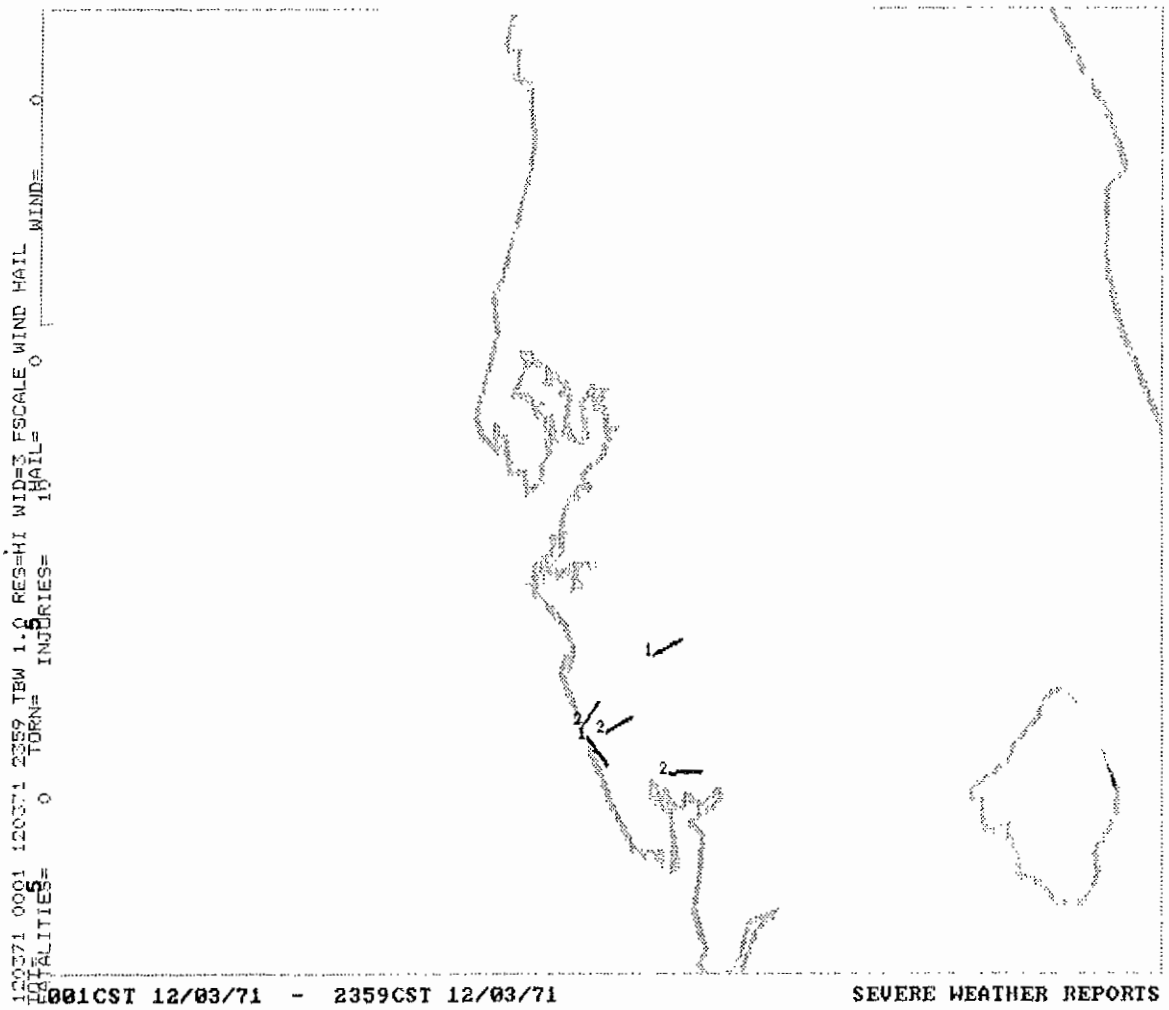

Mean Wind
0-3km.. 213/24
0-6km.. 226/37
Positive Shear
0-2km.. 10.0
0-3km.. 8.7
SR Helicity
0-2km.. 289
0-3km.. 312
Storm Motion
256/ 26
HELICITY
pos neg
0-1km.. 217 0
0-2km.. 289 0
0-3km.. 312 0
SHEAR
pos neg
0-1km.16.3 0.0
0-2km.10.0 1.4
0-3km. 8.7 3.2
STREAM VORTICITY
0-1km.... 116.7
0-2km.... 79.8
0-3km.... 32.6
TPA / 11/11/68 / 122
MODIFIED
180
090 270
360
64
48
32
16
16 16 32 48 64 80
SFC - 7000 m

