

QC
995
U672
NO 9
1978

ANNUAL DATA AND VERIFICATION TABULATION
ATLANTIC TROPICAL CYCLONES 1978

Paul J. Hebert and Staff, NHC

National Hurricane Center
Miami, Florida
April 1979

UNITED STATES
DEPARTMENT OF COMMERCE
Juanita M. Kreps, Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
Richard A. Frank, Administrator

National Weather
Service
George F. Cressman, Director

Property of
NOAA Coral Gables Library
Gables One Tower

Room 520



4674

INTRODUCTION

This is the fifth report of an annual series prepared by the National Hurricane Center (NHC) to provide a source of summarized data on Atlantic tropical cyclones. It will not duplicate the narrative overview of the hurricane season and the description of the individual storms, which will continue to be published in the Monthly Weather Review.

In addition to data supplied by the National Weather Service, materials have been furnished by the NOAA National Environmental Satellite Services (NESS) Miami office, and the CARCAH (Chief Aerial Reconnaissance Coordination, all Hurricanes).

OBJECTIVE FORECAST TECHNIQUES

The following tropical cyclone prediction models were used at the National Hurricane Center for forecasting motion on an operational basis:

1. NHC-67 (Miller, Hill, Chase, 1968). A stepwise screening regression model using predictors derived from the current and 24-hour old 1000, 700, and 500 mb data, and includes persistence during the early forecast periods.
2. SANBAR (Sanders and Burpee, 1968). A filtered barotropic model using input data derived from the 1000 to 100 mb pressure weighted winds. The model requires the use of "bogus" data in data-void areas. The system was modified by Pike (1972) so that the initial wind field near the storm would conform to the current storm motion.
3. HURRAN (Hope and Neumann, 1970). An analog system using as a data base the tracks of all Atlantic tropical storms and hurricanes dating back to 1886.
4. CLIPER (Neumann, 1972). Stepwise multiple screening regression using the predictors derived from climatology and persistence.

Tropical cyclone warning lead times for United States landfalling storms are given in Table 3a. A summary of warning lead times for the period 1970-1978 for hurricanes only and for both tropical storms and hurricanes is given in Table 3b. The length of time between the issuance of the warnings and the time that the center crossed the coast, as determined from the "best track" was taken as the warning lead time. A more complete discussion of the verification of tropical cyclone warning lead times, as well as verifications for individual storms from 1970-1977 can be found in the 1977 Annual Data and Verification Tabulation (Lawrence, Hebert, and Staff, 1979)

DATA SUMMARIES

A summary of 1978 North Atlantic tropical cyclone statistics is given in Table 4. A unique subtropical storm which occurred in January is also included. Tracks of 1978 named storms and the January subtropical storm are shown in Figure 1.

The best track, initial, and forecast positions for 1978 named storms are in Table 5, along with initial position and forecast errors, and storm average errors.

Table 6 lists all center fix positions and intensity evaluations used operationally at the National Hurricane Center during 1978. Fixes are in chronological order, and include those obtained by aerial reconnaissance penetrations and radar, satellite (Miami SFSS), and land-based radar

Supplementary Vortex Data Messages which replaced Vortex Profiles in the 1977 Annual Data Tabulation are given in Table 7. A diagram of the paths flown in obtaining these Data Messages is given in Figure 2. The symbolic code for interpreting the Data Messages is given as Appendix A.

Table 8 is an aerial reconnaissance summary for the 1978 season.

Graphs of the lowest central pressure versus time for 1978 tropical

cyclones and the January subtropical cyclone are presented in Figure 3.

Daily GOES-2 satellite photographs of 1978 named tropical cyclones and the January subtropical cyclone are shown in Figure 4.

ACKNOWLEDGMENTS

Main contributors were: Ms Albertha Sanders, who listed the center fixes in chronological order; Ms Mary Watson, who did the pressure-time graphs; Dr. Joseph Pelissier, who computed the verification statistics; Mrs. Charlotte M. Hinderliter, who typed the tables and manuscript.

REFERENCES

- Hope, J. R. and C. J. Neumann, 1970: "An Operational Technique for Relating the Movement of Existing Tropical Cyclones to Past Tracks", Monthly Weather Review, Vol. 98, No. 23, pp. 925-933.
- Hovermale, J. B., 1975: First season storm movement characteristics of the NMC objective hurricane forecast model. Minutes of the NOAA Hurricane Warning Conference, National Hurricane Center, Coral Gables, Florida.
- Lawrence, Miles B., Paul J. Hebert, and Staff, NHC, 1979: "Annual Data and Verification Tabulation Atlantic Tropical Cyclones, 1978", NOAA Technical Memorandum NWS NHC
- Miller, B. I., E. C. Hill and P. P. Chase, 1968: "Revised Technique for Forecasting Hurricane Motion by Statistical Methods", Monthly Weather Review, Vol. 96, No. 8, pp. 540-548.
- Neumann, C. J., 1972: "An Alternate to the HURRAN Tropical Cyclone Forecast System", NOAA Technical Memorandum NWS SR-62, 24 pp.
- J. R. Hope and B. I. Miller, 1972: "A Statistical Method of Combining Synoptic and Empirical Tropical Cyclone Prediction Systems", NOAA Technical Memorandum NWS SR-63, 32 pp.
- and M. B. Lawrence, 1973: "Statistical-Dynamical Prediction of Tropical Cyclone Motion (NHC-73)", NOAA Technical Memorandum NWS SR-69, 34 pp.
- Pelissier, J. M., 1978: Minutes of the NOAA Hurricane Warning Conference, National Hurricane Center, Coral Gables, Florida.
- Pike, A. C., 1972: "Improved Barotropic Hurricane Track Prediction by Adjustment of the Initial Wind Field", NOAA Technical Memorandum NWS SR-66, 16 pp.
- Sanders, F., and R. W. Burpee, 1968: "Experiments in Barotropic Hurricane Track Forecasting", Journal of Applied Meteorology, Vol. 7, No. 3, pp. 313-323.

LIST OF FIGURES, TABLES, AND APPENDICES

PAGE NO.

- 7 Table 1. Verification of 1978 tropical storm and hurricane forecasts. Figures in parenthesis are the number of cases.
- 8 Table 2. Landfall errors of 1978 tropical storms and hurricanes
- 9 Table 3a. Warning lead times for 1978 landfalling United States tropical storms and hurricanes.
- 9 Table 3b. Summary of warning lead times for hurricanes only and all tropical cyclones for the period 1970-78.
- 10 Table 4. Summary of 1978 tropical and subtropical cyclone statistics.
- 11 Table 5. Best track, initial and forecast positions, initial position error and forecast errors for 1978 tropical cyclones.
- 18 Table 6. Center fix positions and intensity evaluations for 1978 tropical and subtropical cyclones.
- 35 Table 7. Supplementary Vortex Data Messages, 1978 Atlantic tropical cyclones.
- 45 Table 8. Aerial weather reconnaissance summary for 1978 hurricane season.
- 46 Figure 1. Tracks of 1978 tropical and subtropical cyclones.
- 47 Figure 2. Flight pattern flown in obtaining Supplementary Vortex Data Messages.
- 48 Figure 3. Lowest pressure vs time, 1978 tropical and subtropical cyclones.
- 54 Figure 4. Daily GOES-2 satellite photographs of 1978 named tropical cyclones and the January subtropical cyclone
- 61 Appendix 1. Code for Supplementary Vortex Data Messages of Figure

Table 1. Verification of 1978 tropical storm and hurricane forecasts.

Figures in parenthesis are number of cases.

METHOD	INITIAL POSITION ERROR (N.MI.)	FORECAST DISPLACEMENT ERRORS (N.MI.)			
		12 HR	24 HR	48 HR	72 HR
OFFICIAL	19 (123)	61 (115)	135 (101)	315 (59)	408 (33)
NHC-67	19 (93)	55 (91)	113 (77)	277 (51)	414 (35)
NHC-72	19 (120)	60 (118)	130 (100)	266 (67)	407 (41)
HURRAN	20 (83)	55 (83)	119 (70)	258 (44)	344 (24)
CLIPER	19 (122)	57 (120)	136 (102)	300 (68)	398 (41)
NHC-73	15 (43)	59 (42)	137 (36)	301 (24)	444 (17)
SANBAR	17 (52)	67 (51)	136 (43)	303 (28)	479 (19)
MFM	9 (10)	52 (10)	122 (10)	351 (8)	--- ---

Table 2. Landfall errors of 1978 tropical storms and hurricanes.

STORM NAME	LANDFALL DAY	FORECAST ERROR (N.MI.)	LOCATION AND REMARKS
Amelia	7/30/2100 GMT		Storm made landfall less than 24 hours after developing.
Bess	8/08/0600 GMT	90	Near Nautla, Mexico
Cora	8/11/0200 GMT	85	Crossed island of Grenada
Debra	8/29/0100 GMT		Storm made landfall less than 24 hours after developing.
Greta #1	9/18/0600 GMT	0	Honduras
Greta #2	9/19/0000 GMT	0	Belize
	1978 AVERAGE	= 44	

NINE YEAR SUMMARY OF ERRORS IN THE PREDICTION OF THE POINTS OF LANDFALL OF ATLANTIC HURRICANES AND TROPICAL STORMS:

1970-1978

	<u>UNITED STATES</u>	<u>ALL LANDFALLS</u>
Average error (N.MI. (number of cases)	39 (13)	50 (34)

Table 3a. Tropical cyclone warning lead times for 1978 United States landfalling storms.

Amelia	T.S.	7/30/2200Z	Gale warnings Brownsville to Port O'Connor, Texas. 7/30/2200Z (System became a tropical storm on the coast at this time.)	0 hr
Debra	T.S.	7/29/0100Z	Gale Warnings Galveston, Texas to Grand Isle, La. 7/28/1800Z (System became a tropical storm at this time.)	7 hr

Table 3b. Summary of warning lead times for all tropical cyclones and for only hurricanes making United States landfalls during the period 1970-1978.

ALL HURRICANES

AVERAGE LEAD TIME-----18.8 hours
 STANDARD DEVIATION-----5.6 hours
 NUMBER OF CASES----- 7

ALL TROPICAL STORMS AND HURRICANES

AVERAGE LEAD TIME-----17.6 hours
 STANDARD DEVIATION-----8.6 hours
 NUMBER OF CASES-----17

Table 4. Summary of North Atlantic Tropical Cyclone Statistics, 1978

NO.	NAME	CLASS	DATES	MAXIMUM SUSTAINED WINDS (KT)	LOWEST PRESSURE (MB)	U.S. DAMAGE (\$ MILLION)	DEATHS
1.		ST	18-22 JAN.	40	1002		
	AMELIA	T	30-31 JULY	45	1005	20	U.S., 30
3.	BESS	T	5-8 AUG.	45	1005		
4.	CORA	H	7-11 AUG.	80	980		
5.	DEBRA	T	26-29 AUG.	50	1000		U.S., 2
6.	ELLA	H	29 AUG. - 5 SEPT.	120	956		
7.	FLOSSIE	H	3-16 SEPT.	85	976		
8.	GRETA	H	13-19 SEPT.	115	947		1 HONDUR 4 BELIZE
9.	HOPE	T	11-21 SEPT.	60	987		
10.	IRMA	T	2-5 OCT.	45	1001		
11.	JULIET	T	7-11 OCT.	45	1006		
12.	KENDRA	H	28 OCT. - 3 NOV.	70	990		

Table 5. Best track, initial and forecast positions, initial position error and forecast errors for 1978 tropical cyclones.

TROPICAL STORM AMELIA 30-31 JULY 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST ERROR			24 HOUR FORECAST ERROR			48 HOUR FORECAST ERROR			72 HOUR FORECAST ERROR		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
3100	26.4	97.4	26.0	97.0	32	27.5	98.5	38	29.0	99.0							
3106	27.2	97.8	26.9	97.9		29.2	97.8										
3112	28.0	98.2	28.7	97.8		30.5	97.8										
MEAN VECTOR ERRORS (N.MI.)					32			38			0			0			0
NUMBER OF CASES					1			1									

TROPICAL STORM BESS 5-8 AUGUST 1978

II

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST ERROR			24 HOUR FORECAST ERROR			48 HOUR FORECAST ERROR			72 HOUR FORECAST ERROR		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
0618	23.9	94.0															
0700	23.3	95.0	23.5	94.9	13	22.8	96.6	37	22.4	98.2	107						
0706	22.8	95.7	22.8	95.9	11	21.4	98.4	90									
0712	22.2	96.2	22.3	96.2	6	21.5	98.0	69									
0718	21.6	96.6	21.3	95.3	75	20.0	96.5	51									
0800	21.1	96.8	21.2	97.0		21.3	98.0										
0806	20.4	96.9	20.6	96.9		20.0	97.5										
MEAN VECTOR ERRORS (N.MI)					26			62			106			0			
NUMBER OF CASES					4			4			1						

Table 5 continued.

HURRICANE CORA 7-11 AUGUST 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)
0812	14.0	41.5	14.0	41.6	6	14.2	45.0	12	14.5	48.0	68	15.5	54.0	260	17.0	61.0	
0818	14.0	43.2	14.0	43.3	6	14.2	46.7	21	14.5	49.0	126	15.5	55.0	305	16.5	61.0	
0900	14.0	44.9	14.0	44.7	12	14.2	48.0	43	15.0	51.0	162	16.5	56.5	364	18.5	61.5	
0906	13.9	46.8	14.0	46.4	24	14.0	49.8	48	14.5	52.5	163	16.0	58.0	347	18.0	63.0	
0912	13.6	48.6	13.8	47.7	54	13.9	50.0	123	14.0	53.0	195	15.0	59.0		16.0	65.0	
0918	13.2	50.6	13.3	50.4	13	13.0	54.3	35	13.0	57.5	80	13.5	63.5		14.0	68.0	
1000	12.8	52.8	13.2	52.4	34	13.0	56.5	25	13.0	58.5	123	14.0	65.0		14.5	69.5	
1006	12.4	54.8	13.0	54.7	36	12.8	58.8	8	13.0	63.0	30	14.0	69.0		15.0	74.0	
1012	12.2	56.8	12.2	56.8	0	12.0	62.0	65	12.0	65.0		13.0	71.0		14.0	76.0	
1018	12.1	58.8	12.3	58.6	17	12.1	62.5	8	12.2	65.5		13.0	71.5		14.0	77.5	
1100	12.0	60.9	12.0	60.9		12.2	64.5		13.0	68.0		15.5	73.5		18.5	78.0	
1106	12.0	62.8	12.1	63.0		12.5	67.0		13.5	71.0		15.0	77.0		17.0	83.0	
MEAN VECTOR ERRORS (N.MI.)					20			39			118			319			0
NUMBER OF CASES					10			10			8			4			

TROPICAL STORM DEBRA 26-29 AUGUST 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)
2818	28.7	94.1	28.3	94.2		29.9	93.7		31.5	93.0		33.5	90.0				
2900	29.6	93.6	29.7	93.5		31.3	93.0		33.5	92.5							
MEAN VECTOR ERRORS (N.MI.)																	
NUMBER OF CASES					0			0			0			0			0

Table 5 continued.

HURRICANE ELLA 29 AUGUST - 5 SEPTEMBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
3018	27.3	63.1	27.3	63.0	5				27.5	66.5	159						
3100	27.6	64.2	27.5	64.0	12	27.9	66.0	88	28.2	67.5	144	29.0	70.0	181	30.0	72.0	136
3106	28.2	65.9	28.1	65.8	8	28.7	68.6	31	29.5	71.0	30	30.5	74.0	70	32.0	77.0	244
3112	28.8	67.6	28.7	67.5	8	30.0	71.0	65	31.0	73.0	71	34.0	75.0	175	38.0	73.0	267
3118	29.3	68.8	29.2	68.8	6	30.5	72.0	56	32.0	74.0	106	35.0	74.5	206	38.0	73.0	230
0100	29.6	70.0	29.6	70.0	0	30.5	72.0	16	32.0	74.0	82	35.0	74.5	183	37.0	72.0	185
0106	30.1	71.1	30.1	71.1	0	31.5	73.5	66	33.5	74.5	145	36.0	74.0	197	37.5	71.0	239
0112	30.7	71.8	30.7	71.9	5	32.0	73.5	60	33.5	74.5	127	36.0	73.0	145	37.0	70.0	371
0118	31.1	72.3	31.1	72.2	5	32.0	73.2	37	33.0	74.0	86	35.5	73.5	169	38.0	68.0	477
0200	31.2	72.7	31.4	72.7	12	32.3	73.2	30	33.5	73.5	70	35.0	73.0	244	37.0	68.0	765
0206	31.4	73.1	31.4	73.0	5	31.6	73.2	24	31.6	73.2	96	33.0	73.5	477	35.5	72.5	1222
0212	31.6	73.3	31.5	73.4	8	31.6	73.3	41	31.6	73.3	147	33.0	73.5	650	35.5	72.5	1447
0218	31.9	73.0	31.8	73.1	8	32.3	72.8	39	33.7	72.2	119	36.0	70.0	617	39.0	66.0	
0300	32.3	72.8	32.2	72.7	8	33.5	72.0	23	35.0	70.5	130	38.5	66.0	627	42.0	60.0	
0306	33.0	72.4	33.0	72.4	0	34.5	71.0	50	36.0	69.5	206	39.0	65.0	812	42.0	60.0	
0312	33.8	71.7	33.8	71.9	10	36.5	69.5	52	38.5	67.0	198	44.0	61.0	716	50.0	53.0	
0318	35.0	70.2	34.9	70.2	6	36.4	68.0	131	38.0	65.0	365	42.0	56.0		46.0	47.0	
0400	36.2	68.3	36.2	68.4	5	39.0	63.0	60	42.0	56.0	184	48.0	42.0				
0406	38.0	66.0	37.3	66.0	42	40.2	60.0	99	44.0	52.0	168	49.0	38.0				
0412	40.0	63.0	39.8	63.0	12	45.0	56.0	44	49.0	48.0	119	51.0	29.0				
0418	42.5	59.5	42.0	60.0	37	47.0	52.0	56	50.0	42.0		51.0	24.0				
0500	45.0	55.0	45.5	55.0	30	49.0	45.0	30	51.0	30.0							
0506	47.2	50.2	48.5	47.5													
0512	49.0	45.0	49.5	45.0													
MEAN VECTOR ERRORS (N.MI.)					11			52			138			365			507
NUMBER OF CASES					22			21			20			15			11

13

Table 5 continued.

