

HURRICANE KATE
15-23 NOVEMBER 1985

1st draft

12/10/85

RAC

of BC

Excellent

HIGH PRESSURE SURFACE AND ALOFT DOMINATED THE FALL WEATHER OF 1985 ACROSS THE SOUTHEASTERN U.S. WHILE A MAJOR TROUGH PERSISTED OVER THE SOUTHWESTERN STATES. AS A RESULT, WITH THE EXCEPTION OF A BRIEF COOL FRONT, NO COLD WEATHER HAD BEEN ABLE TO PENETRATE THE GULF, CARIBBEAN NOR THE SOUTHWEST NORTH ATLANTIC SOUTH OF LATITUDE 32 DEGREES NORTH PRIOR TO THE ADVENT OF KATE. THEREFORE, WHEN THE TROPICAL WAVE WHICH ULTIMATELY BECAME KATE COMMENCED TO DEVELOP JUST NORTHEAST OF THE VIRGIN ISLANDS, WEATHER CONDITIONS WERE MORE LIKE ONE WOULD EXPECT TO FIND IN LATE SEPTEMBER OR EARLY OCTOBER RATHER THAN MID NOVEMBER, WITH ~~ALSO~~ SEA SURFACE TEMPERATURES WERE NEAR 27 DEGREES ^{Celsius} CENTIGRADE, AND HIGH PRESSURE SURFACE AND ALOFT DOMINATED THE EASTERN U.S. AND WESTERN ATLANTIC WHICH PROVIDED THE BLOCKING MECHANISM TO FORCE THE DEVELOPING SYSTEM (KATE) TOWARD THE WEST.

DEVELOPMENT OF KATE BEGAN JUST NORTHEAST OF THE VIRGIN ISLANDS WHEN A WEAK TROPICAL WAVE BEGAN TO INTERACT WITH A 200 MILLIBAR TROUGH ON 13-14 NOVEMBER. BY THE TIME AIR FORCE RECONNAISSANCE INVESTIGATED THE AREA ON 15 NOVEMBER, THE SYSTEM HAD ALREADY ATTAINED STORM FORCE WINDS AND WAS NAMED KATE. ON 16 NOVEMBER THE 200 MILLIBAR TROUGH DEVELOPED A CUT OFF CLOSED CIRCULATION AND BY 17 NOVEMBER ACCELERATED TO THE SOUTHWEST IN ADVANCE OF KATE'S CIRCULATION. MEANTIME A LARGE 200 MILLIBAR ANTICYCLONE LOCATED OVER THE FLORIDA STRAITS ON 16 NOVEMBER BUILT NORTHEASTWARD AND PLACED KATE IN AN EXCELLENT OUTFLOW PATTERN BETWEEN THE ANTICYCLONE AND THE SOUTHWEST MOVING UPPER COLD LOW. THE TROPICAL STORM RESPONDED TO THIS FAVORABLE PATTERN AND INTENSIFIED TO HURRICANE STRENGTH BY 18Z ON 16 NOVEMBER AND TO A 967 MILLIBAR HURRICANE BY 00Z 19 NOVEMBER AS THE HURRICANE MOVED WESTWARD THROUGH THE EXTREME SOUTHEAST BAHAMAS.

BY 06Z 19 NOVEMBER THE EYE OF KATE MADE CONTACT WITH THE NORTH CENTRAL CUBAN COAST. SATELLITE PICTURES SHOWED AN EXCELLENT VIEW OF KATE'S WELL STRUCTURED EYE AS THE CENTER MOVED ONSHORE. EVEN THOUGH THE MAJORITY OF THE EYE WALL CLOUD MOVED OVER LAND AND CONTINUED TO TRACK INLAND FOR A PERIOD OF 12 HOURS, SATELLITE PICTURES INDICATED THAT KATE MAINTAINED AN EXCELLENT EYE DEFINITION DURING THIS ENTIRE TIME. AIR FORCE RECONNAISSANCE'S DATA INDICATE KATE WEAKENED FROM 967 MILLIBARS, JUST PRIOR TO LANDFALL, TO 976 MILLIBARS JUST AFTER IT EMERGED FROM THE CUBAN COAST JUST EAST OF HAVANA. MAXIMUM WINDS OBSERVED FROM CUBAN STATIONS IN OR NEAR THE TRACK WERE 65 KNOTS FROM SAGUA LA GRANDE LAS VILLAS WHILE VARADERO REPORTED 60 KNOTS FROM THE EAST WITH GUSTS TO 90 KNOTS. HAVANA HAD NORTH AND WEST WINDS OF 50 TO 60 KNOTS.