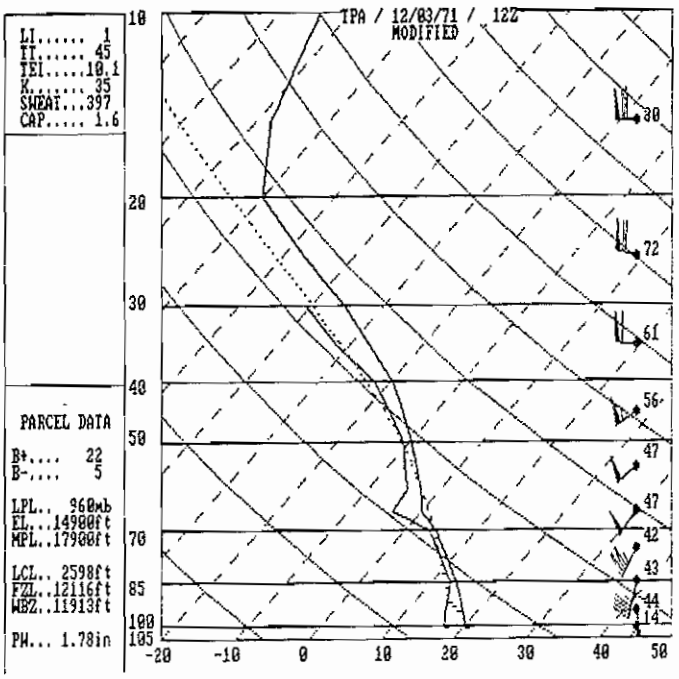

11/11/68
12Z

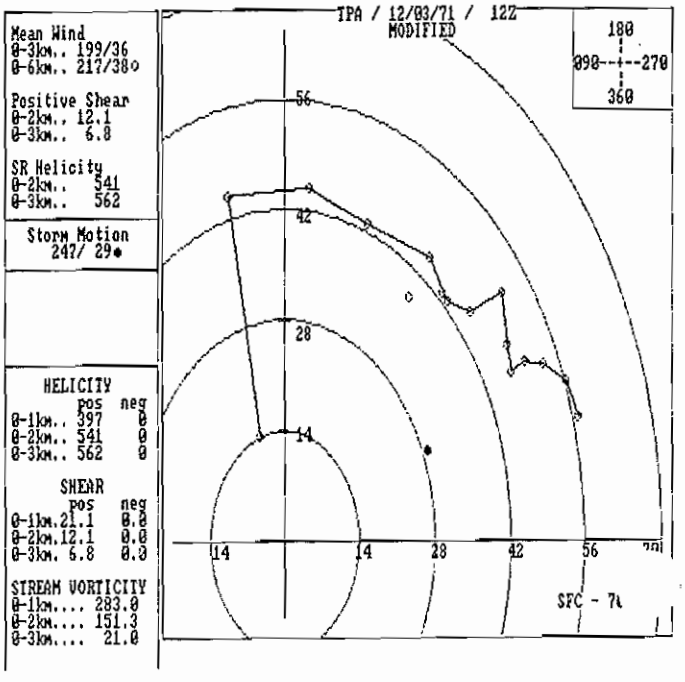

11/11/68
18Z

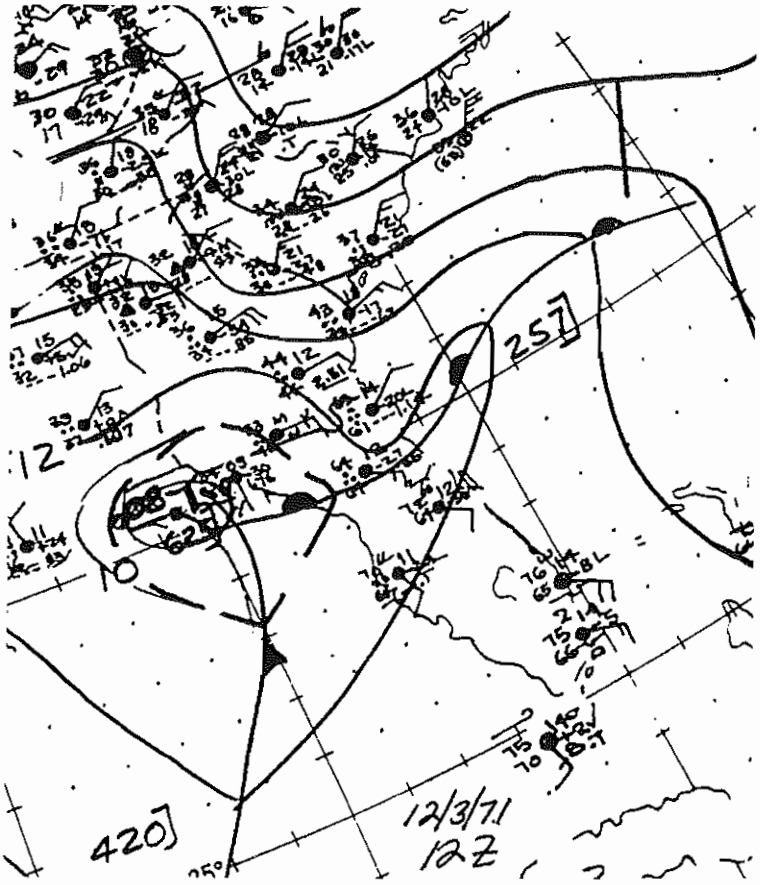

11/11/68 12Z
850 MB

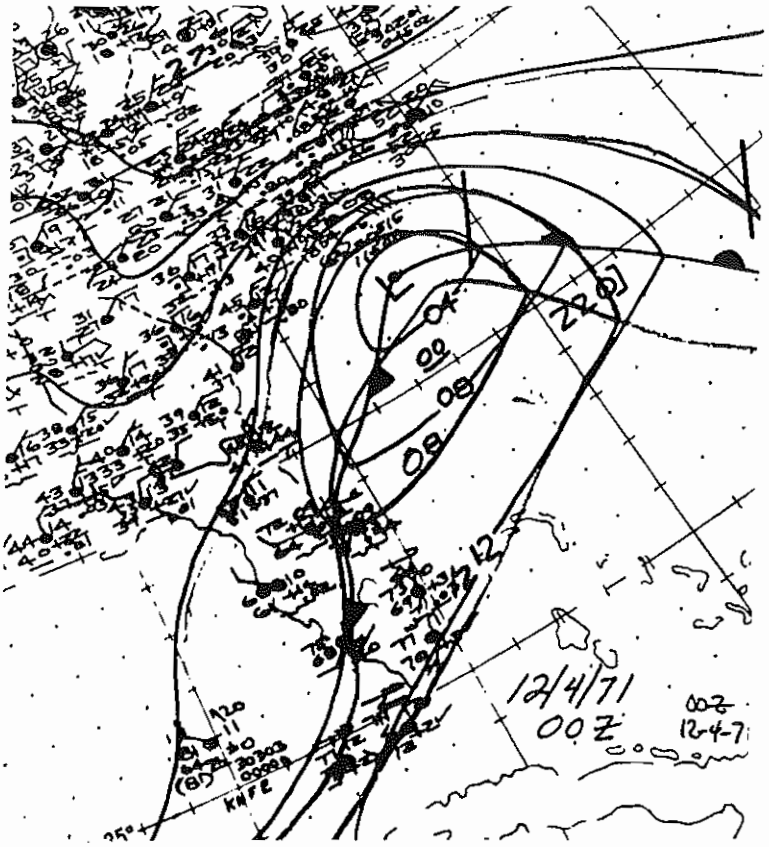

12Z
11/11/68
500 MB


120371 0001 120371 2359 TBW 1.0 RES=HI WID=3 FSCALE WIND HAIL
TOTALITIES= 5 TORN= 0 INJURIES= 5 HAIL= 0 WIND= 0
0001CST 12/03/71 - 2359CST 12/03/71
SEVERE WEATHER REPORTS


TPA / 12/03/71 / 122Z
MODIFIED
LI..... 1
TT..... 45
TEI.....10.1
K..... 35
SWEAT...397
CAP..... 1.6
PARCEL DATA
B+.... 22
B-.... 5
LPL.. 960mb
EL...14900ft
MPL..17900ft
LCL.. 2598ft
FZL..12116ft
WBZ..11913ft
PW... 1.78in


TPA / 12/03/71 / 122Z
MODIFIED
Mean Wind
0-3km.. 199/36
0-6km.. 217/38
Positive Shear
0-2km.. 12.1
0-3km.. 6.8
SR Helicity
0-2km.. 541
0-3km.. 562
Storm Motion
242/ 29
HELICITY
pos neg
0-1km.. 397 0
0-2km.. 541 0
0-3km.. 562 0
SHEAR
pos neg
0-1km.21.1 0.0
0-2km.12.1 0.0
0-3km. 6.8 0.0
STREAM VORTICITY
0-1km.... 283.0
0-2km.... 151.3
0-3km.... 21.0
SFC - 7k