HURRICANE FLOSSIE 3-17 SEPTEMBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST			
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	
0412	14.2	41.2	14.0	41.0	17	13.8	42.5	203	14.5	44.5	312	15.5	48.5	529	16.5	52.5	529	
0418	15.5	42.9	15.0	42.5	38	15.2	44.8	144	15.5	47.0	285	16.5	52.5	363	18.0	57.0	313	
0500	16.7	44.8	14.0	44.0	168	15.1	46.8	68	16.0	49.5	159	17.0	54.0	219	18.0	59.0	169	
0506	17.8	46.4	15.0	45.0	186	16.0	47.5	96	16.5	50.0	192	18.0	54.0	213	20.0	58.0	152	
0512	18.9	47.9	19.0	48.0	8	20.0	51.0	80	21.0	54.0	98	23.0	60.0	42	25.0	65.0	210	
0518	20.3	49.5	20.3	49.5	0	22.5	52.5	49	25.0	55.0	216	28.0	58.0	384	30.0	60.0		
0600	21.2	51.2	21.2	51.3	6	23.0	53.5	109	25.5	55.5	269	29.0	58.0	443	32.0	58.0		
0606	22.0	53.2	22.0	53.0	11	24.0	55.0	159	26.0	56.5	282	29.0	58.0	388	32.0	58.0		
0612	22.1	55.1	21.5	55.2	36	22.5	58.5	87	24.0	62.0	178	27.0	65.0	286	31.0	66.0		
0618	21.8	56.8	22.0	57.2	25	22.5	61.5	120	24.0	65.0	208	28.0	68.0		32.0	68.0		
0700	21.7	58.0	22.0	58.2	21	22.0	61.0	54	22.0	63.0	70	23.0	67.0		25.0	70.0		
0706	21.8	59.0	21.9	59.1	8	22.0	61.0	29	22.0	63.0	108	23.0	67.0		25.0	70.0		
0712	22.2	60.0	22.2	60.0	0	23.0	62.0	24	24.5	63.5	132	28.0	63.0		31.0	57.0		
0718	22.3	61.2	22.7	61.2	24	23.5	63.5	86	25.0	64.0		29.0	62.0		32.0	54.0		
0800	22.6	62.0	22.2	62.0	24	22.5	62.0	98	23.0	62.5		25.0	64.0		27.0	65.0	776	
0806	23.5	62.0	22.0	62.0	90	22.0	62.0		22.0	62.0		24.0	63.0		27.0	63.0	743	
0812	24.3	61.1	24.5	60.5	35	26.0	59.0		29.0	56.0		33.0	48.0		37.0	37.0	613	
1100	29.2	50.5	29.3	50.3		(NOTE: FLOSSIE WAS A TROPICAL DEPRESSION FROM 8/18 TO 11/00. FORECASTS NOT VERIFIED.)												
1106	29.9	49.1	30.0	49.0	8	32.0	46.0	58	34.0	43.0	157	38.0	38.0	423	42.0	32.0	618	
1112	30.7	47.5	30.9	47.2	20	33.0	43.0	115	36.0	39.0	327	41.0	32.0	710				
1118	31.0	45.7	31.2	45.8	13	33.0	43.0	101	36.0	39.0	320	41.0	32.0	686				
1200	31.3	44.7	31.5	45.0	19	33.0	42.0	116	34.5	39.0	259	37.0	35.0	429	40.0	30.0	406	
1206	31.4	44.0	31.5	44.0	6	31.8	42.0	51	32.0	40.0	153	34.0	35.0	406	38.0	29.0	443	
1212	31.6	43.5	31.6	43.3	10	31.7	42.3	21	31.8	41.0	103	32.0	39.0	350	33.0	36.0	778	
1218	31.7	43.0	31.7	42.9	5	31.8	41.5	74	32.0	40.2	171	32.0	38.0	455	33.0	35.0	919	
1300	31.8	42.9	31.7	42.8	8	31.8	42.5	47	31.8	42.5	164	36.0	42.0	334	42.0	37.0		
1306	32.1	43.0	31.8	42.8	21	32.8	42.7	32	34.0	42.7	96	38.0	42.0	407	44.0	38.0		
1312	32.6	43.0	32.6	43.0	0	33.8	43.0	48	35.0	43.0	154	39.0	42.0	572	45.0	38.0		
1318	33.6	43.1	33.5	43.0	8	35.5	42.5	23	37.5	41.5	112	42.0	38.0	500	46.0	30.0		
1400	34.6	43.1	34.5	42.9	12	36.5	42.0	50	39.0	40.5	148	44.0	36.0		49.0	27.0		
1406	35.9	42.9	35.3	42.6	39	38.5	41.5	58	42.0	38.0	111	46.0	30.0					
1412	37.4	41.9	37.3	41.8	8	40.0	40.0	88	43.0	37.0	242	48.0	27.0					
1418	39.3	40.6	39.2	40.3	15	43.0	37.0	61	46.0	32.0	153	49.0	20.0					
1500	40.9	38.5	40.9	38.0	23	44.0	32.0	103	46.0	25.0								
1506	43.1	35.9	43.0	36.0	7	45.5	30.0	128	47.0	22.0								
1512	45.7	32.8																
1518	47.7	29.4																
MEAN VECTOR ERRORS (N.MI.)					27				81				407				13	
NUMBER OF CASES					34				32				28				13	

Table 5 continued.

HURRICANE GRETA 13-20 SEPTEMBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
	LAT.	LONG.	LAT.	LONG.	(N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)	LAT.	LONG.	ERROR (N.MI.)
1412	12.5	67.5	12.5	67.5	0				13.5	74.0	53						
1418	13.0	69.0	13.1	69.2	13	13.4	71.6	19	13.5	74.0	30	14.0	78.0	58	14.5	82.0	81
1500	13.3	70.4	13.1	70.9	32	13.5	73.5	13	13.8	76.5	43	14.5	81.5	82	16.5	86.0	138
1506	13.4	71.7	13.4	72.2	29	14.1	75.3	42	14.7	78.5	93	15.5	82.5	94	16.5	86.5	107
1512	13.5	73.1	13.6	73.4	18	13.7	75.5	13	14.5	78.0	24	15.5	82.0	13	17.0	86.0	31
1518	13.7	74.2	13.8	74.2	6	14.0	76.2	30	14.5	78.0	41	15.5	82.0	35	17.0	86.0	55
1600	13.8	75.3	13.9	75.3	6	14.4	77.2	34	15.0	79.0	39	16.5	83.0	53	18.0	87.0	87
1606	13.8	76.7	14.0	76.5	17	14.3	78.7	17	14.5	80.5	38	15.5	84.5	38	17.0	88.0	70
1612	14.0	77.7	13.9	77.8	8	14.2	80.0	25	14.7	82.3	42	15.5	85.5	49	17.0	88.5	
1618	14.3	78.7	14.0	78.6	19	14.5	81.0	35	15.0	83.2	42	15.5	85.5	89	17.0	88.5	
1700	14.6	79.6	14.6	79.6	0	15.0	81.5	13	15.5	83.5	8	17.0	87.0	69	19.0	90.0	
1706	14.9	80.5	14.9	80.6	6	15.7	83.4	42	17.0	86.0	117	20.0	89.0	182	24.0	91.0	
1712	15.2	81.6	15.1	81.6	6	15.6	83.7	18	16.2	86.0	24	18.5	89.5		21.0	92.0	
1718	15.5	82.6	15.4	82.6	6	16.0	85.0	44	16.5	87.0	6	18.0	90.0		20.5	92.5	
1800	15.6	83.4	15.5	83.4	6	16.0	85.5	19	16.5	87.5	47	17.5	91.5		19.0	95.0	
1806	15.8	84.3	15.8	84.3	0	16.5	86.3	35	17.0	88.0	80	18.0	91.0		19.0	94.0	
1812	16.4	85.6	16.4	85.5	6	16.9	87.7	24	17.5	89.6		18.4	93.0		19.5	96.0	
1818	16.6	86.9	16.6	86.9	0	17.3	89.4	18	18.0	92.0		19.5	95.0		21.0	98.0	
1900	17.0	88.2	17.0	88.0		17.5	90.5		18.0	93.0		20.0	96.5		22.0	99.0	
1906	17.0	89.4	17.1	89.3		17.8	92.0		18.6	94.0		21.0	98.0				
MEAN VECTOR ERRORS (N.MI.)					10			26			45			69			81
NUMBER OF CASES					18			17			16			11			7

15

Table 5 continued.

TROPICAL STORM HOPE 11-21 SEPTEMBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST ERROR			24 HOUR FORECAST ERROR			48 HOUR FORECAST ERROR			72 HOUR FORECAST ERROR		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
1706	33.0	54.8	33.2	54.8	12				37.0	50.0	106						
1712	33.8	53.4	33.7	53.4	6	34.8	51.0	85	36.5	48.5	179	40.0	44.0	368	46.0	38.0	467
1718	35.0	51.8	35.0	52.0	10	36.8	49.8	87	39.0	47.0	177	44.0	42.0	293	55.0	35.0	194
1800	36.0	49.9	36.0	50.0	5	38.5	43.5	90	43.0	37.0	238	55.0	30.0	582			
1806	37.0	47.8	37.6	47.8	36	41.0	43.0	78	44.0	39.0	134	55.0	30.0	372			
1812	38.0	45.2	38.0	45.7	24	41.5	41.5	87	45.0	36.5	152	57.0	27.0	346			
1818	39.1	43.0	39.0	44.0	47	41.2	39.2	15	43.5	35.0	50	55.0	25.0	203			
1900	40.1	40.5	40.0	40.5	6	43.0	35.0	75	48.0	30.0	199						
1906	41.2	38.5	41.3	38.5	6	45.0	34.0	69	50.0	29.0	109						
1912	42.5	36.5	42.0	37.0	37	45.0	33.0	21	50.0	28.0	97						
1918	44.0	35.0	44.0	35.0	0	47.0	31.0	83	52.0	26.0	174						
2000	45.5	33.0	46.0	33.0	30	50.0	28.0	133	56.0	24.0	217						
2006	48.2	30.0	48.2	30.0	0	54.0	25.0	159	60.0	22.0	184						
2012	51.5	29.5															
2018	54.0	29.5															
2100	57.0	30.0															
2106	59.5	28.0															
MEAN VECTOR ERRORS (N.MI.)					17			82			155			361			330
NUMBER OF CASES					13			12			12			6			2

TROPICAL STORM IRMA 2-5 OCTOBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST ERROR			24 HOUR FORECAST ERROR			48 HOUR FORECAST ERROR			72 HOUR FORECAST ERROR		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
0412	35.1	31.5	35.0	31.5	6	37.8	31.5	73	41.0	30.0	86	45.5	24.0		49.5	16.5	
0418	35.8	31.4	35.8	31.4	0	38.0	31.5	53	41.0	30.0		45.5	24.0				
0500	36.7	31.2	36.5	31.3	13	39.0	30.0	70	41.5	27.0		45.0	20.0				
0506	38.2	30.4	38.0	30.5		42.0	28.0		46.0	24.0							
0512	40.0	28.8	49.8	29.5		43.5	25.0										
MEAN VECTOR ERRORS (N.MI.)					6			66			86			0			0
NUMBER OF CASES					3			3			1						

Table 5 continued.

TROPICAL STORM JULIET 7-11 OCTOBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST ERROR			24 HOUR FORECAST ERROR			48 HOUR FORECAST ERROR			72 HOUR FORECAST ERROR		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
0812	18.8	58.7															
0818	19.0	59.8	19.1	59.7	8				21.0	64.0	36						
0900	19.3	60.9	19.2	60.9	6				20.5	65.5	19						
0906	19.7	62.0	19.7	61.9	6				23.0	66.5	81						
0912	19.9	63.0	20.2	63.2	21	21.0	65.7	13	22.0	67.5	106	24.0	70.0	390	27.0	71.0	
0918	20.3	64.2	20.4	64.3	8	21.0	66.5	59	21.5	68.0	212	24.0	70.0		27.0	71.0	
1000	20.9	65.4	20.8	65.7	18	21.5	67.5	114	22.5	68.5	262	25.0	70.0		28.0	70.0	
1006	21.7	67.0	21.2	66.0	63	22.3	67.3	134	23.0	68.0	308	25.0	69.0		28.0	68.0	
1012	22.8	68.8	22.5	68.5	24	24.5	71.0	87	26.0	73.0	295	28.0	75.0		30.0	77.0	
1018	24.3	70.1	25.0	70.5	47	27.5	71.0	92	30.0	70.0							
1100	26.2	70.9	27.0	71.0	48	29.0	71.0	131									
1106	28.3	71.0															
1112	30.2	69.9	30.0	71.0		32.0	67.0		33.5	62.0							
MEAN VECTOR ERRORS (N.MI.)					25			90			165			390			0
NUMBER OF CASES					10			7			8			1			

HURRICANE KENDRA 28 OCTOBER - 3 NOVEMBER 1978

DATE/TIME (GMT)	BEST TRACK		OPERATIONAL POSITION		POSITION ERROR (N.MI.)	12 HOUR FORECAST ERROR			24 HOUR FORECAST ERROR			48 HOUR FORECAST ERROR			72 HOUR FORECAST ERROR		
	LAT.	LONG.	LAT.	LONG.		LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)	LAT.	LONG.	(N.MI.)
2918	26.2	74.1	26.3	74.3	12	27.5	75.0	81	29.0	75.5	159	31.0	76.0	215	33.0	76.0	
3000	27.3	73.7	27.5	73.7	12	29.5	74.0	77	31.0	74.0	114	34.0	74.0	190	36.0	70.0	
3006	28.1	73.5	28.3	73.7	16	30.0	73.2	47	31.0	73.0	40	34.0	73.0		36.0	69.0	
3012	28.9	72.6	29.2	72.5	19	31.0	71.8	42	32.5	71.0	78	36.0	69.0		40.0	65.0	
3018	29.3	72.3	30.1	72.0	50	31.5	71.5	20	33.0	70.7	46	36.0	69.0		40.0	65.0	
3100	30.0	72.0	30.0	72.0	0	30.5	72.0	36	32.0	72.0	84	37.0	67.0		39.0	55.0	
3106	30.5	72.1	30.5	72.2	5	31.0	71.8	42	32.5	71.0		36.0	69.0				
3112	31.1	71.9	31.0	72.0	8	32.5	71.0	20	37.0	65.0							
3118	31.7	71.7	31.6	71.8		33.0	71.0		36.0	68.0							
0100	32.6	70.5															
MEAN VECTOR ERRORS (N.MI.)					15			46			87			202			0
NUMBER OF CASES					8			8			6			2			

1978 SUMMARY FOR OFFICIAL	POS. ERR	12HR	24HR	48HR	72HR
AVERAGE ERROR FOR ALL STORMS (N.MI.)	19	61	135	315	408
NUMBER OF CASES	123	115	101	59	33

Table 6. Center fix positions and intensity evaluations for 1978 tropical and subtropical cyclones.

SUBTROPICAL STORM
18-22 JANUARY 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. PRESS. 700MB (MB)	MIN. HT. (M)	TEMP. (°C)		EYE		REMARKS
			LAT. °N	LON. °W			FLT. LVL.	ACFT. ALT.			IN.	OUT.	C=CIR. DIA. E=ELIP. (N.MI.)		
1	19	1730	23.8	48.4	GOES 2	2,3,VSBL 2		35							
2	20	0030	24.2	49.6	GOES 2	2,3, IR 8		35							
3	20	0630	24.1	50.5	GOES 2	2,3, IR 8		35							
4	20	1230	23.5	51.8	GOES 2	1,1,VSBL 2		35							
5	20	1830	23.0	53.4	GOES 2	1,3,VSBL 2		35							
6	21	0030	22.9	54.8	GOES 2	2,5, IR 8		35							
7	21	0630	22.6	56.2	GOES 2	2,5, IR 8		40							
8	21	1230	22.8	57.4	GOES 2	2,5,VSBL 2		40							
9	21	1800	22.4	58.8	GOES 2	3,VSBL 2									
10	21	1830	22.4	58.9	GOES 2	1,3,VSBL 2		40							
11	21	1925	22.1	58.9	AF	5/5		50	235M	1003		22	22		
12	22	0030	22.1	59.9	GCES 2	2,3, IR 8		40							
13	22	0630	21.7	61.0	GOES 2	2,3, IR 8		35							
14	22	1230	21.4	61.9	GOES 1	1,3,VSBL 2		32							
15	22	1830	21.3	63.1	GOES 2	1,3,VSBL 2		25							
16	22	2025	20.8	63.4	AF	5/5	30	30	213M	1010		23	24		
17	23	1230	21.5	66.5	GOES 2	5,VSBL 2									
18	23	1230	21.0	66.7	AF	10/10		15	290M	1018		24	24		
19	23	1421	20.6	67.2	AF	5/15			152M	1015		24			
20	23	1830	21.8	68.0	GOES 2	5,VSBL 1									

Table 6 continued.

TROPICAL STORM AMELIA
30-31 JULY 1978CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. PRESS. 700MB	MIN. HT. (M)	TEMP. (°C)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	ACFT. SFC.			IN.	OUT.	C=CIR. DIA. E=ELIP. (N.MI.)		
1	30	0030	22.3	95.0	GOES 2	1,5, IR 8		25							
2	30	0630	22.6	95.7	GOES 2	1,5, IR 8		25							
3	30	1130	23.5	95.3	GOES 2	5, IR 8									
4	30	1300	23.6	95.3	GOES 2	1,5, VSBL 5		28							
5	30	1730	25.7	97.0	GOES 2	3, VSBL 1									
6	30	1830	25.8	97.0	GOES 2	1,5, VSBL 1		28							
7	31	0100	26.1	96.8	GOES 2	1,5, IR 8		30							
8	31	0630	27.0	97.5	GOES 2	5, IR 8									

Table 6 continued.