BY 00Z 20 NOVEMBER KATE HAD CLEARED THE ISLAND OF CUBA AND THE CENTER HAD PASSED AS CLOSE AS 85 MILES SOUTH SOUTHWEST OF KEY WEST. MAXIMUM SUSTAINED WINDS AT WSO KEY WEST WERE 41 KNOTS WITH PEAK GUSTS OF 60 KNOTS. HOWEVER UNOFFICIAL WIND GUSTS FROM A SHERIFF'S OFFICE (ANNEMOMETER REPORTEDLY ON ROOF OF THIRD FLOOR BUILDING) WAS 90 KNOTS.

IT WAS DURING THIS NEXT TWENTY FOUR HOUR PERIOD THAT KATE INTENSIFIED AT A RATE OF NEARLY A MILLIBAR PER HOUR FROM A 972 MILLIBAR AT 00Z 20 NOVEMBER TO 953 MILLIBARS (LOWEST PRESSURE) AT 20Z 20 NOVEMBER. THE CENTER OF KATE PASSED VERY CLOSE TO THE NOAA DATA BUOY IN THE EASTERN GULF ABOUT THE SAME TIME AIR FORCE RECONNAISSANCE WAS IN THE HURRICANE. PRESSURE MEASUREMENTS FROM THE DROPSONDE AND THE DATA BUOY WERE EXTREMELY CLOSE. AIRCRAFT MEASURED THE CENTRAL PRESSURE OF KATE AT 956 MILLIBARS WHILE THE DATA BUOY HAD A READING OF 957. DURING THIS TIME PERIOD THE AIRCRAFT WAS MEASURING TOP WINDS OF 100 TO 109 KNOTS WHILE THE DATA BUOY REPORTED AN EIGHT MINUTE AVERAGED WIND OF 94 KNOTS WITH A PEAK GUST OF 118 KNOTS.

AT 00Z 20 NOVEMBER A FRONTAL TROUGH, MOVING FROM THE WEST, WAS LOCATED OVER THE UPPER MISSISSIPPI VALLEY AND EXTENDED SOUTHWEST INTO TEXAS. AS KATE MOVED OFF THE CUBAN COAST IT BEGAN A TURN TOWARD THE NORTHWEST IN RESPONSE TO THE ADVANCING FRONTAL SYSTEM. BY THE TIME KATE HAD REACHED THE CENTRAL EASTERN GULF IT WAS MOVING TOWARD THE NORTH AND COMMENCED TO MOVE OVER COOLER WATERS. THE COMBINATION OF COOLER GULF WATERS (22 DEGREES ^{CELSIUS} ~~CENTIGRADE~~ JUST OFF THE GULF NORTH GULF COAST) AND INCREASING SOUTHWEST SHEAR FROM THE APPROACHING FRONTAL TROUGH CAUSED KATE TO BEGIN WEAKENING ONCE THE HURRICANE MOVED NORTH OF LATITUDE 26.5N. BY THE TIME IT REACHED THE COAST AT MEXICO BEACH, FLORIDA, KATE HAD WEAKENED TO 967 MILLIBARS.