12/3/71
12Z


12/4/71
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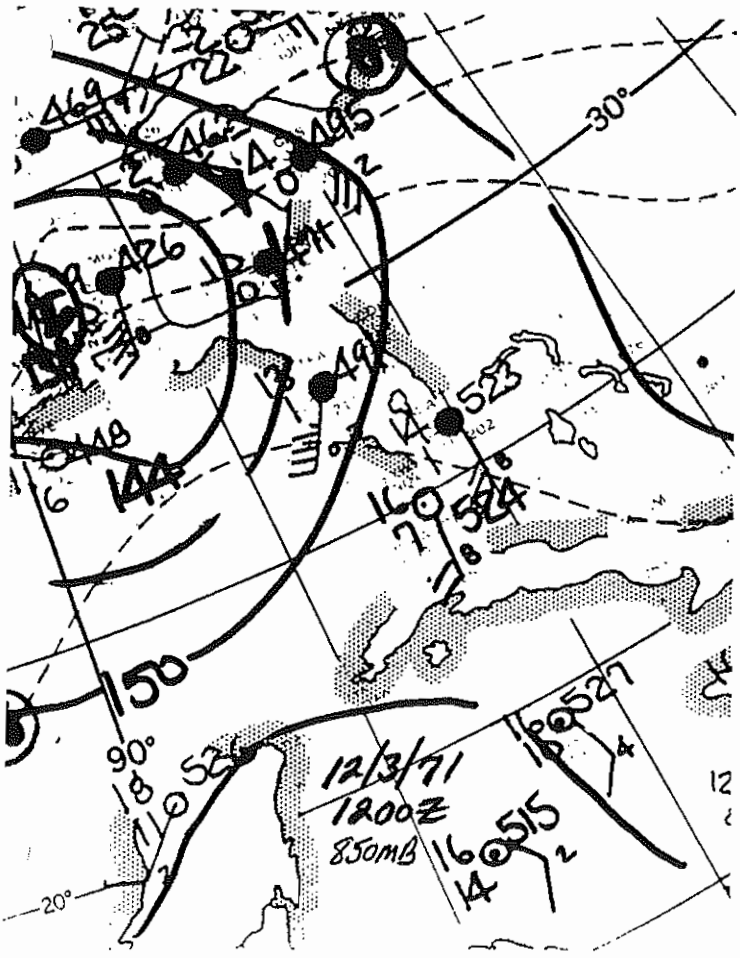
12/3/71
1200Z
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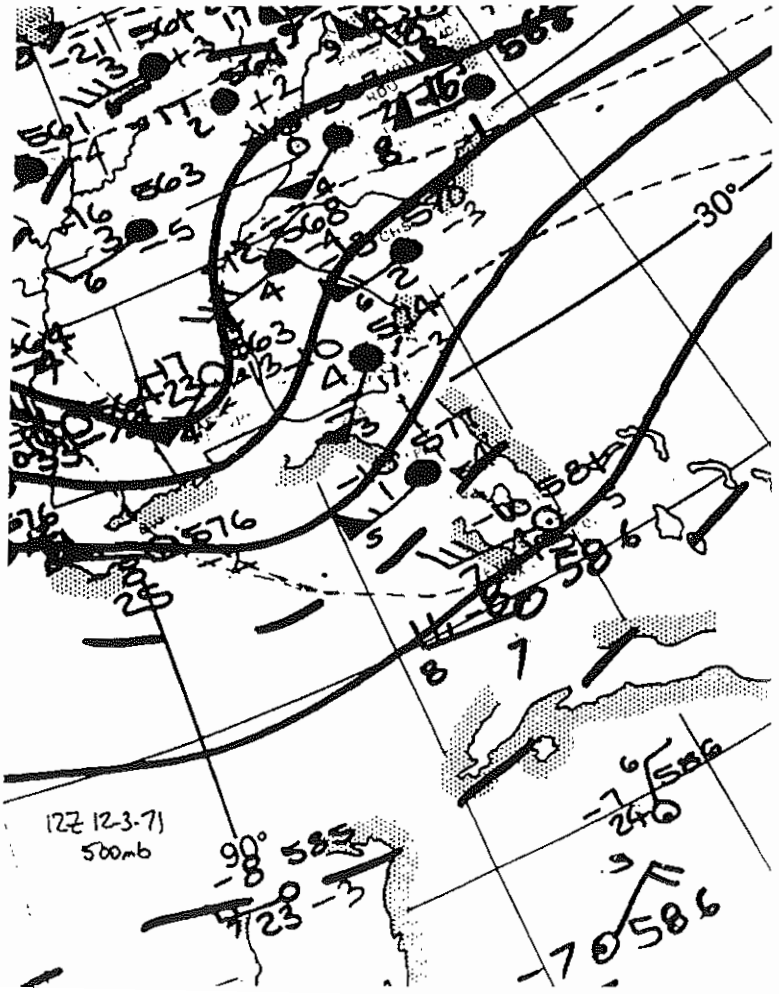
12Z 12-3-71
500mb