TROPICAL STORM BESS
5-8 AUGUST 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND(KT)		MIN. ALT.	MIN. PRESS. (MB)	MIN. HT. (M)	TEMP. (°C)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				ACFT.	700MB	IN.	OUT.	
1	6	1230	24.5	93.6	GOES 2	1,5,VSBL 1		25								
2	6	1830	24.2	94.2	GOES 2	2,3,VSBL 1		30								
3	6	2120	23.6	94.3	AF	2/4	40	40	283M	1008		25	24	C	20	EYE BROAD & DIFFUSED.
4	6	2330	23.5	95.0	GOES 2	3,VSBL 1										
5	6	2348	23.1	94.7	AF	2/4	41	45	283M	1007		25	25	C	20	EYE BROAD & DIFFUSED.
6	7	0000	23.4	95.1	GOES 2	2,3,VSBL 1		33								
7	7	0530	22.8	95.9	GOES 2	5, IR 8										
8	7	0630	22.4	96.2	GOES 2	2,5, IR 8		33								
9	7	1018	22.1	96.5	AF	2/10	38		445M	1006		25	25	C	20	POORLY DEFINED.
10	7	1140	22.4	96.1	AF	2/30	40		448M	1005		25	25	E12/55/30		CLOSED.
11	7	1200	21.9	96.1	GOES 2	5,VSBL 1		35								
12	7	1230	21.9	96.1	GOES 2	2,3,VSBL 1		35								
13	7	1800	21.7	96.6	GOES 2	3,VSBL										
14	7	1804	21.3	96.3	AF	10/1	30	35	314M	1008		24	22			POORLY DEFINED.
15	7	1830	21.6	96.7	GOES 2	2,3,VSBL 2		35								
16	7	1947	21.3	96.5	AF		45	60	323M	1007		28	23			
17	7	2100	21.2	96.6	GOES 2	2,3,VSBL 1		45								
18	7	2101	21.2	96.7	AF	1/1	41	45		1006		28	23			POORLY DEFINED.
19	7	2303	21.3	96.8	AF	1/1	45	45	219M	1009		24	22			
20	8	0000	20.9	96.9	GOES 2	3,VSBL 1										
21	8	0530	20.5	96.9	GOES 2	3, IR 8										
22	8	0542	20.6	96.9	AF	5/8	47		700MB			9				
23	8	1135	20.2	96.9	AF	5/15	22		500MB			-7				
24	8	1815	20.4	96.5	AF	3/10	38		700MB			8	8	C	60	

Table 6 continued.

 HURRICANE CORA
 7-11 AUGUST 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. ACFT. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT. (M)	TEMP. (°C)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				IN.	OUT.	C-CIR.	DIA. E-ELIP. (N.MI.)	
1	7	1800	13.6	36.2	GOES 2	2,3,VSBL 2										
2	8	0000	13.6	37.5	GOES 2	5, IR 8										
3	8	0030	13.6	38.0	GOES 2	2,5, IR 8										
4	8	0530	14.0	39.5	GOES 2	5, IR 8										
5	8	0630	14.0	40.0	GOES 2	2,5, IR 8										
6	8	1200	14.0	41.6	GOES 2	5,VSBL 2										
7	8	1231	14.0	41.6	GOES 2	2,5,VSBL 1										
8	8	1800	13.9	43.3	GOES 2	1,VSBL 4										
9	8	1830	13.9	43.4	GOES 2	2,1,VSBL 1										
10	8	2330	14.0	44.7	GOES 2	1, IR 8										
11	9	0030	14.0	45.0	GOES 2	2,1, IR 8										
12	9	0530	14.0	46.3	GOES 2	5, IR 8										
13	9	0630	13.9	46.6	GOES 2	2,5, IR 8										
14	9	1200	13.8	47.7	GOES 2	3,VSBL 4										
15	9	1230	13.8	47.8	GOES 2	1,3,VSBL 1										
16	9	1430	13.2	49.6	GOES 2	1,3,VSBL 1										
17	9	1730	13.2	50.3	AF	3/3	45	55	700MB	1001	3109	16	10	C	40	OPEN SOUTHWEST-NORTH.
18	9	1800	13.3	50.4	GOES 2	5,VSBL 4										
19	9	1830	13.3	50.5	GOES 2	1,5,VSBL 1										
20	9	1857	13.1	50.9	AF	3/3		55	213M	1002		24		C	25	OPEN WEST-NORTH.
21	10	0000	13.2	52.4	GOES 2	5, IR 8										
22	10	0030	13.2	52.5	GOES 2	2,4, IR 8										
23	10	0530	13.3	54.5	GOES 2	5, IR 8										
24	10	0630	12.8	54.8	GOES 2	2,5, IR 8										
25	10	1001	11.1	55.6	AF	20/10			549M	1011		23	22	C	25	APPARENTLY NOT CENTER.
26	10	1130	12.3	56.6	GOES 2	3,VSBL 1										
27	10	1230	12.3	57.0	GOES 2	1,3,VSBL 1										
28	10	1530	12.4	57.8	GOES 2	1,5,VSBL 2										
29	10	1800	12.2	58.7	GOES 2	3,VSBL 1										
30	10	1830	12.3	59.0	GOES 2	1,3,VSBL 1										
31	10	1941	12.0	59.2	AF		55	70		1008						
32	10	2100	12.3	59.8	GOES 2	1,5,VSBL 1										
33	10	2244	11.9	60.6	AF					1009						
34	10	0000	12.2	60.9	GOES 2	5, IR 8										
35	11	0030	12.2	61.2	GOES 2	2,5, IR 8										
36	11	0630	12.2	63.0	GOES 2	2,5, IR 8										
37	11	1201	13.1	64.6	GOES 2	5,VSBL 1										
38	11	1230	12.5	64.9	GOES 2	2,5,VSBL 1										
39	11	1800	12.6	65.9	GOES 2	5,VSBL 1										
40	11	1830	13.5	64.0	GOES 2	3,5,VSBL 1										
41	12	0000	12.5	69.0	GOES 2	5, IR 8										
42	12	0030	12.5	69.0	GOES 2	3,5, IR 8										

Table 6 continued.

TROPICAL STORM DEBRA
26-29 AUGUST 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. ACFT. ALT.	MIN. PRESS. (MB)	MIN. HT. (M)	TEMP. (°C)		EYE		REMARKS
			LAT. °N	°W			FLT. LVL.	SFC.				IN.	OUT.	C=CIR. DIA.	E=ELIP. (N.MI.)	
1	26	1230	23.5	88.5	GOES 2	1,5,VSBL 1		25								
2	26	1730	24.0	89.5	GOES 2	5,VSBL 1										
3	26	1830	24.5	89.5	GOES 2	1,5,VSBL 1		25								
4	27	0000	24.5	91.0	GOES 2	5, IR 8										
5	27	0030	24.5	91.0	GOES 2	1,5, IR 8		25								
6	27	0600	24.5	91.4	GOES 2	5, IR 8										
7	27	0630	24.5	91.5	GOES 2	1,5, IR 8		25								
8	27	1200	25.4	92.7	GOES 2	5, IR 8										
9	27	1230	25.0	93.0	GOES 2	2,5,VSBL 1		25								
10	27	1730	25.0	93.0	GOES 2	5,VSBL 1										
11	27	1830	25.0	93.0	GOES 2	2,5,VSBL 1		25								
12	28	0000	26.0	93.8	GOES 2	1,5, IR 8		25								
13	28	0600	27.0	94.5	GOES 2	1,5, IR 8		25								
14	28	1130	27.5	94.9	GOES 2	5, IR 8										
15	28	1230	27.8	94.5	GOES 2	2,5,VSBL 1		30								
16	28	1700	28.2	94.2	AF	5/10		40	305M	1005		23	23	E03/80/40	POORLY DEFINED.	
17	28	1730	28.4	93.9	GOES 2	5,VSBL 1										
18	28	1830	28.7	93.9	GOES 2	2,5,VSBL 1		35								
19	28	2030	28.7	94.3	LCH	RADAR										POSSIBLE CENTER.
20	28	2100	29.0	93.8	GOES 2	2,5,VSBL 1		35								
21	28	2109	28.7	94.2	NOAA	0/0	25		450M	1002		23	23			POORLY DEFINED.
22	28	2135	28.8	94.0	LCH	RADAR										POSSIBLE CENTER.
23	28	2230	29.2	93.8	GLSC	RADAR										POSSIBLE CENTER.
24	28	2233	29.0	93.8	LCH	RADAR										POSSIBLE CENTER.
25	28	2300	29.2	93.7	LCH	RADAR										POSSIBLE CENTER.
26	29	0000	29.8	93.5	GOES 2	3,VSBL 1										
27	29	0000	29.5	93.7	NOAA	0/0	58	50	150M	1000		26	25			POORLY DEFINED.
28	29	0001	29.4	93.7	LCH	RADAR										POSSIBLE CENTER.
29	29	0153	29.6	93.2	LCH	RADAR										POSSIBLE CENTER.
30	29	0234	29.9	93.6	LCH	RADAR										POSSIBLE CENTER.
31	29	0306	30.2	93.9	LCH	RADAR										POSSIBLE CENTER.
32	29	0334	30.2	93.7	LCH	RADAR										POSSIBLE CENTER.

Table 6 continued.

HURRICANE ELLA
9 AUGUST - 5 SEPTEMBER 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT. (M)	TEMP. (°C)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				ACFT.	IN.	OUT.	C-CIR. E-ELIP. (N.MI.)	
1	30	1800	27.3	63.0	GOES 2	5, VSBL 4										
2	30	1830	27.3	63.1	GOES 2	2,5, VSBL 1		25								
3	31	0000	27.7	64.1	GOES 2	5, IR 8										
4	31	0030	27.7	64.2	GOES 2	3,5, IR 8		30								
5	31	0600	28.1	65.8	GOES 2	3, IR 8										
6	31	0630	28.2	65.9	GOES 2	2,3, IR 8		35								
7	31	1130	28.5	67.5	GOES 2	5, VSBL 1										
8	31	1230	28.8	67.6	GOES 2	2,5, VSBL 1		55								
9	31	1500	29.0	68.2	GOES 2	3, IR 8										
10	31	1750	29.2	68.8	AF	3/10	61	70	700MB		2955	15	9	C10-20		POORLY DEFINED.
11	31	1800	29.2	68.9	GOES 2	3, IR 8										
12	31	1830	29.3	69.0	GOES 2	2,3, VSBL 1		65								
13	31	1910	29.3	69.1	AF	3/10	75	90	700MB		2945	13	15	C8-18		POORLY DEFINED.
14	31	2100	29.4	69.4	AF	3/10	70		700MB		2906	13	9	E01/08/05		POORLY DEFINED.
15	31	2341	29.6	70.0	AF	5/5	79		700MB	978	2887	15	7	E18/10/08		CLOSED.
16	1	0000	29.6	70.0	GOES 2	1, IR 8										
17	1	0030	29.6	70.1	GOES 2	2,1, IR 8		77								
18	1	0232	29.8	70.5	AF	5/5	75		700MB	981	2909	12	7	E18/10/08		CLOSED.
19	1	0346	29.9	70.6	AF		92		700MB	982	2909					
20	1	0512	30.0	71.0	AF	5/3	85		700MB	976	2878	13	9	C 10		CLOSED.
21	1	0600	30.1	71.1	GOES 2	1, IR 8										
22	1	0630	30.1	71.2	GOES 2	1,1, IR 8		83								
23	1	0755	30.3	71.3	AF		75		700MB		2864					
24	1	0925	30.5	71.5	AF	5/3			700MB	974	2857	12	7	C 10		CLOSED WALL.
25	1	1200	30.7	71.9	GOES 2	1, IR 8										
26	1	1230	30.8	71.9	GOES 2	1,1, VSBL 1		96								
27	1	1257	30.8	71.8	NOAA	2/2	130		1400M	972		25	21	C 12		CLOSED.
28	1	1500	30.9	72.2	GOES 2	1, IR 8										
29	1	1527	31.0	72.1	NOAA	2/2	130		720M	969		25	22	C 12		CLOSED.
30	1	1630	31.0	72.2	GOES 2	1, VSBL 1										
31	1	1730	31.0	72.3	GOES 2	1, VSBL 1										
32	1	1745	31.1	72.2	NOAA	2/2	108		700MB		2794	14	9	C 18		CLOSED.
33	1	1830	31.1	72.4	GOES 2	1,1, VSBL 1		102								
34	1	1930	31.1	72.5	GOES 2	1, VSBL 1										
35	1	2039	31.2	72.5	AF	3/1	120	100	850MB	959		22	19	C 11		CLOSED.

Table 6 continued.

Hurricane Ella continued.

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	CENTER FIXES			TEMP. (°C)		EYE		REMARKS	
			LAT. N	LONG. W			MAX. WIND (KT)	MIN. PRESS. (MB)	MIN. HT. (M)	IN.	OUT.	C=CIR. DIA.	E=ELIP. (N.M.I.)		
							FLT. LVL.	ACFT. SFC. ALT.	PRESS. 700MB						
36	1	2207	31.3	72.6	AF		120	850MB							
37	1	2255	31.3	72.6	AF		92	110 850MB							
38	1	2344	31.3	72.7	AF	3/3	113	850MB	961		20	17	C	11	CLOSED.
39	2	0000	31.2	72.6	GOES 2	1, IR 8									
40	2	0030	31.3	72.7	GOES 2	2,1, IR 8		102							
41	2	0302	31.3	72.9	NOAA	4/4	120	1000MB	974		27	22	C	15	OPEN SOUTHWEST.
42	2	0553	31.4	73.2	NOAA	5/5	85	1000MB	981		25	21			POORLY DEFINED.
43	2	0600	31.4	72.8	GOES 2	5, IR 8									
44	2	0630	31.5	73.2	GOES 2	2,5, IR 8		96							
45	2	0910	31.5	73.2	NOAA	4/4	95	1000MB	982		25	22			POORLY DEFINED.
46	2	1130	31.5	73.4	GOES 2	3, VSBL 1									
47	2	1151	31.5	73.4	AF	5/5	75	85 700MB	979	2900	15	16	C	15	OPEN SOUTH-NORTHWEST.
48	2	1200	31.5	73.4	GOES 2	1,3, VSBL 1		96							
49	2	1230	31.5	73.4	GOES 2	1,3, VSBL 1		96							
50	2	1344	31.5	73.3	AF		50	700MB		2913					
51	2	1452	31.6	73.3	AF	5/5	54	65 700MB	980	2913	13	9	C	15	OPEN SOUTH-NORTHWEST.
52	2	1530	31.5	73.4	GOES 2	1, VSBL 1									
53	2	1647	31.7	73.1	AF		48	75 700MB		2907					
54	2	1743	31.8	73.1	AF	3/2	55	75 700MB	981	2913	14	8	C	15	OPEN SOUTH-NORTHWEST.
55	2	1800	31.6	73.1	GOES 2	1, VSBL 1									
56	2	1830	31.7	73.0	GOES 2	1,1, VSBL 1		84							
57	2	2024	32.0	72.9	AF	5/1	55	70 700MB	983	2930	14	9	C	25	POORLY DEFINED.
58	2	2200	32.1	72.9	AF		50	65 700MB		2920					
59	3	0000	32.2	72.5	GOES 2	1, IR 8									
60	3	0003	32.2	72.8	AF	5/5	65	50 700MB	984	2932	14	7	C	25	OPEN SOUTHWEST.
61	3	0030	32.2	72.6	GOES 2	1,1, IR 8		90							
62	3	0202	32.5	72.7	AF	5/5	45	700MB	983	2928	14	8	C	20	OPEN SOUTHWEST.
63	3	0600	33.0	72.4	AF	5/5	56	700MB	981	2909	13	9	E36/30/25		POORLY DEFINED. OPEN SOUTHEAST
64	3	0600	33.0	72.5	GOES 2	3, IR 8									
65	3	0630	33.0	72.3	GOES 2	2,3, IR 8		90							
66	3	0815	33.2	72.2	AF	5/5	67	700MB	977	2900	14	10	E36/30/25		POORLY DEFINED. OPEN SOUTH.
67	3	1113	33.7	71.9	AF	5/5	67	80 700MB	975	2874	15	10			OPEN SOUTH SEMI-CIRCLE.
68	3	1150	34.0	71.6	HAT	RADAR									
69	3	1200	34.4	72.1	GOES 2	5, VSBL 4									
70	3	1230	34.3	71.8	GOES 2	2,5, VSBL 1		90							

Table 6 continued.

Hurricane Ella continued.