MAXIMUM WINDS AT LANDFALL WERE NEAR 85 KNOTS WHICH PRODUCED STORM SURGE AS HIGH AS 11 FEET AT CAPE SAN BLAS, FLORIDA. KATE CONTINUED TO TRACK TOWARD THE NORTHEAST, PASSING JUST TO THE WEST OF TALLAHASSEE. LITTLE STRUCTURAL DAMAGE OCCURRED IN THE STATE CAPITOL, HOWEVER, NUMEROUS TREES WERE DOWNED CAUSING EXTENSIVE POWER OUTAGE THROUGHOUT THE AREA. THE HURRICANE WAS DOWNGRADED TO A TROPICAL STORM BY 10Z ON 22 NOVEMBER AS IT CONTINUED MOVING TOWARD THE NORTHEAST ACROSS SOUTH CENTRAL GEORGIA. KATE CONTINUED TO LOSE STRENGTH AFTER IT EMERGED OVER THE CAROLINA COASTAL WATERS LATE IN THE DAY ON 22 NOVEMBER. SEA SURFACE TEMPERATURES ALONG THE COAST WERE IN THE UPPER TEENS (^{CELSIUS} ~~CENTIGRADE~~) AND EVEN THE GULF STREAM WAS A MILD 24 DEGREES. ALSO STRONG SHEAR CONTINUED OVER THE SYSTEM. THEREFORE, KATE CONTINUED TO WEAKEN AND BECAME EXTRATROPICAL ON 23 NOVEMBER AS IT TURNED TOWARD THE EAST SOUTHEAST. THE REMNANTS OF KATE PRODUCED WIND GUSTS OF 23 KNOTS AT BERMUDA AS IT PASSED JUST TO THE NORTH OF THE ISLAND ON THE MORNING OF ²⁴ ~~23~~ NOVEMBER.

PRELIMINARY DAMAGE FIGURES FOR THE HURRICANE CURRENTLY ARE ESTIMATED TO BE NEAR ²⁰ MILLION DOLLARS. THIS FIGURE DOES NOT INCLUDE THE LOST JOBS IN THE APALACHICOLA AREA DUE TO THE TOTAL RUINATION OF THE OYSTER INDUSTRY BY KATE. EARLIER IN THE YEAR ELENA DID CONSIDERABLE DAMAGE TO THE OYSTER BEDS IN THE APALACHICOLA AREA. HOWEVER, THE FINAL BLOW WAS DEALT BY KATE. DEATH TOLL FOR THE HURRICANE STANDS AT SIX. DEATHS AND DAMAGE IN CUBA ARE NOT KNOWN.

TABLE 1. WATCHES AND WARNINGS ISSUED BY THE NATIONAL HURRICANE CENTER.

LOCATION	TYPE	EFFECTIVE	DISCONTINUED
SOUTHEAST FLORIDA COAST FROM JUPITER INLET THROUGH THE DRY TORTUGAS.	GALE WARNING	18/16Z	19/22Z
	HURRICANE WATCH	18/16Z	18/21Z
	HURRICANE WARNING	18/21Z	19/13Z, 20/10Z
THE DRY TORTUGAS NORTHWARD TO FORT MYERS INCLUDING LEE COUNTY.	GALE WARNING	18/21Z	20/10Z
	HURRICANE WARNING	18/21Z	19/13Z
GRANDE ISLE, LOUISIANA TO CEDAR KEY, FLORIDA	HURRICANE WATCH	20/13Z	20/22Z
BAY ST. LOUIS, MISSISSIPPI TO ST. MARKS, FLORIDA INCLUDING WAKULLA COUNTY.	HURRICANE WARNING	20/22Z	21/16Z
WEST OF BAY ST. LOUIS TO GRANDE ISLE AND EAST OF ST. MARKS TO CEDAR KEY.	GALE WARNING	20/22Z	21/16Z
	HURRICANE WATCH	20/22Z	21/16Z
PENSACOLA TO ST. MARKS INCLUDING WAKULLA COUNTY.	HURRICANE WARNING	21/16Z	21/22Z
EAST OF ST. MARKS TO CEDAR KEY.	GALE WARNING	21/16Z	21/22Z
	HURRICANE WATCH	21/16Z	21/22Z
WEST OF PENSACOLA TO GRANDE ISLE	GALE WARNING	21/16Z	21/22Z
EAST OF PENSACOLA TO ST. MARKS INCLUDING WAKULLA COUNTY	HURRICANE WARNING	21/22Z	22/00Z
PENSACOLA TO GULFPORT AND EAST OF ST. MARKS TO CEDAR KEY.	GALE WARNING	21/22Z	22/00Z
EAST OF DESTIN, FLORIDA TO ST. MARKS.	HURRICANE WARNING	22/00Z	22/10Z
DESTIN TO GULFPORT AND EAST OF ST. MARKS TO CEDAR KEY.	GALE WARNING	22/00Z	22/20Z

TABLE 1. WATCHES AND WARNINGS CONTINUED.