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	CENTER FIXES			TEMP. (°C)		EYE		REMARKS	
			LAT. °N	°W			MAX. WIND (KT) FLT. LVL.	SFC.	ACFT. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT. (M)	IN.	OUT.		C=CIR. DIA. E=ELIP. (N.MI.)
71	3	1330	34.2	71.4	GOES 2	3, VSBL 1									
72	3	1430	34.2	71.2	GOES 2	3, VSBL 1									
73	3	1510	34.3	71.0	NOAA	3/3	100	100	1000MB	975	24	22	35	OPEN NORTHWEST.	
74	3	1530	34.3	71.0	GOES 2	3, VSBL 1									
75	3	1630	34.5	70.7	GOES 2	3, VSBL 1									
76	3	1730	34.6	70.4	GOES 2	1, VSBL 2									
77	3	1757	34.9	70.3	NOAA	3/3	105	110	1000MB	972	24	22	25	WELL DEFINED.	
78	3	1830	34.8	70.1	GOES 2	2,1, VSBL			90						
79	3	1930	35.0	69.8	GOES 2	1, VSBL 2									
80	3	2103	35.6	69.5	NOAA	1/1	108	100	1000MB	974	23	21		WELL DEFINED.	
81	3	2330	35.8	68.6	GOES 2	1, IR 8									
82	4	0026	36.2	68.2	AF	7/5	60		700MB	962	2758	7	12	25	OPEN SOUTHWEST.
83	4	0030	36.1	68.1	GOES 2	1,1, IR 8			102						
84	4	0205	36.7	67.7	AF		30		700MB		2752				
85	4	0309	37.0	67.4	AF	6/5	77		700MB	959	2734	14	10	20	CLOSED.
86	4	0600	37.3	65.6	GOES 2	2, IR 8									
87	4	0630	37.6	65.6	GOES 2	2,2, IR 8			102						
88	4	1130	39.7	63.2	GOES 2	3, VSBL 1									
89	4	1230	40.3	62.7	GOES 2	2,3, VSBL 1			102						
90	4	1300	40.1	63.1	AF	5/5	105	140	700MB	956	2700	13	C	20	POORLY DEFINED.
91	4	1330	40.5	62.5	GOES 2	5, VSBL 1									
92	4	1430	40.6	61.8	GOES 2	1, VSBL 1									
93	4	1435	40.6	62.1	AF		68	90	700MB		2685				
94	4	1530	41.1	61.4	GOES 2	3, VSBL 1									
95	4	1605	41.3	61.3	AF		105	120	700MB		2683				
96	4	1700	41.4	60.7	AF	5/5	109	120	700MB	956	2696	13	E01/15/10		POORLY DEFINED.
97	4	1800	42.3	59.2	GOES 2	5, VSBL 4									
98	4	1830	42.6	59.1	GOES 2	2,3, VSBL 1			96						
99	4	2330	44.8	55.3	GOES 2	2,4, IR 8			96						
100	5	0600	46.9	50.9	GOES 2	4, IR 8									
101	5	1330	49.5	44.0	GOES 2	5, VSBL 4									

Table 6 continued.

HURRICANE FLOSSIE
3-16 SEPTEMBER 1978

DENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND. (KT)		MIN. ACFT. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				IN.	OUT.	C-CIR. DIA.	E-ELIP. (N.M.I.)	
1	3	1600	13.0	38.0	GOES-2	2,5,VSBL 4		25								
2	4	0000	12.4	39.5	GOES-2	1,5, IR 8		25								
3	4	0600	12.6	40.1	GOES-2	2,6, IR 8		25								
4	4	1030	13.9	40.5	GOES-2	3,VSBL 1										
5	4	1300	14.3	40.9	GOES-2	2,3,VSBL 2		25								
6	4	1730	15.2	42.4	GOES-2	2,5,VSBL 1		30								
7	5	0000	14.1	44.2	GOES-2	2,4, IR 8		35								
8	5	0600	14.5	45.5	GOES-2	6, IR 8										
9	5	0630	14.5	45.6	GOES-2	2,6, IR 8		35								
10	5	1130	17.5	47.5	GOES-2	5,VSBL 1										
11	5	1230	19.0	48.0	GOES-2	2,5,VSBL 1		35								
12	5	1800	20.3	49.5	GOES-2	5,VSBL 1										
13	5	1830	20.4	49.6	GOES-2	2,3,VSBL 1		35								
14	6	0000	21.2	51.3	GOES-2	5, IR 8										
15	6	0030	21.3	51.4	GOES-2	2,5, IR 8		35								
16	6	0630	22.0	53.0	GOES-2	2,5, IR 8		35								
17	6	1200	21.5	55.2	GOES-2	5,VSBL 4										
18	6	1230	21.5	55.3	GOES-2	2,5,VSBL 1		35								
19	6	1430	22.2	56.0	GOES-2	5,VSBL 1										
20	6	1530	22.2	56.6	GOES-2	3,VSBL 1										
21	6	1800	22.0	57.2	GOES-2	5,VSBL 4										
22	6	1830	22.1	57.4	GOES-2	2,5,VSBL 1		25								
23	6	2016	21.8	57.6	AF	3/5	41	55	262M	1003		26	24	C	30	POORLY DEFINED.
24	7	0000	21.8	58.2	GOES-2	5, IR 8										
25	7	0030	21.7	58.2	GOES-2	2,3, IR 8		30								
26	7	0600	21.9	59.1	GOES-2	3, IR 8										
27	7	0630	22.0	59.2	GOES-2	2,3, IR 8										
28	7	1130	22.2	59.9	GOES-2	3,VSBL 1										
29	7	1230	22.3	60.1	GOES-2	2,3,VSBL 1		40								
30	7	1530	22.5	60.7	AF	5/5	41	35		1007						
31	7	1800	23.1	61.4	GOES-2	1,5,VSBL 4										
32	7	1830	23.1	61.5	GOES-2	1,5,VSBL 1		40								
33	7	1907	22.2	61.7	AF	5/5	27	25		1001						
34	8	0000	22.0	62.0	GOES-2	5, IR 8										
35	8	0030	21.9	62.0	GOES-2	2,5, IR 8		40								

Table 6 continued

HURRICANE FLOSSIE

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		ACFT.	MIN. PRESS. (MB)	MIN. HT (M)	TEMP (C°)		EYE		REMARKS
			LAT. N	LONG. W			FLT. LVL.	SFC.				IN.	OUT.	E-ELIP.	(N.M.I.)	
36	8	0600	21.7	61.9	GOES-2	5, IR 8		40								
37	8	0630	21.7	61.8	GOES-2	2,5, IR 8										
38	8	1230	24.5	60.5	GOES-2	2,5,VSBL 1		40								
39	8	1800	25.7	60.5	GOES-2	5,VSBL 4										
40	8	1830	25.3	60.7	GOES-2	2,3,VSBL 1		30								
41	9	1333	27.2	58.0	GOES-2	5,VSBL 2										
42	10	1530	28.7	52.3	GOES-2	5,VSBL 1										
43	10	1830	29.1	51.8	GOES-2	2,5,VSBL 1		25								
44	10	2330	29.3	50.3	GOES-2	5, IR 8										
45	11	0030	29.3	50.2	GOES-2	3,5, IR 8		35								
46	11	0330	29.6	49.2	GOES-2	2,5, IR 8		45								
47	11	0600	30.1	48.9	GOES-2	5, IR 8										
48	11	0630	30.1	48.8	GOES-2	2,5, IR 8		45								
49	11	1130	30.8	47.3	GOES-2	5,VSBL 1										
50	11	1230	31.0	46.8	GOES-2	2,3,VSBL 1		55								
51	11	1330	30.8	46.5	GOES-2	3,VSBL 1										
52	11	1430	30.9	46.4	GOES-2	3,VSBL 1										
53	11	1530	31.0	46.3	GOES-2	3,VSBL 1										
54	11	1730	31.0	45.9	GOES-2	3,VSBL 1										
55	11	1830	31.2	45.9	GOES-2	2,3,VSBL 1		55								
56	11	2330	31.5	45.0	GOES-2	5, IR 8										
57	12	0030	31.3	44.4	GOES-2	2,3, IR 8		60								
58	12	0630	31.5	44.0	GOES-2	1,2, IR 8		65								
59	12	1230	31.6	43.3	GOES-2	2,1,VSBL 1		77								
60	12	1430	31.5	43.1	GOES-2	1,VSBL 1										
61	12	1530	31.6	43.1	GOES-2	1,VSBL 1										
62	12	1830	31.7	42.9	GOES-2	2,1,VSBL 1		77								
63	13	0030	31.7	42.8	GOES-2	2,2, IR 8		84								
64	13	0630	32.1	43.0	GOES-2	2,2, IR 8		84								
65	13	1230	32.6	43.0	GOES-2	2,2,VSBL 1		84								
66	13	1800	33.5	43.0	GOES-2	2,VSBL 1										
67	13	1830	33.6	43.1	GOES-2	2,2,VSBL 1		77								
68	13	2330	34.5	42.9	GOES-2	2, IR 8										
69	14	0030	34.7	42.8	GOES-2	2,2, IR 8		77								
70	14	0630	36.0	42.8	GOES-2	2,5, IR 8		77								
71	14	1130	37.2	41.9	GOES-2	2, IR 8										
72	14	1230	37.4	41.5	GOES-2	2,1,VSBL 1		77								
73	14	1800	39.2	40.3	GOES-2	3,VSBL 4										
74	14	1830	39.3	40.4	GOES-2	2,3,VSBL 3		77								
75	15	0000	40.9	38.0	GOES-2	2,3, IR 8		77								
76	15	0600	43.1	35.9	GOES-2	2,5, IR 8		65								
77	15	1200	45.7	32.8	GOES-2	2,6,VSBL 1		55								
78	15	1730	47.7	29.5	GOES-2	3,6,VSBL 1		55								
79	16	0000	49.8	24.2	GOES-2	5, IR 8		45								
80	16	0600	51.5	19.0	GOES-2	2,6, IR 8		45								

Table 6 continued.

HURRICANE GRETA
13-19 SEPTEMBER 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		ACFT.	MIN. PRESS. (MB)	MIN. 700MB HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	°W			FLT.	SFC.				IN.	OUT.	C=CIR. DIA.	E=ELIP. (N.MI.)	
1	14	0730	12.1	66.1	GOES-2	2,5, IR 8		25								
2	14	1230	12.0	66.0	GOES-2	5, IR 8										
3	14	1300	13.0	68.2	GOES-2	2,5, VSBL 1		(28								
4	14	1800	13.2	69.2	GOES-2	2,3, VSBL 1		30								
5	14	1911	13.0	69.2	AF	5/5	37	40	347M	1004		25				
6	14	2330	13.1	70.8	GOES-2	5, IR 8										
7	15	0030	13.4	71.0	GOES-2	2,5, IR 8		35								
8	15	0600	13.6	72.6	GOES-2	5, IR 8										
9	15	0620	13.5	72.3	AF	5/10	58		387M	1006		24	24			
10	15	0630	13.6	72.8	GOES-2	2,3, IR 8		33								
11	15	1130	13.6	73.0	GOES-2	5, VSBL 1										
12	15	1230	13.6	73.4	GOES-2	1,5, VSBL 1										
13	15	1335	13.5	73.6	AF	3/4	60	65	293M	1001		25	24			
14	15	1629	13.6	73.9	AF	3/4		60	700MB	1006	3128	12	9			
15	15	1745	13.6	74.2	AF	3/0.5	30	25	317M	1000		25				
16	15	1800	13.8	74.4	GOES-2	3, VSBL 1										
17	15	1831	13.8	74.4	GOES-2	1,3, VSBL 1		45								
18	15	2330	13.8	76.0	GOES-2	5, IR 8										
19	16	0000	13.9	75.3	AF	4/4	50		463M	995		27				
20	16	0030	13.9	75.8	GOES-2	2,5, IR 8		55								
21	16	0210	14.0	75.7	AF		33			995						
22	16	0400	14.1	76.3	AF		45			994						
23	16	0515	13.8	76.5	AF	5/5	55		442M	994		26	24			
24	16	0630	14.0	77.2	GOES-2	2,5, IR 8		55	442M							
25	16	1130	14.1	76.7	GOES-2	5, VSBL 4										
26	16	1215	13.9	77.8	AF	2/2	65	75	442M	989		25	23			
27	16	1230	14.0	77.0	GOES-2	1,5, VSBL 1		55								
28	16	1530	14.2	78.3	GOES-2	5, VSBL 1										
29	16	1555	14.0	78.3	AF		63	75	700MB							
30	16	1705	14.1	78.4	AF	1/5	75	85	408M	988		27	25			
31	16	1800	14.2	78.8	GOES-2	5, VSBL 4										
32	16	1830	14.3	79.0	GOES-2	2,5, VSBL 1		60								
33	16	2031	14.4	79.3	GOES-2	5, VSBL 1										
34	16	2200	14.8	79.5	GOES-2	5, VSBL 1										
35	16	2330	15.0	79.8	GOES-2	5, IR 8										

Table 6 continued.

HURRICANE GRETA CONTINUED.

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	CENTER FIXES		MIN. PRESS. 700MB (MB)	MIN. HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	LON. °W			FLT. LVL.	SFC.			ACFT. ALT.	IN.	OUT.	C=CIR. DIA.	
36	17	0010	14.6	79.6	NOAA	5/5		75		1000MB	982				
37	17	0030	15.0	80.0	GOES-2	2,5, IR 8						25	21	C	25
38	17	0100	14.9	80.1	GOES-2	5, IR 8		60							OPEN SOUTHEAST.
39	17	0120	14.7	79.7	NOAA										
40	17	0300	14.7	80.4	GOES-2	5, IR 8									
41	17	0412	14.8	80.3	NOAA										
42	17	0531	14.9	80.5	NOAA	5/5									
43	17	0630	15.0	80.8	GOES-2	2,5, IR 8	100		1000MB	981		25	24	C	25
44	17	0930	15.1	81.3	GOES-2	1, IR 8		65							WELL DEFINED.
45	17	1131	15.2	81.4	GOES-2	2, IR 8									
46	17	1207	15.2	81.6	AF										
47	17	1230	15.3	81.5	GOES-2	1,2,VSBL 1	65	100	700MB	974	2880	14	10		
48	17	1400	15.3	81.9	GOES-2	2, IR 8		84						EXX/30/20	CLOSED.
49	17	1422	15.3	82.0	AF	3/3									
50	17	1530	15.4	82.2	GOES-2	1,2,VSBL 1	85	100	700MB	970	2837	15	9		
51	17	1700	15.4	82.4	GOES-2	1,VSBL 1		102						E36/30/20	CLOSED.
52	17	1800	15.4	82.6	GOES-2	1,VSBL 1									
53	17	1822	15.4	82.7	AF	3/3									
54	17	1830	15.5	82.7	GOES-2	2,1,VSBL 1	66	100	700MB	968	2826	15	10		
55	17	2000	15.5	82.9	GOES-2			102							CLOSED.
56	17	2100	15.5	83.1	GOES-2	1,1,VSBL 1									
57	17	2200	15.5	83.2	GOES-2			102							
58	17	2205	15.5	83.2	AF										
59	17	2300	15.6	83.3	GOES-2		90	75	700MB		2741				
60	17	2303	15.5	83.2	AF	3/3									
61	18	0000	15.6	83.4	GOES-2	1, IR 8	80	90	700MB	952	2698	19	12	C	25
62	18	0030	15.6	83.5	GOES-2	2,1, IR 8									
63	18	0130	15.7	83.6	GOES-2	1, IR 8		115							
64	18	0300	15.6	83.8	GOES-2	2,1, IR 8									
65	18	0600	15.8	84.3	GOES-2	1, IR 8									
66	18	0630	15.9	84.4	GOES-2	2,1, IR 8									
67	18	0710	16.0	84.6	AF	5/2									
68	18	0730	16.1	84.6	GOES-2	1, IR 8	52		700MB	947	2628	16	11	C	12
69	18	0800	16.1	84.7	GOES-2	1, IR 8									
70	18	0830	16.2	84.8	GOES-2	1, IR 8									
71	18	0930	16.2	85.0	GOES-2	2,1, IR 8									
72	18	1000	16.4	85.0	AF			115							
73	18	1102	16.4	85.2	AF	5/2	92		700MB		2683				
74	18	1130	16.4	85.5	GOES-2	1, IR 8	82		700MB	955	2700	16	9	C	14
75	18	1230	16.4	85.7	GOES-2	1,2,VSBL 1		115							OPEN EAST.

Table 6 continued.

HURRICANE GRETA CONTINUED.						CENTER FIXES										
FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		ACFT. ALT.	MIN. PRESS. (MB)	MIN. 70QMB HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				IN.	OUT.	C=CIR. DIA.	E=ELIP. (N.MI.)	
76	18	1400	16.7	85.9	RADAR	BELIZE										
77	18	1430	16.6	86.4	RADAR	BELIZE										
78	18	1430	16.5	86.2	NOAA			115		963						
79	18	1500	16.5	86.5	RADAR	BELIZE										
80	18	1530	16.5	86.5	GOES-2	1,1,VSBL 1		115								
81	18	1545	16.6	86.4	NOAA			115		964						
82	18	1600	16.5	86.5	RADAR	BELIZE										
83	18	1645	16.5	86.6	RADAR	BELIZE										
84	18	1741	16.5	86.8	AF	2/3	90	75	700MB	64	2789	17	11		20	CLOSED.
85	18	1800	16.6	86.9	RADAR	BELIZE										
86	18	1800	16.6	86.9	GOES-2	1,VSBL 1										
87	18	1810	16.6	86.9	AF		85		700MB		2790					
88	18	1830	16.7	86.9	GOES-2	1,1,VSBL 1		115								
89	18	1900	16.7	87.0	RADAR	BELIZE										
90	18	1916	16.6	87.0	AF		42		700MB		2784					
91	18	1935	16.7	87.1	RADAR	BELIZE										
92	18	2000	16.8	87.2	RADAR	BELIZE										
93	18	2012	16.7	87.2	AF	5/5	44		700MB	965	791	15	9		18	CLOSED WALL.
94	18	2030	16.9	87.3	GOES-2	2,VSBL 1										
95	18	2030	16.8	87.3	RADAR	BELIZE										
96	18	2100	16.8	87.4	RADAR	BELIZE										
97	18	2130	16.9	87.6	GOES-2	1,2,VSBL 1		15								
98	18	2141	16.8	87.5	AF			55								
99	18	2205	16.8	87.6	AF			75								OPEN SOUTHWEST.
100	18	2306	16.9	87.7	AF	3/3				964		14	10			OPEN WEST.
101	19	0000	17.0	88.1	GOES-2	1, IR 8										
102	19	0030	17.1	88.2	GOES-2	1, IR 8		15								
103	19	0600	17.1	89.3	GOES-2	3, IR 8										
104	19	1300	16.9	91.1	GOES-2	4,VSBL 1										
105	19	1730	16.3	92.1	GOES-2	3, IR 8										
106	19	1830	16.0	92.5	GOES-2	5,VSBL 1										
107	19	2330	17.0	93.5	GOES-2	5,VSBL 1										
108	20	0600	14.5	95.0	GOES-2	5, IR 8										

Table 6 continued.

TROPICAL STORM HOPE
11-21 SEPTEMBER 1978

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. ALT.	MIN. PRESS. (MB)	MIN. HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				ACFT.	IN.	OUT.	C=CIR. DIA. E=ELIP. (N.MI.)	
1	12	0000	30.0	79.7	GOES-2	1,5, IR 8		25								
2	12	0600	29.9	79.1	GOES-2	1,5, IR 8		25								
3	12	1300	31.0	78.5	GOES-2	2,5,VSBL 1		25								
4	12	1800	31.0	78.5	GOES-2	5,VSBL 4										
5	12	1900	31.2	78.0	GOES-2	2,5,VSBL 4		25								
6	12	2200	31.2	77.0	GOES-2	5,VSBL 1										
7	13	0000	31.1	76.4	GOES-2	2,5, IR 8		25								
8	13	0600	30.5	76.2	GOES-2	2,5, IR 8		25								
9	13	1200	31.8	74.1	GOES-2	2,5,VSBL 1		25								
10	13	1800	32.5	73.5	GOES-2	2,6,VSBL 4		25								
11	14	0000	32.2	72.0	GOES-2	2,5, IR 8		25								
12	14	0600	33.0	70.8	GOES-2	2,5, IR 8		25								
13	14	1200	33.2	69.6	GOES-2	2,5,VSBL 1		30								
14	14	1400	33.6	66.5	GOES-2	5,VSBL 4										
15	14	1718	33.1	66.3	AF	5/5	34	35		1009						
16	14	1800	33.5	65.8	GOES-2	5,VSBL 4										
17	14	1830	33.5	65.7	GOES-2	2,5,VSBL 2		30								
18	14	1907	32.9	66.3	AF	5/5	30	35		1009						
19	15	0030	32.6	63.3	GOES-2	2,5, IR 8		40								
20	15	0630	31.9	61.9	GOES-2	2,5, IR 8		40								
21	15	1200	31.4	62.3	GOES-2	2,3,VSBL 1		40								
22	15	1800	31.2	61.4	GOES-2	2,5,VSBL 1		40								
23	16	0000	30.9	60.4	GOES-2	5, IR 8										
24	16	0600	31.1	59.3	GOES-2	5,2, IR 8		35								
25	16	1100	31.6	57.6	GOES-2	2,5,VSBL 1		30								
26	16	1700	31.6	57.6	GOES-2	1,5,VSBL 1		30								
27	17	0000	32.7	56.4	GOES-2	2,5, IR 8		35								
28	17	0600	33.2	54.8	GOES-2	2,6, IR 8		(37)								
29	17	0900	34.1	54.4	GOES-2	6, IR 8										
30	17	1030	33.5	53.7	GOES-2	4,VSBL 1										
31	17	1200	33.7	53.4	GOES-2	1,5,VSBL 1		40								
32	17	1730	35.0	52.1	GOES-2	1,5,VSBL 1		45								
33	18	0000	35.9	49.8	GOES-2	3, IR 8										
34	18	0100	36.0	49.6	GOES-2	2,5, IR 8		50								
35	18	0200	36.7	49.0	GOES-2	5, IR 8										

Table 6 continued.

TROPICAL STORM HOPE

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER	MAX. WIND (KT)		MIN. ACFT. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	°W			FLT. LVL.	SFC.				IN.	OUT.	C=CIR. DIA. E=ELIP. (N.MI.)		
36	18	0600	37.6	47.8	GOES-2	2,5, IR 8		55								
37	18	0900	37.9	46.8	GOES-2	5, IR 8										
38	18	1200	38.0	45.6	GOES-2	1,3,VSBL 1		55								
39	18	1730	38.7	43.5	GOES-2	2,3,VSBL 1		60								
40	19	0000	40.3	40.5	GOES-2	2,5, IR 8		60								
41	19	0630	41.3	38.5	GOES-2	2,5, IR 8		60								
42	19	1200	41.9	37.2	GOES-2	4,VSBL 4										
43	19	1230	42.2	37.0	GOES-2	2,4,VSBL 1		40								
44	19	1800	43.9	35.1	GOES-2	2,3,VSBL 1		45								
45	19	2300	45.5	33.6	GOES-2	5, IR 8										
46	20	0030	45.7	32.7	GOES-2	2,5, IR 8		55								
47	20	0630	48.5	29.5	GOES-2	2,5, IR 8		55								

TROPICAL STORM IRMA
2-5 OCTOBER 1978

CENTER FIXES

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER	MAX. WIND (KT)		MIN. ACFT. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	°W			FLT. LVL.	SFC.				IN.	OUT.	C=CIR. DIA. E=ELIP. (N.MI.)		
1	4	1230	35.1	31.5	GOES-2	2,4,VSBL 1		40								
2	4	1800	35.8	31.4	GOES-2	2,4,VSBL 1		45								
3	4	2330	36.5	31.2	GOES-2	5, IR 8										
4	5	0030	36.7	31.1	GOES-2	2,5, IR 8		45								
5	5	0600	38.0	30.5	GOES-2	5, IR 8										
6	5	0630	38.5	30.0	GOES-2	2,5, IR 8		35								
7	5	1131	39.7	28.5	GOES-2	3,VSBL 1										
8	5	1230	40.1	28.5	GOES-2	2,3,VSBL 1		30								
9	5	1800	43.2	26.3	GOES-2	5, IR 8										
10	5	1830	43.3	26.0	GOES-2	2,5,VSBL 1		30								

Table 6 continued.

TROPICAL STORM JULIET
7-11 OCTOBER 1978

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		MIN. ACFT. ALT.	MIN. PRESS. (MB)	MIN. 700MB HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				IN.	OUT.	C=CIR. E-ELIP. (N.MI.)	DIA.	
1	5	1930	15.0	48.0	GOES-2	5, VSBL 1										
2	6	1830	16.2	51.8	GOES-2	1,5, VSBL 1										
3	8	1230	18.7	58.6	GOES-2	1,3, VSBL 1										
4	8	1710	18.9	59.6	AF	3/5	41	40		1007		23	24			POORLY DEFINED.
5	8	1800	19.1	59.7	GOES-2	3, VSBL 1										
6	8	1830	19.1	59.8	GOES-2	1,3, VSBL 1										
7	8	1845	19.1	59.8	AF		52	50		1007						
8	9	0000	19.2	60.9	GOES-2	5, IR 8										
9	9	0030	19.2	61.1	GOES-2	2,5, IR 8										
10	9	0600	19.8	61.9	GOES-2	3, IR 8										
11	9	0630	20.0	62.1	GOES-2	2,3, IR 8										
12	9	1130	20.1	63.1	GOES-2	3, VSBL 1										
13	9	1230	20.2	63.2	GOES-2	2,3, VSBL 1										
14	9	1316	20.1	63.4	AF	2/5	44	30		1007		23	24	C	10	
15	9	1430	20.2	63.6	GOES-2	3, VSBL 1										
16	9	1433	20.1	63.6	AF		56	45		1008						
17	9	1530	20.2	63.7	GOES-2	3, VSBL 1										
18	9	1730	20.4	64.1	GOES-2	3, VSBL 1										
19	9	1830	20.4	64.3	GOES-2	2,3, VSBL 1										
20	9	1845	20.4	64.4	AF	2/5	28	35		1006		24	24	C	10	
21	9	2001	20.7	64.8	AF		39	40	305M	1006		25	24	E18/10/05		
22	10	0000	20.3	65.7	GOES-2	5, IR 8										
23	10	0030	20.8	65.5	GOES-2	2,5, IR 8										
24	10	0600	21.3	65.9	GOES-2	5, IR 8										
25	10	0630	21.4	65.9	GOES-2	2,6, IR 8										
26	10	1130	22.5	68.0	GOES-2	5, VSBL 1										
27	10	1133	22.6	68.7	AF		30	35		1011		25	25	C	30	POORLY DEFINED.
28	10	1230	22.9	68.6	GOES-2	3,5, VSBL 1										
29	10	1730	25.2	70.5	GOES-2	5, VSBL 1										
30	11	1200	30.2	68.9	GOES-2	5, VSBL 1										
31	11	1230	30.8	68.8	GOES-2	VSBL 1										

33
1320 South Dixie Highway, Room 520
Coral Gables, Florida 33145

Property of
NOAA Coral Gables Library
Gables One Tower

Table 6 continued.

HURRICANE KENDRA -
28 OCTOBER - 3 NOVEMBER 1978

FIX NO.	DATE	TIME (GMT)	POSITION		UNIT	CHARACTER.	MAX. WIND (KT)		ACFT.	MIN. PRESS. (MB)	MIN. HT (M)	TEMP. (C°)		EYE		REMARKS
			LAT. °N	LONG. °W			FLT. LVL.	SFC.				IN.	OUT.	C=CIR.	DIA.	
1	28	1830	23.0	72.7	GOES-2	1,5,VSBL 1		25								
2	28	2130	23.9	73.3	GOES-2	5,VSBL 4										
3	29	0000	24.4	73.3	GOES-2	2,5, IR 8		27								
4	29	0330	24.1	73.5	GOES-2	5, IR 8										
5	29	0630	24.9	73.2	GOES-2	1,5, IR 8		30								
6	29	1200	25.8	73.7	GOES-2	5,VSBL 1										
7	29	1230	25.8	73.8	GOES-2	2,5,VSBL 1		40								
8	29	1530	26.3	73.9	GOES-2	1,5,VSBL 1		45								
9	29	1830	26.3	74.2	GOES-2	1,3,VSBL 1		50								
10	29	1920	26.3	74.1	AF	3/3	60	70	238M	995		25	24			POORLY DEFINED.
11	29	2053	26.5	73.9	AF	3/3	35		700MB	994	3030	12	10			OPEN SOUTH.
12	30	0000	27.5	73.5	GOES-2	5, IR 8										
13	30	0030	27.5	73.5	GOES-2	2,5, IR 8		55								
14	30	0600	28.0	73.5	GOES-2	3, IR 8										
15	30	0630	28.1	73.5	GOES-2	2,3, IR 8		60								
16	30	1018	28.7	72.6	AF	2/10	82	90	700MB	990	2980	12	10			POORLY DEFINED.
17	30	1118	28.8	72.6	AF	2/5	60	100	700MB	990	2968	11		IRR.		POORLY DEFINED.
18	30	1200	29.7	72.3	GOES-2	3,VSBL 4										
19	30	1230	29.7	72.2	GOES-2	2,5,VSBL 1		65								
20	30	1330	29.3	72.4	GOES-2	2,3,VSBL 1		65								
21	30	1800	30.1	72.0	GOES-2	5,VSBL 1										
22	30	1830	29.9	72.1	GOES-2	1,3,VSBL 1		65								
23	30	2031	29.9	72.0	AF	1/2	38	50	700MB	1002	3111	12	9			
24	30	2330	30.0	72.2	AF	5/10	30		700MB	1007	3104	10	9			
25	31	0000	29.8	72.1	GOES-2	3, IR 8										
26	31	0030	29.8	72.1	GOES-2	1,3, IR 8		45								
27	31	0030	30.1	72.2	AF	5/10	30		700MB		3109	8	9			
28	31	0600	29.8	72.1	GOES-2	5, IR 8										
29	31	0630	30.0	72.1	GOES-2	1,3, IR 8		35								
30	31	0630	30.6	72.2	AF	2/15	44		00MB	1006		9	10			
31	31	1140	31.0	72.0	AF	2/5	37	35	00MB	1004		10	10			
32	31	1200	31.2	72.0	GOES-2	3,VSBL 4										
33	31	1230	31.3	71.9	GOES-2	2,3,VSBL 1		30								
34	31	1730	31.7	71.8	GOES-2	3,VSBL 1										
35	31	1741	31.5	71.8	AF	5/5	44	50	92M	1006		23	22			
36	31	1830	31.8	71.7	GOES-2	2,5,VSBL 1		25								
37	31	2006	31.9	71.4	AF	5/5	43	40	04M	1006		23				
38	31	2330	32.4	70.6	GOES-2	5, IR 8										
39	1	0230	33.0	70.0	GOES-2	5, IR 8										

Table 7. Supplementary vortex data messages, 1978 Atlantic tropical cyclones.

BESS

URNT12 KMIA 070030
 AF972 0202 BESS OB 14
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 270DEG FL010
 RIGHT REAR QUAD
 80013 82323 40012 42323 30011 32323 1///// 1/////

00008 02525 64/// 50/// 34045 MX040 36040 /////

RIGHT FRONT QUAD
 80012 82523 40010 42323 30008 32323 10008 12524

00007 02525 64/// 50/// 34040 MX041 33025 /////

ELLA

URNT12 KMIA 312330
 AF977 0106 ELLA OB 15
 AZIMUTH 120DEG FL100
 LEFT FRONT
 83192 80803 43160 40806 33135 30706 13959 11508

03945 01311 64/// 50018 34025 MX061 27015 /////

RIGHT FRONT
 83181 80804 4///// 4///// 33180 30803 13156 10808

03945 01311 64030 50035 34050 MX081 36015 /////

LEFT REAR
 83193 80803 43176 40704 33170 30808 13070 10908

03906 01308 64/// 50020 34035 MX055 18015 ////

RIGHT REAR
 83186 80804 43174 40903 33173 30903 13139 11206

03906 01308 64/// 50020 34040 MX060 09015 /////

URNT12 KMIA 010505
 AF967 0206 ELLA OB 16
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 310DEG FL100
 LEFT FRONT QUAD
 83180 80904 43160 41003 33122 30707 13058 10707

03887 01507 64020 50025 34050 MX079 27015 /////

RIGHT FRONT QUAD
 83192 80904 43168 40806 33153 30806 13112 11209

03887 01507 64020 50025 34050 MX083 36015 /////

LEFT REAR QUAD
 83176 80904 43170 40704 33142 30606 13112 10707

03909 01210 64015 50020 34030 MX075 17010 /////

RIGHT REAR QUAD
 83173 80704 43173 40605 33113 30707 13052 11008

03909 01210 64020 50030 34065 MX092 09010 /////

Table 7 continued

URNT12 KMIA 011035
 AF967 0306 ELLA OB14
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 290DEG FL100
 LEFT FRONT QUAD
 83182 80702 43152 40706 33122 30707 13009 10906
 02876 01309 64020 50040 34060 MX085 24010 /////
 RIGHT FRONT QUAD
 83180 80705 43161 40705 33117 30907 13010 10907
 02876 01309 64020 50045 34070 MX085 33010 /////
 LEFT REAR QUAD
 83174 80604 43136 40605 33125 30606 13076 10707
 02864 01211 64020 50030 34055 MX075 14015 /////
 RIGHT REAR QUAD
 83185 80606 43155 40606 33155 30606 13108 10706
 02864 01211 64020 50026 34045 MX082 06012 /////
 06012

URNT12 KMIA 021615 COR
 AF980 0706 ELLA OB 11 COR
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 300DEG FL100
 LEFT FRONT QUAD
 83123 80707 43080 40808 33041 30909 12951 11610
 02900 01512 64030 50040 34080 03075 27020 /////
 RIGHT REAR QUAD
 83139 80605 43084 40707 33003 30808 12940 11010
 02900 01512 64/// 50/// 34080 21046 11045 /////
 RIGHT FRONT QUAD
 83120 80606 43096 40807 33061 30808 12943 11312
 02913 01312 64/// 50045 34060 06050 33045 /////
 LEFT REAR QUAD
 83142 80803 43112 40606 33101 30505 13050 10909
 02913 01312 64/// 50030 34080 25063 17025 /////
 17025

URNT12 KMIA 021925
AF980 0706 ELLA OB 17
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 300DEG FL100
LEFT REAR QUAD
83141 80707 43107 40808 33069 30908 13005 10808
02913 01212 64/// 50025 34080 MX054 17015 /////
RIGHT FRONT QUAD
83132 80806 43091 40707 33068 30808 12997 11208
02913 01212 64/// 50/// 34080 MX041 33045 /////
LEFT FRONT QUAD
83135 80707 43094 40707 33062 30808 13010 11009
02907 01111 64/// 50/// 34075 MX048 27030 /////
RIGHT REAR QUAD
83138 80404 43093 40707 33061 30707 12979 10808
02907 01111 64/// 50065 34080 MX055 15020 /////
DOPPLER RADAR INTERMITTENTLY ATTENUATED BY MDT TO
HVY PRECIP

URNT12 DMIA 022325
AF977 0806 ELLA OB 10
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 360DEG FL100
LEFT REAR QUAD
83146 81002 41316 40704 33088 31007 13041 11009
03930 01409 64/// 50020 34100 MX055 22515 /////
RIGHT REAR QUAD
83149 80704 43099 40707 33088 30707 13058 10808
03930 01409 64/// 50/// 34/// MX045 22080 /////
RIGHT FRONT QUAD
83135 80802 43076 40905 33047 30908 13975 11110
03920 01310 64/// 50100 34/// MX050 04510 /////
LEFT FRONT QUAD
83137 80804 43099 40707 33076 30806 13054 10907
03920 01310 64/// 50/// 34060 MX050 04510 /////

Table 7 continued.