MOUTH OF THE CHESAPEAKE BAY TO ST. AUGUSTINE, FLORIDA.	GALE WARNING	22/10Z	22/16Z
CHINCOTEAGUE, VIRGINIA TO ST. AUGUSTINE.	GALE WARNING	22/16Z	22/22Z
CHINCOTEAGUE TO CAPE ROMAIN, SOUTH CAROLINA.	GALE WARNING	22/22Z	23/04Z
CHINCOTEAGUE TO LITTLE RIVER NORTH CAROLINA.	GALE WARNING	23/04Z	23/10Z
CAPE CHARLES, VIRGINIA TO CAPE LOOKOUT NORTH CAROLINA.	GALE WARNING	23/10Z	23/16Z
SOUTH OF VIRGINIA BEACH TO CAPE LOOKOUT.	GALE WARNING	23/16Z	23/22Z

19/22Z.... GALE WARNING WERE DISCONTINUED FROM JUPITER INLET TO
NORTHEAST OF CRAIG KEY ONLY.

19/13Z....EXCEPT MIDDLE AND LOWER KEYS SOUTHWEST OF CRAIG KEY, WHERE
HURRICANE WARNINGS CONTINUED UNTIL 20//10Z.

TABLE 3. SELECTED METEOROLOGICAL AND HYDROLOGICAL STATISTICS FOR HURRICANE KATE 15 TO 23 NOVEMBER 1985.

LOCATION	STRONGEST WIND (MPH)		MIN PRESS. DATE/TIME	RAINFALL (IN.) DATE 24 HR	STORM TOTAL
	DATE/TIME	SUSTD PEAK			
MIAMI (MIA) FLORIDA	19/0809Z	38 48	1014.6MB 19/0738Z	18-19 0.20	0.20
MIAMI BEACH FLORIDA	19/0655Z 19/0855Z	37 78			
KEY WEST (EYW) FLORIDA	19/2213Z 19/1854Z	47 69	1006.8MB 19/2000Z	19-20 2.08	2.08
CONCH KEY FLORIDA	19/1630Z 19/1639Z	50 78			
APALACHICOLA (AQQ) FLORIDA	21/2215Z 21/2213Z	62 85	985.3MB 21/2210Z	20-21 4.60	4.93
PANAMA CITY FLORIDA	21/2001Z 21/2102Z	40 78	973.1MB 21/2130Z	21-22 5.11	5.97
TALLAHASSEE (TLH) FLORIDA	22/0115Z 22/0151Z	46 68	992.0MB 22/0225Z	21-22 3.63	3.63
ALBANY (ABY) GEORGIA	22/0400Z	51 67		21-22 5.02	5.02
SAVANNAH, (SAV) GEORGIA	22/1250Z 22/1054Z	40 62	1001.4MB 22/1223Z	21-22 1.73	1.73
CHARLESTON, (CHS) S.C.	22/1401Z 22/1314Z	37 50	1002.7MB 22/1455Z		
WILMINGTON, (ILM) N.C.	22/1824Z 22/2222Z	29 40	1002.4MB 22/2220Z	21-22 1.99	1.99

SELECTED COASTAL...DATA BUOY AND OFFSHORE OBSERVATIONS.

LOCATION	STRONGEST WINDS (MPH) DATE/TIME SUSTD	PEAK	MIN PRESS. DATE/TIME	SEAS (FT)	STORM SURGE (FT)
BUOY 26.0N 85.9W	20/1700Z	108	136 957MB 20/1800Z	33	
CAPE SAN BLAS FLORIDA	21/2012Z	74	100** 975.3MB 21/2208Z		11
CEDAR ISLAND AND KEATON BEACH, FL					6
TURKEY POINT FLORIDA					5
EDISTO BEACH S.C.	22/1706Z		53		
FRYING PAN	22/2000Z*	43	48		
SHIP 32.8N 77.9W	22/1800Z	58	1005.0MB 22/1800Z	12	
BUOY 34.9N 72.9W	23/0600Z	29	1009.2MB 23/0600Z		
BERMUDA	24/0300Z** 24/0500Z**	18	27 1009.4MB 24/0900Z		

*
TIME THAT REPORT WAS OBTAINED. MAXIMUM WIND MAY HAVE OCCURRED SEVERAL HOURS PRIOR TO TIME GIVEN.