URNT12 KMIA 030339 COR 02
AF977 0806 ELLA OB 22 COR 02
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 360DEG FL100
RIGHT REAR QUAD
83121 80707 43074 40707 33039 30909 13979 11110
03932 01410 64/// 50/// 34045 MX045 19030 /////
RIGHT FRONT QUAD
83122 80705 43092 40707 33040 30909 13021 11110
03932 01410 64/// 50/// 34045 MX040 04530 /////
LEFT FRONT QUAD
83126 80706 43086 40908 33027 31009 13966 11209
03928 01410 64/// 50/// 34045 MX045 32530 /////
LEFT REAR QUAD
83127 80707 43081 40806 33058 31106 13019 11208
03928 01410 64/// 50/// 34080 MX040 24540 /////

URNT12 KMIA 031234
AF866 0906 ELLA OB 18
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 040DEG FL100
RIGHT REAR QUAD
83138 80803 43129 40806 33109 30905 13005 10808
03909 01309 64/// 50035 34080 MX056 20045 /////
LEFT FRONT QUAD
83138 80803 43128 40806 33107 30707 13003 10808
03909 01309 64/// 50015 34080 MX050 36015 /////
RIGHT FRONT QUAD
83090 80505 43014 40707 33107 31010 13000 10808
03900 01410 64080 50100 34120 MX067 09045 /////
LEFT REAR QUAD
83104 80804 43064 40705 33036 31004 13990 11107
03900 01410 64/// 50030 34050 MX056 27015 /////

URNT12 KMIA 040355 COR
AF980 1106 ELLA OB 11 COR
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 050DEG FL105
LEFT REAR QUAD
8//// 8//// 4//// 4//// 33967 30505 13924 10707
03758 01210 64/// 50050 34/// MX060 27030 ////
RIGHT FRONT QUAD
83025 80505 43956 40707 33911 30808 13839 10909
03758 01210 64070 50/// 34/// MX077 09030 ////
LEFT FRONT QUAD
83005 80705 43989 40706 33920 30908 13887 11010
03752 01312 64/// 50/// 34/// MX030 36030 ////
RIGHT REAR QUAD
83040 80905 43969 40807 33907 31009 13814 11111
03752 01312 64065 50080 34/// MX075 18045 ////

URNT12 KMIA 040555 COR
AF980 1106 ELLA OB 16 COR
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 050DEG FL100
RIGHT REAR QUAD
83040 80806 43962 40808 33933 30908 13883 11009
03734 01412 64050 50080 34/// MX077 18015 ////
LEFT FRONT QUAD
83988 80705 43931 40808 33913 30909 13881 11010
03734 01412 64/// 50015 34075 MX050 36015 ////

URNT12 KMIA 161901
AF365 0511 GRETA OB 14
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 028DEG FL100
RIGHT FRONT QUAD
83101 80905 43082 41009 33058 31108 13058 11108
03004 01510 64/// 50/// 34/// MX055 31015 /////
LEFT FRONT QUAD
83106 80908 43097 40907 33084 31009 13056 11108
03004 01510 64/// 50/// 34/// MX045 22005 /////
SFC WND 65 KTS AT 55 NMI RIGHT FRONT QUAD

URNT12 KMIA 171614
AF980 0711 GRETA OB 14
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 290DEG FL100
LEFT REAR QUAD
83106 80905 43102 40905 33079 30905 13054 10805
02868 01406 64020 50040 34055 MX065 15015 /////
RIGHT REAR QUAD
83098 80805 43079 40905 33047 30805 13000 10905
02837 01507 64035 50050 34100 MX085 05013 /////
RIGHT FRONT QUAD
86090 80905 43060 41005 33038 31006 12986 11006
02837 01507 64020 50030 34100 MX070 32012 /////
LEFT FRONT QUAD NOT FLOWN DUE TO PROXIMITY OF COASTLINE

URNT12 KMIA 180058 COR
AF977 0811 GRETA OB 16 COR
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 290DEG FL100
LEFT REAR QUAD
83076 81008 43047 40908 33022 31107 13938 11010
03826 01510 64/// 50/// 34035 MX066 33040 25000
RIGHT REAR QUAD
83078 81008 43051 41008 33027 31007 13006 11109
03741 01808 64/// 50040 34/// MX090 36020 30000
LEFT FRONT QUAD
8//// 8//// 43062 41010 33005 31009 13866 11310
03741 01808 64020 50025 34/// MX078 28015 30000
RIGHT FRONT QUAD
83088 80909 43045 41009 33019 31010 13940 11310
03698 01908 64/// 50040 34/// MX063 33030 30000
DOPPLER INTERMITTENTLY INOPERATIVE DUE TO HEAVY
PRECIPITATION

URNT12 KMIA 181143
AF980 0911 GRETA OB 14
SUPPLEMENTARY VORTEX DATA MESSAGE
AZIMUTH 280DEG FL100
LEFT REAR QUAD
83100 80909 43082 40808 33071 30808 13049 10909
03628 01612 64/// 50040 34/// MX052 12085 30000
RIGHT REAR QUAD
83076 80808 43037 40808 33982 30909 13894 10808
03863 01712 64010 50040 34070 MX092 06010 30000
RIGHT FRONT QUAD
8//// 8//// 43065 40808 33046 30808 13013 10909
03700 01612 64010 50/// 34/// MX082 34010 30000

URNT12 KMIA 182012
 AF977 1011 GRETA OB 12
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 285DEG FL100
 RIGHT REAR QUAD
 83099 81052 43077 41009 33044 31010 13964 11109
 03789 01712 64030 50/// 34/// MX090 01015 /////
 LEFT REAR QUAD
 8///// 8///// 4///// 4///// 33047 31010 13976 11209
 03790 01712 64020 50030 34/// MX085 11010 /////
 RIGHT FRONT QUAD
 83087 81010 43058 41008 33025 31109 13949 11306
 03790 01712 64/// 50025 34080 MX053 33015 /////
 LEFT FRONT QUAD
 8///// 8///// 43053 41010 33044 31010 13993 11010
 03784 01712 64/// 50/// 34025 MX042 27015 /////

URNT12 KMIA 182300
 AF977 1011 GRETA OB 20
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 290DEG FL100
 LEFT REAR QUAD
 8///// 8///// 43068 40908 33027 31010 13989 11110
 03791 01513 64/// 50025 34040 MX060 12015 /////
 RIGHT REAR QUAD
 83086 80907 43065 40906 33040 31007 13998 11209
 03791 01513 64020 50040 34075 MX070 06015 /////
 RIGHT FRONT QUAD
 83091 80907 43059 40906 33042 31007 13992 11111
 03782 01513 64025 50050 34/// MX085 33010 /////
 LEFT FRONT QUAD
 8///// 8///// 4///// 4///// 33004 31010 13948 11110
 03782 01513 64/// 50025 34/// MX060 24015 /////

URNT12 KMIA 182012
 AF977 1011 GRETA OB 12
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 285DEG FL100
 RIGHT REAR QUAD
 83099 81052 43077 41009 33044 31010 13964 11109
 03789 01712 64030 50/// 34/// MX090 01015 /////
 LEFT REAR QUAD
 8///// 8///// 4///// 4///// 33047 31010 13976 11209
 03790 01712 64020 50030 34/// MX085 11010 /////
 RIGHT FRONT QUAD
 83087 81010 43058 41008 33025 31109 13949 11306
 03790 01712 64/// 50025 34080 MX053 33015 /////
 LEFT FRONT QUAD
 8///// 8///// 43053 41010 33044 31010 13993 11010
 03784 01712 64/// 50/// 34025 MX042 27015 /////

URNT12 KMIA 182300
 AF977 1011 GRETA OB 20
 SUPPLEMENTARY VORTEX DATA MESSAGE
 AZIMUTH 290DEG FL100
 LEFT REAR QUAD
 8///// 8///// 43068 40908 33027 31010 13989 11110
 03791 01513 64/// 50025 34040 MX060 12015 /////
 RIGHT REAR QUAD
 83086 80907 43065 40906 33040 31007 13998 11209
 03791 01513 64020 50040 34075 MX070 06015 /////
 RIGHT FRONT QUAD
 83091 80907 43059 40906 33042 31007 13992 11111
 03782 01513 64025 50050 34/// MX085 33010 /////
 LEFT FRONT QUAD
 8///// 8///// 4///// 4///// 33004 31010 13948 11110
 03782 01513 64/// 50025 34/// MX060 24015 /////

KENDRA

URNT12 KMIA 312130

AF964 0715 KENDRA OB 10

SUPPLEMENTARY VORTEX DATA MESSAGE

AZIMUTH 360DEG FLO06

LEFT FRONT QUAD

80013 82020 40011 42120 30009 32121 10008 12222

00006 02323 64/// 50/// 34040 MX044 29060 /////

RIGHT FRONT QUAD

80009 82121 40009 42222 30008 32222 10008 12323

00006 02323 64/// 50/// 34/// MX020 05099 /////

RIGHT REAR QUAD

80010 82322 40008 42323 30007 32323 10006 12323

00006 02323 64/// 50/// 34090 MX043 12050 /////

LEFT REAR QUAD

80011 82222 40010 42222 30009 32323 10008 12323

00006 02323 64/// 50/// 34/// MX021 20030 /////

Table 8. Tropical Cyclone Reconnaissance Summary for 1978.

1. Requirements Levied	Atlantic	Eastern & Central Pacific
Cyclones	110	38
Invest	<u>43</u>	<u>0</u>
TOTAL	153	38
2. Requirements Accomplished	Atlantic	Eastern & Central Pacific
53 WRS (cyclones/invest)	19/19	13/0
920 WRG (cyclones/invest)	77/23	24/0
RFC (cyclones/invest)	<u>13/00</u>	<u>0/0</u>
TOTAL	109/42*	37/0*
3. Missions Flown	Atlantic	Eastern & Central Pacific
53 WRS	29	10
920 WRG	66	16
RFC	<u>5</u>	<u>0</u>
TOTAL	100	26
4. Flying Time (Hours)	Atlantic	Eastern & Central Pacific
53 WRS	263.1	95.2
920 WRG	645.0	166.6
RFC	<u>48.3</u>	<u>0.0</u>
TOTAL	956.4	261.8
	<u>+261.8</u>	
	GRAND TOTAL	1218.2

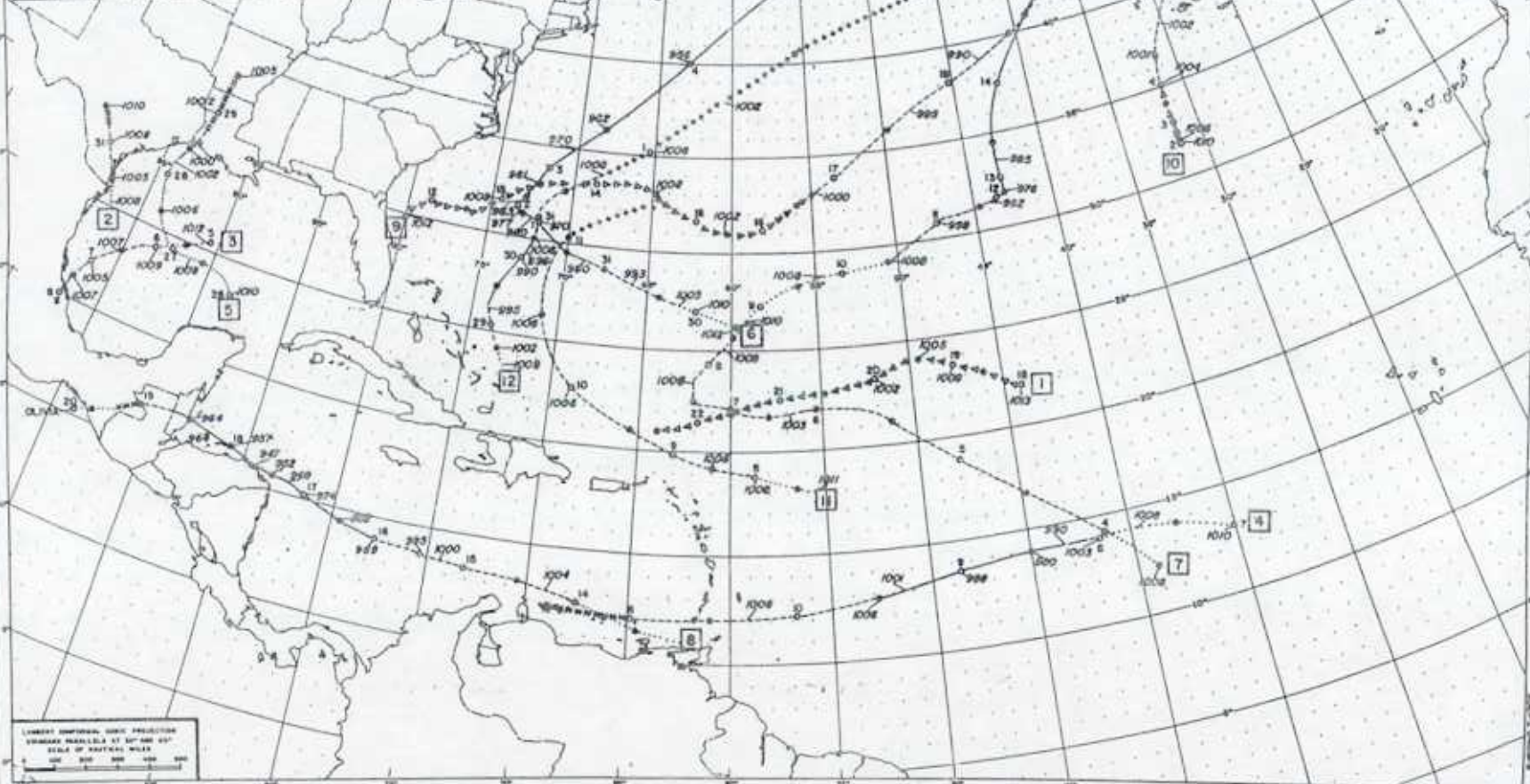
*Two of the unaccomplished requirements in the Atlantic as well as the one in the Pacific were levied as resources permitting.

U. S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE NORTH ATLANTIC HURRICANE TRACKING CHART

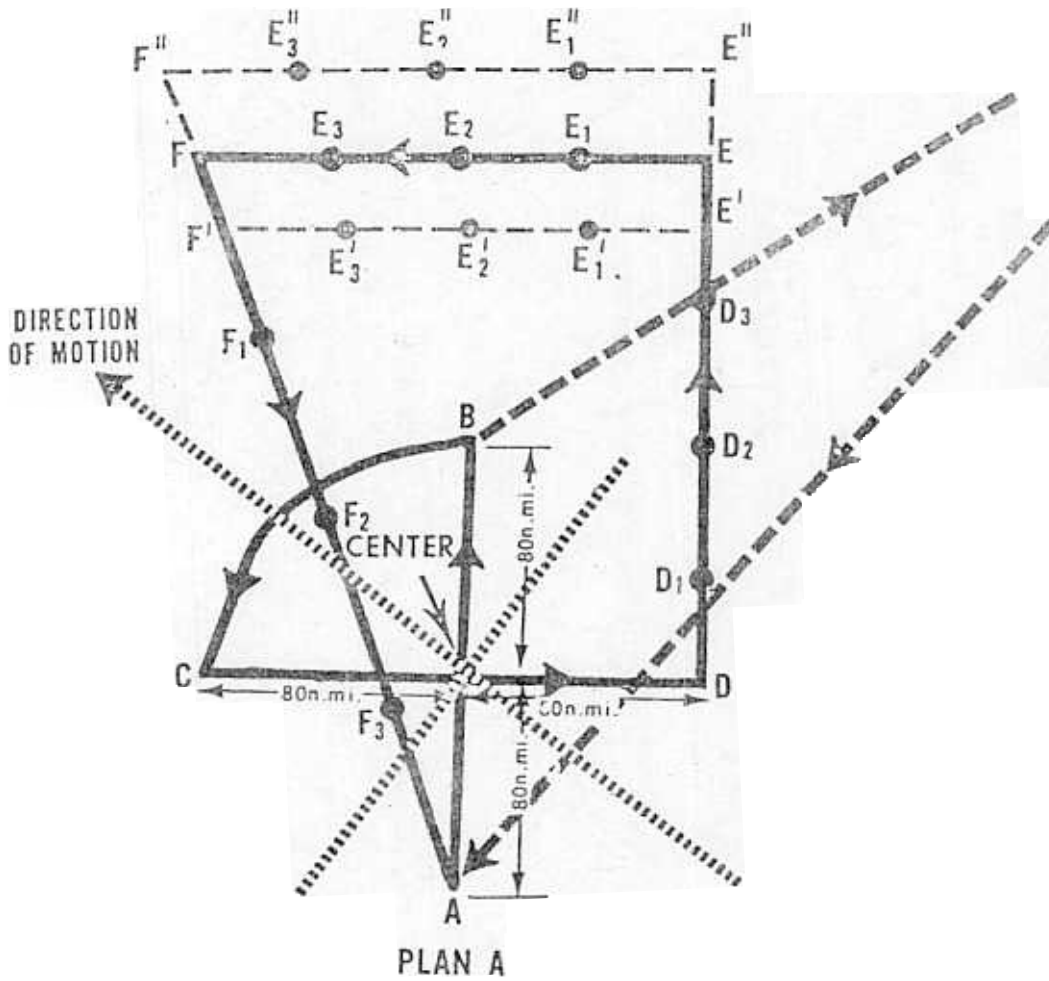
NORTH ATLANTIC TROPICAL STORMS
ORIGINATING IN THE PERIOD

1978			
NUMBER	TYPE	NAME	DATE
1	(T)		JAN 16-22
2	(T)	AMELIA	JULY 30-31
3	(T)	BESS	AUG 5-9
4	(H)	ODRA	AUG 7-11
5	(T)	DEBRA	AUG 26-29
6	(H)	ELLA	AUG 29-SEPT 5
7	(H)	FLOSSIE	SEPT 5-17
8	(H)	GRETA	SEPT 13-20
9	(T)	HOPK	SEPT 11-21
10	(T)	IRMA	OCT 2-5
11	(T)	ALBERT	OCT 7-11
12	(H)	KENRHA	OCT 28-NOV 3

- (T) Tropical Storm; did not reach hurricane intensity
- (H) Hurricane; Reached hurricane intensity
- (S) Subtropical; Never classified as a tropical storm or hurricane
- Tropical depression (development) stage
- Tropical storm stage
- ===== Hurricane stage
- Extratropical stage
- Tropical depression (dissipation) stage
- Subtropical depression (wind less than 34 kts)
- Subtropical storm (wind less than 34 kts)
- Subtropical storm (wind less than 34 kts)
- Subtropical storm (wind less than 34 kts)
- Subtropical storm (wind less than 34 kts)
- Subtropical storm (wind less than 34 kts)



LOWEST COMMON DENOMINATOR
STANDARD PARALLEL AT 30° AND 45°
SCALE OF HORIZONTAL DISTANCE
1:100,000



FLIGHT ALTITUDES	
A B C D	-- 10,000 FEET
D E F A	-- 1,500 FEET

2. Flight pattern flown in obtaining Supplementary Vortex Data Messages.

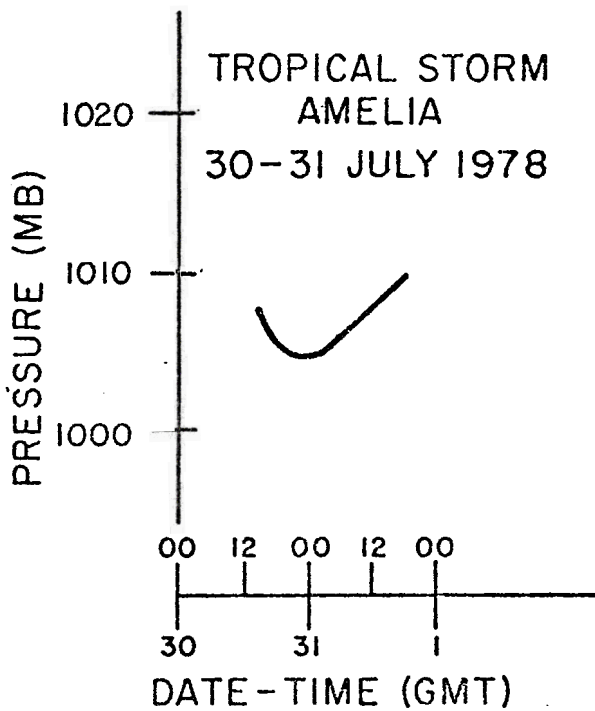
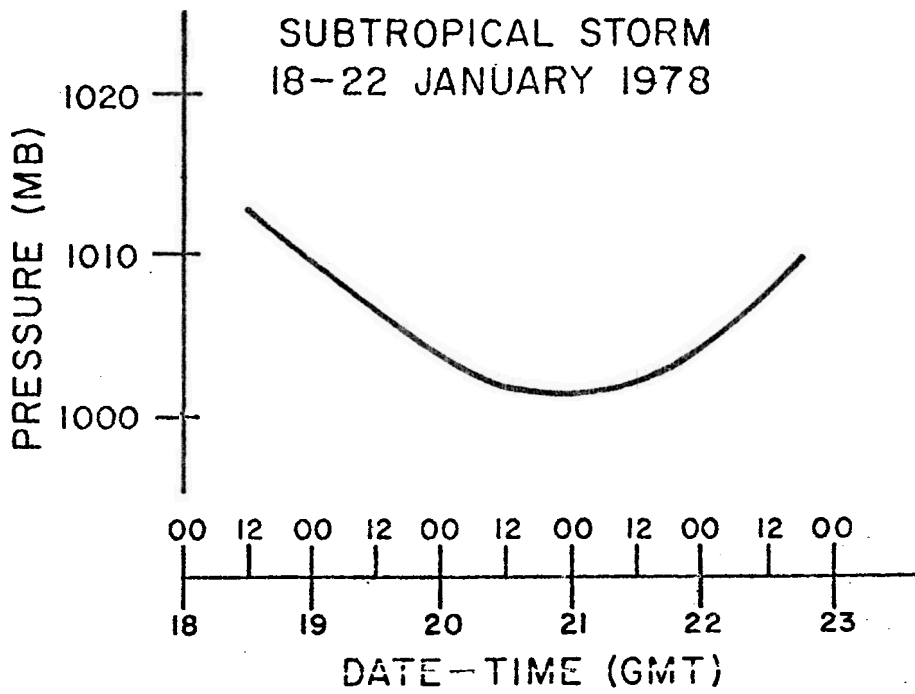


Figure 3. Lowest pressure vs time, 1978 tropical and subtropical cyclones

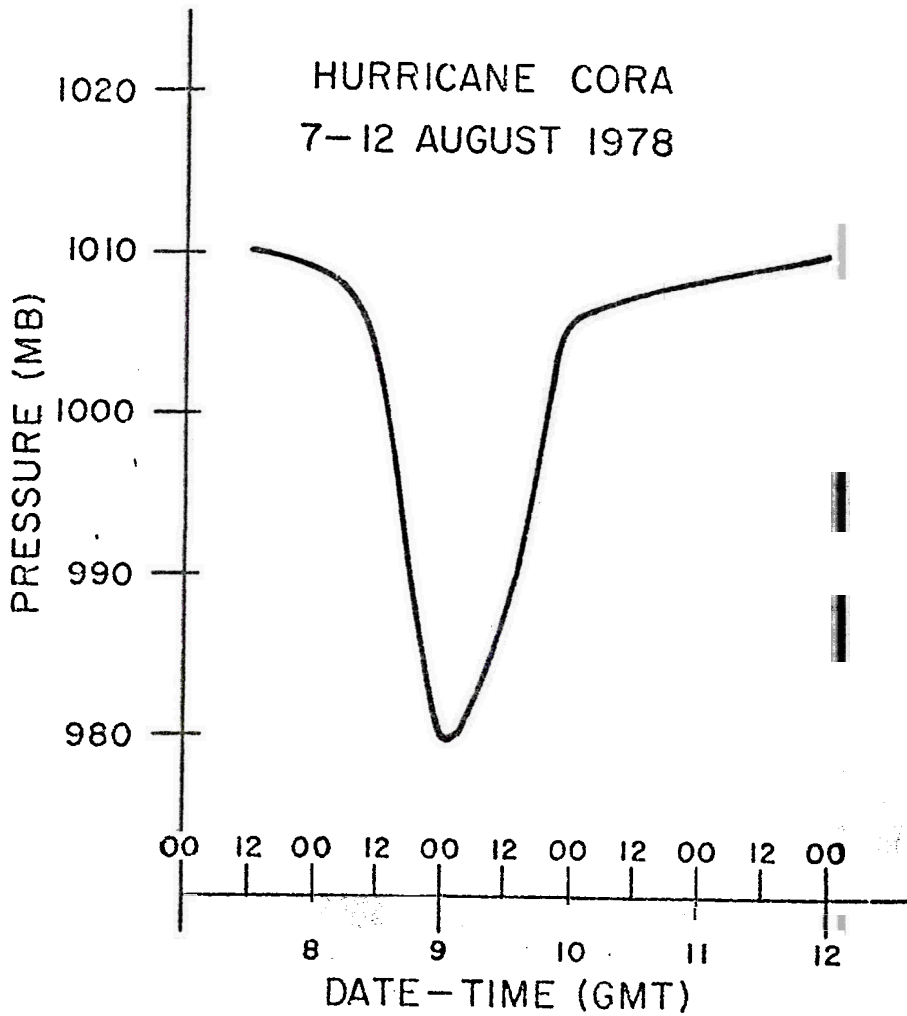
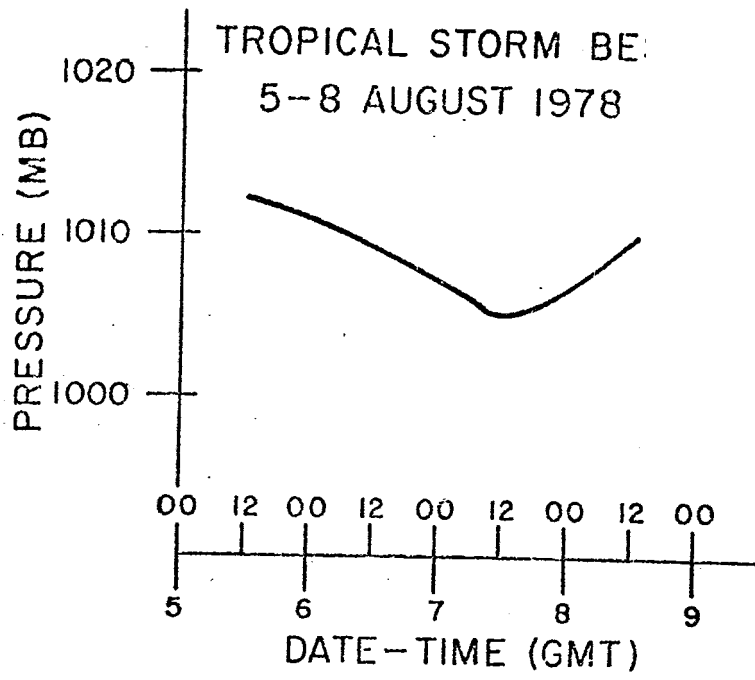


Figure 3 continued.

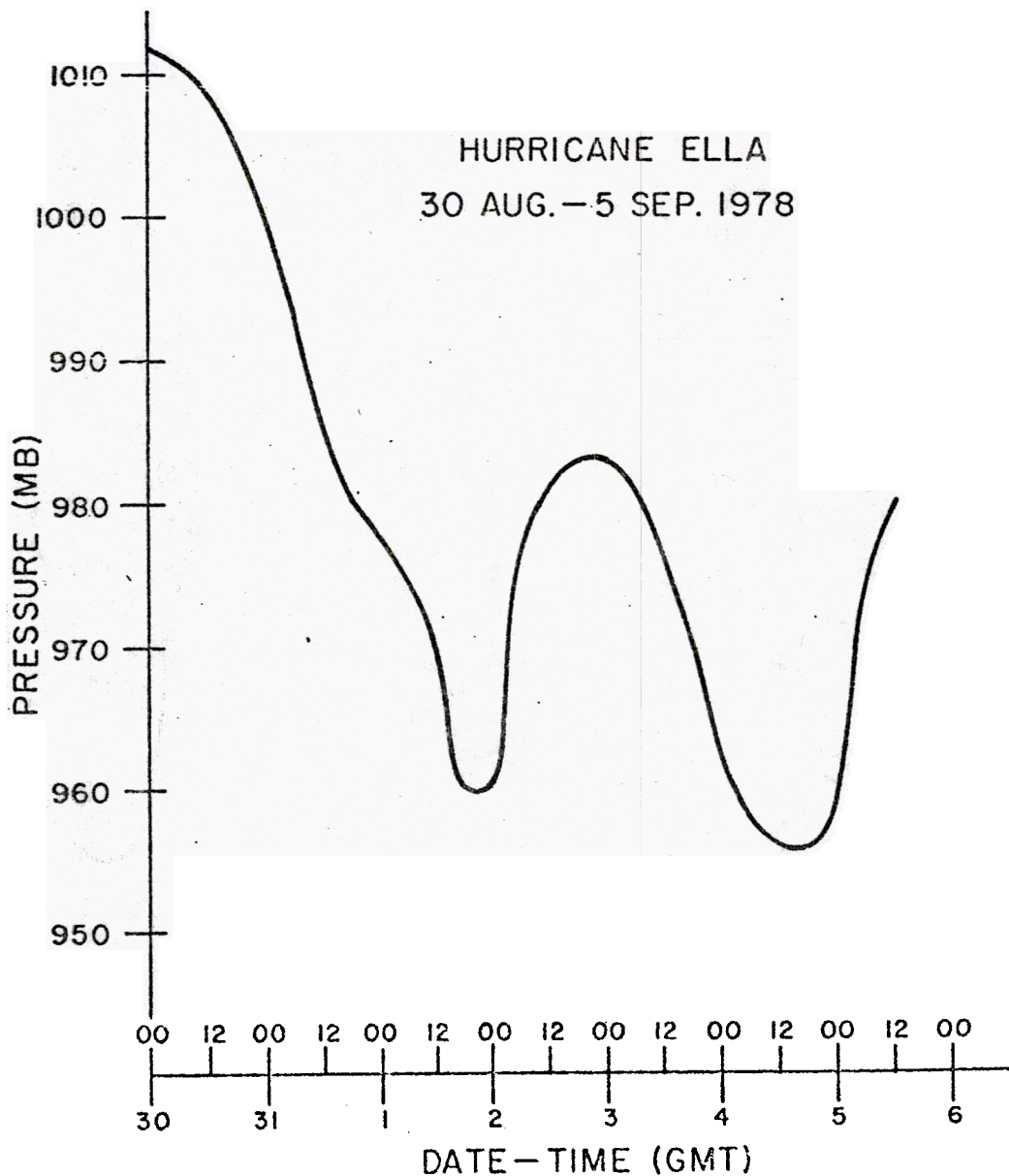
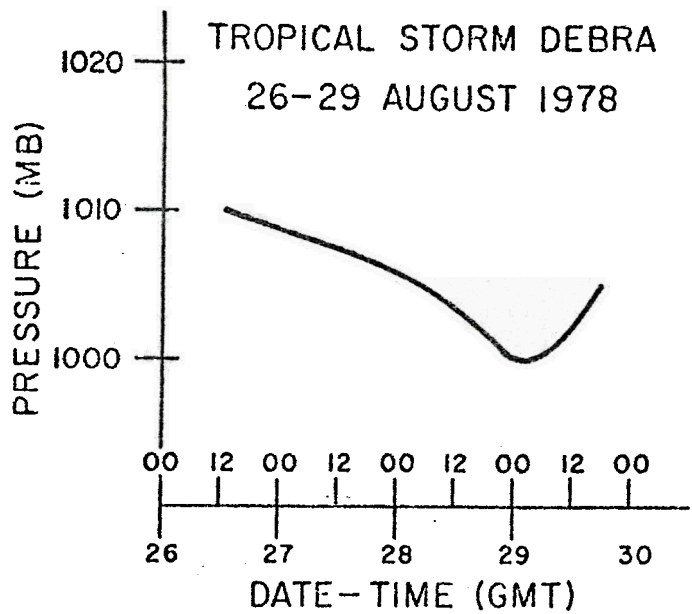


Figure 3 continued.

HURRICANE FLOSSIE
3-16 SEPTEMBER 1978

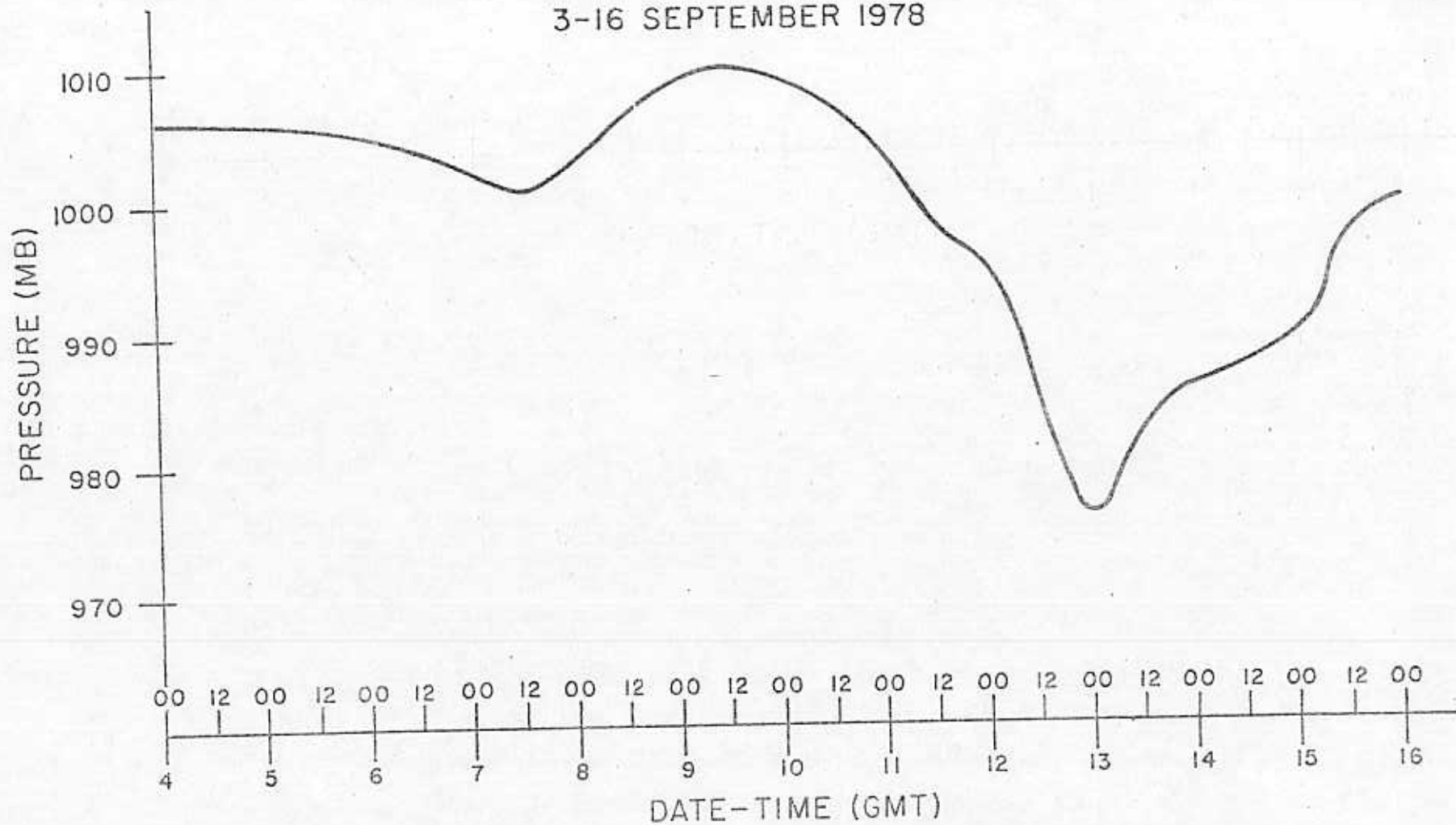


Figure 3 continued.

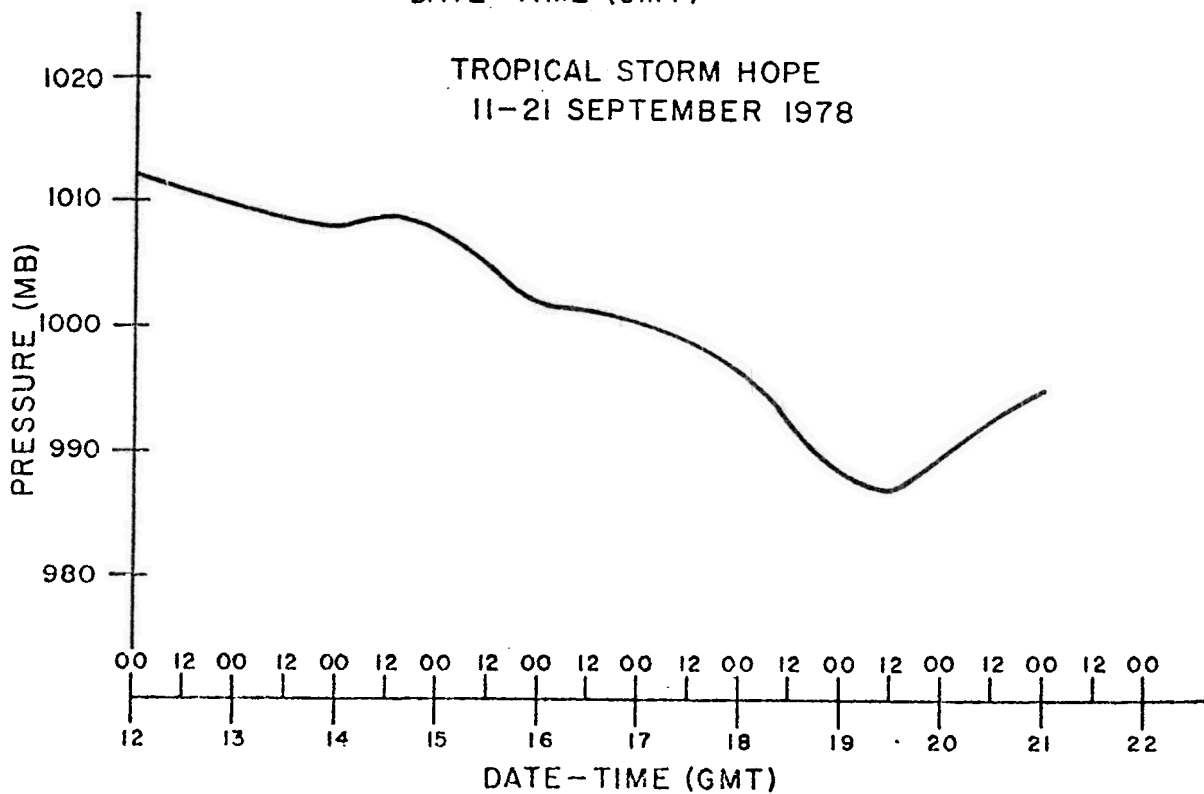
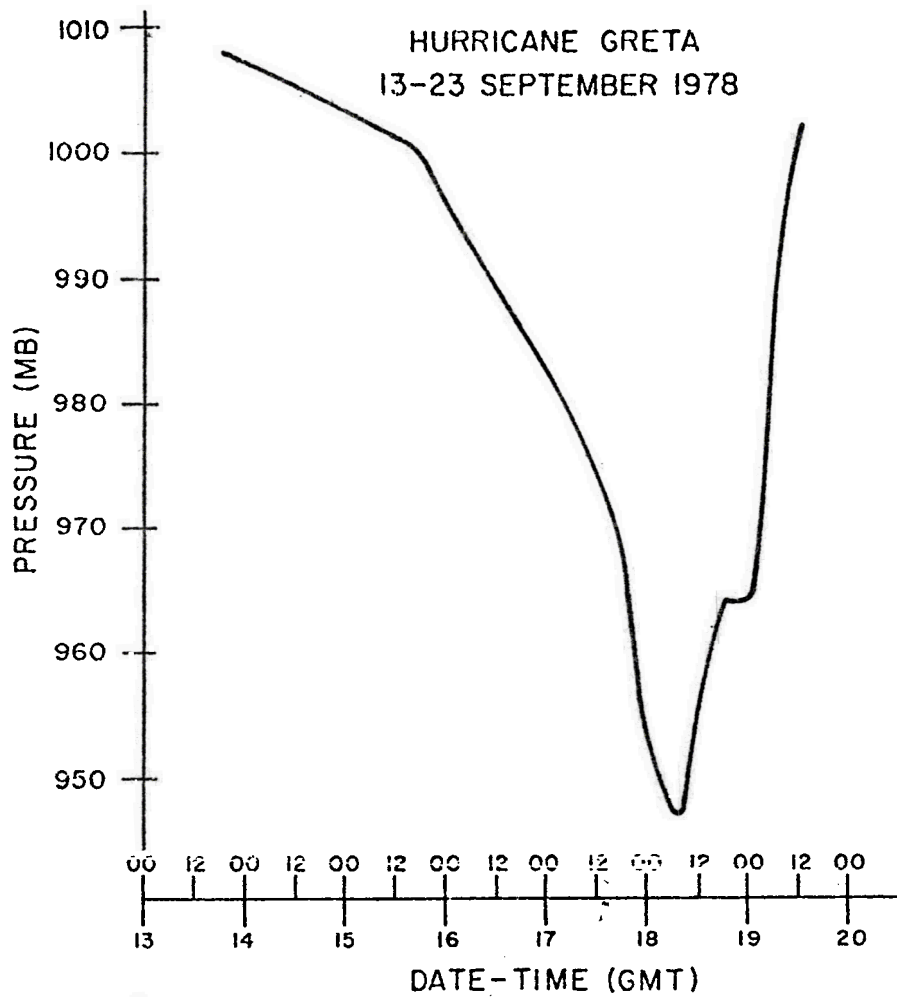


Figure 3 continued.

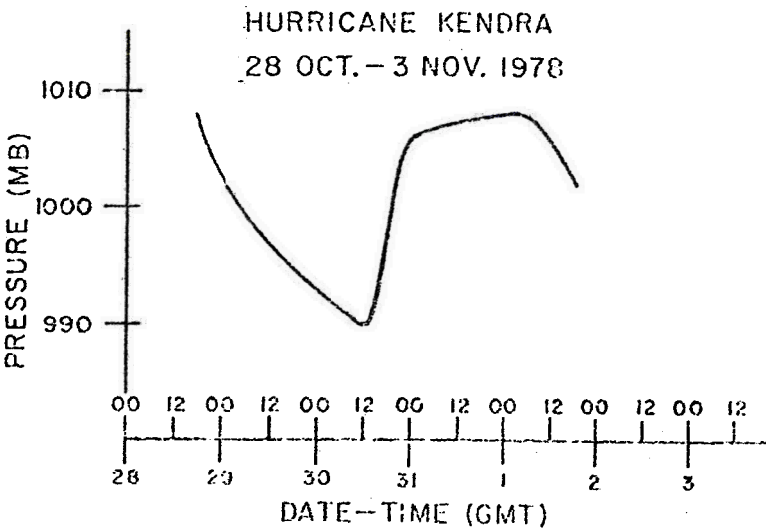
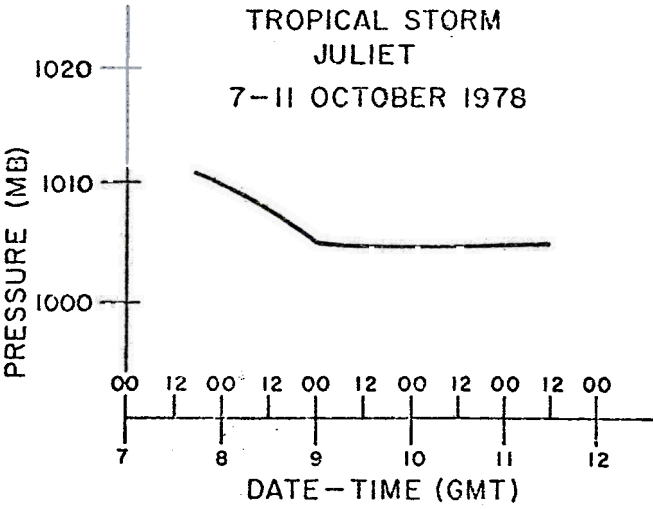
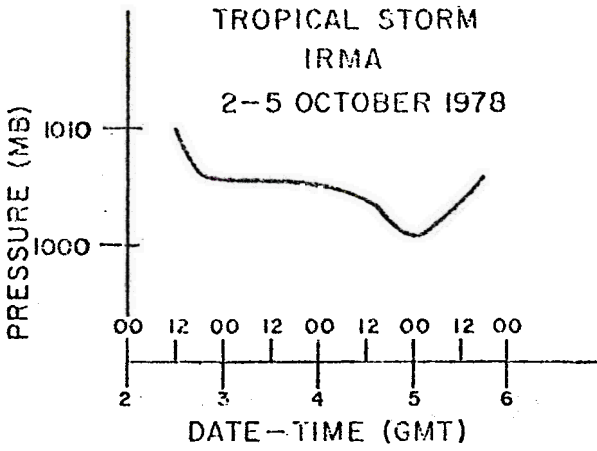
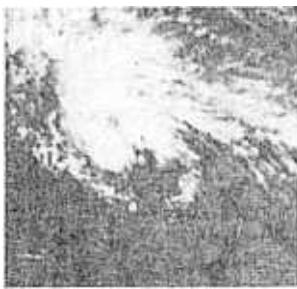
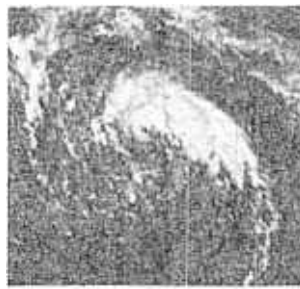


Figure 3 continued.



1301 GMT 1/18/78
1013 MB

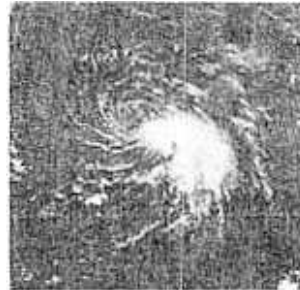


1731 GMT 1/19/78
1005 MB

SUBTROPICAL
STORM



1731 GMT 1/20/78
1002 MB



1731 GMT 1/21/78
1003 MB



2100 GMT 7/30/78

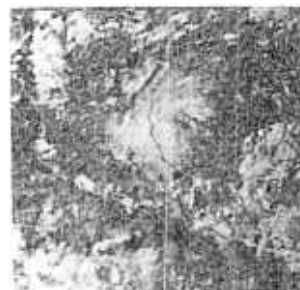


1401 GMT 7/31/78
1009 MB

AMELIA



1931 GMT 8/6/78
1008 MB



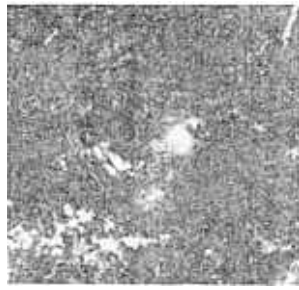
2231 GMT 8/7/78
1006 MB

BESS

Figure 4 Daily GOES-2 satellite photographs of 1978 named tropical cyclones and January subtropical cyclone.



1801 GMT 8/8/
990 MB



1301 GMT 8/9/78
988

CORA



1301 GMT 8/10/78
1007



1301 GMT 8/11/78
1009

DEBRA



2201 GMT 8/27/
1006

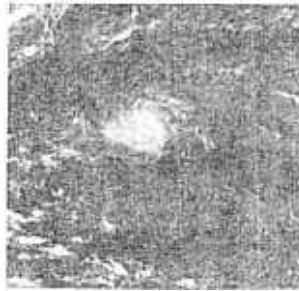


1931 GMT 8/28/
1002

Figure continued



1931 GMT 8/30/78
1004 MB

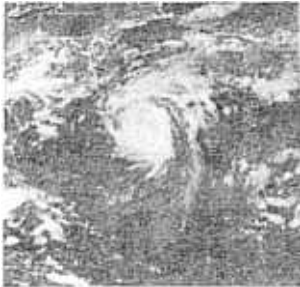


1901 GMT 8/31/78
980 MB



1801 GMT 9/1/78
960 MB

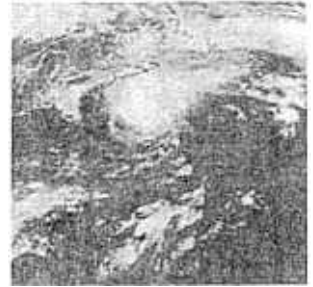
ELLA



1931 GMT 9/2/78
983 MB



1801 GMT 9/3/78
970 MB



1401 GMT 9/4/78
956 MB



1401 GMT 9/5/78
981 MB

Figure 4 continued



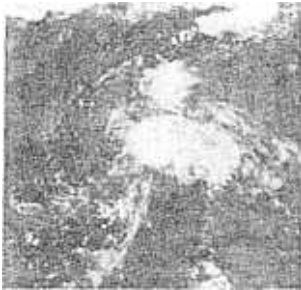
1102 GMT 9/4/78
1006 MB



1301 GMT 9/5/78
1006 MB



1301 GMT 9/6/78
1004 MB



1301 GMT 9/7/78
1001 MB



1301 GMT 9/8/78
1006 MB



1401 GMT 9/9/78
1010 MB

FLOSSIE



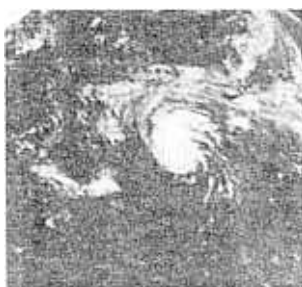
1401 GMT 9/10/78
1006 MB



1301 GMT 9/11/78
998 MB



1301 GMT 9/12/78
984 MB



1301 GMT 9/13/78
982 MB



1101 GMT 9/14/78
988 MB



1101 GMT 9/15/78
997 MB

Figure 4 continued.



1901 GMT 9/14/78
1004 MB



1931 GMT 9/15/78
999 MB



1931 GMT 9/16/78
985 MB

GRETA



2131 GMT 9/17/78
958 MB



2001 GMT 9/18/78
964 MB



1401 GMT 9/19/78
1005 MB



1831 GMT 9/14/78
1009 MB



1501 GMT 9/15/78
1004 MB



1300 GMT 9/16/78
1001 MB

HOPE



1201 GMT 9/17/78
999 MB



1101 GMT 9/18/78
992 MB



1101 GMT 9/19/78
987 MB

IRMA



1401 GMT 10/4/78
1003 MB



1101 GMT 10/5/78
1004 MB



1401 GMT 10/8/78
1007 MB



1301 GMT 10/9/78
1005 MB

JULIET



1301 GMT 10/10/78
1005 MB



1301 GMT 10/11/78
1005 MB

Figure 4 continued.



1931 GMT 10/28/78
1008 MB



1901 GMT 10/29/78
995 MB

KENDRA



1901 GMT 10/30/78
998 MB



1901 GMT 10/31/78
1008 MB

Figure 4 continued.

DATE	AIRCRAFT NUMBER	ARWO
------	-----------------	------

MANOP HEADING (PRECEDENCE IMMEDIATE)

MISSION IDENTIFIER AND OBSERVATION NUMBER

SUPPLEMENTARY VORTEX DATA MESSAGE

1	2 ddDEG	3 FLZZZ					
	DEG	FL					
4	LEFT RIGHT	5 FRONT REAR	6 QUAD				
7 DjHHH	8 DTTQQ	9 DjHHH	10 DTTQQ	11 DjHHH	12 DTTQQ	13 DjHHH	14 DTTQQ
8	8	4	4	3	3	1	1
15 DjHHH	16 DTTQQ	17 64RRR	18 50RRR	19 34RRR	20 MXFFF	21 BBBRR	22 hhhhh
ø	ø	64	50	34	MX		
23	LEFT RIGHT	24 FRONT REAR	25 QUAD				
26 DjHHH	27 DTTQQ	28 DjHHH	29 DTTQQ	30 DjHHH	31 DTTQQ	32 DjHHH	33 DTTQQ
8	8	4	4	3	3	1	1
34 DjHHH	35 DTTQQ	36 64RRR	37 50RRR	38 34RRR	39 MXFFF	40 BBBRR	41 hhhhh
ø	ø	64	50	34	MX		
42	LEFT RIGHT	43 FRONT REAR	44 QUAD				
45 DjHHH	46 DTTQQ	47 DjHHH	48 DTTQQ	49 DjHHH	50 DTTQQ	51 DjHHH	52 DTTQQ
8	8	4	4	3	3	1	1
53 DjHHH	54 DTTQQ	55 64RRR	56 50RRR	57 34RRR	58 MXFFF	59 BBBRR	60 hhhhh
ø	ø	64	50	34	MX		
61	LEFT RIGHT	62 FRONT REAR	63 QUAD				
64 DjHHH	65 DTTQQ	66 DjHHH	67 DTTQQ	68 DjHHH	69 DTTQQ	70 DjHHH	71 DTTQQ
8	8	4	4	3	3	1	1
72 DjHHH	73 DTTQQ	74 64RRR	75 50RRR	76 34RRR	77 MXFFF	78 BBBRR	79 hhhhh
ø	ø	64	50	34	MX		

Remarks

**CODE
FIGURES**

- dd - True direction in tens of degrees (pattern orientation based on direction of storm motion).
- zzz - Flight level in hundreds of feet (absolute altitude below 5500 feet).
- D - Group indicator designating the distance from the center in nautical miles (8-80, 4-45, 3-30, 1-15, ø-center).
- hhhhh - Height of the eyewall in feet.
- jHHH - Pressure height data in RECCO format.
- TTQQ - Temperature/dewpoint in degrees Celsius. Add 50 for negative values.
- FFF - Maximum observed wind speed in knots.
- BBBRR - Bearing and range from the center of MXFFF.
- RRR - Radial extent of 64 kt, 50 kt, and 34 kt winds from the center in nautical miles.
- // - Data are unknown or unobtainable.