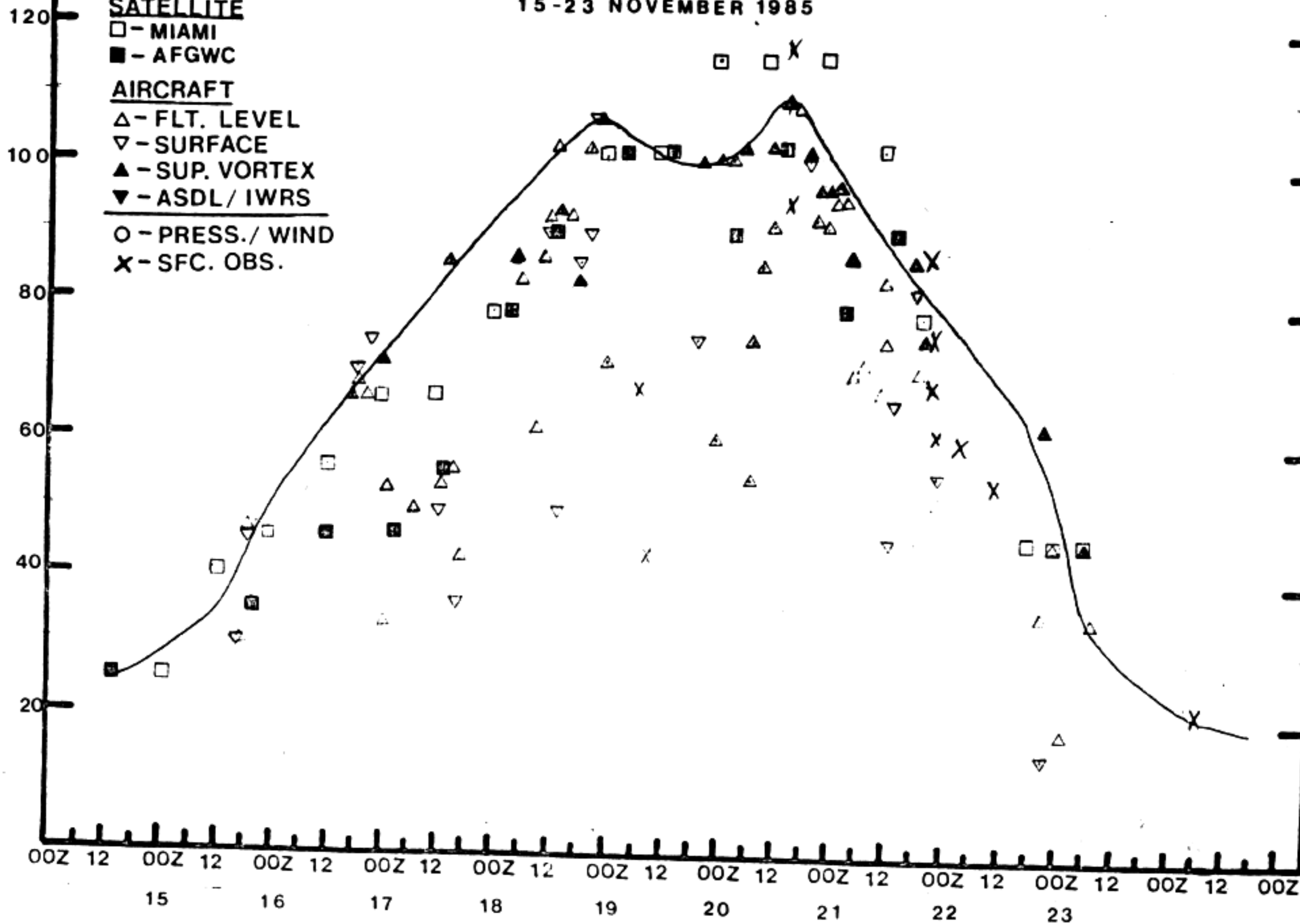
**
ONE OF SEVERAL OCCURRENCES.

HURRICANE KATE

15-23 NOVEMBER 1985

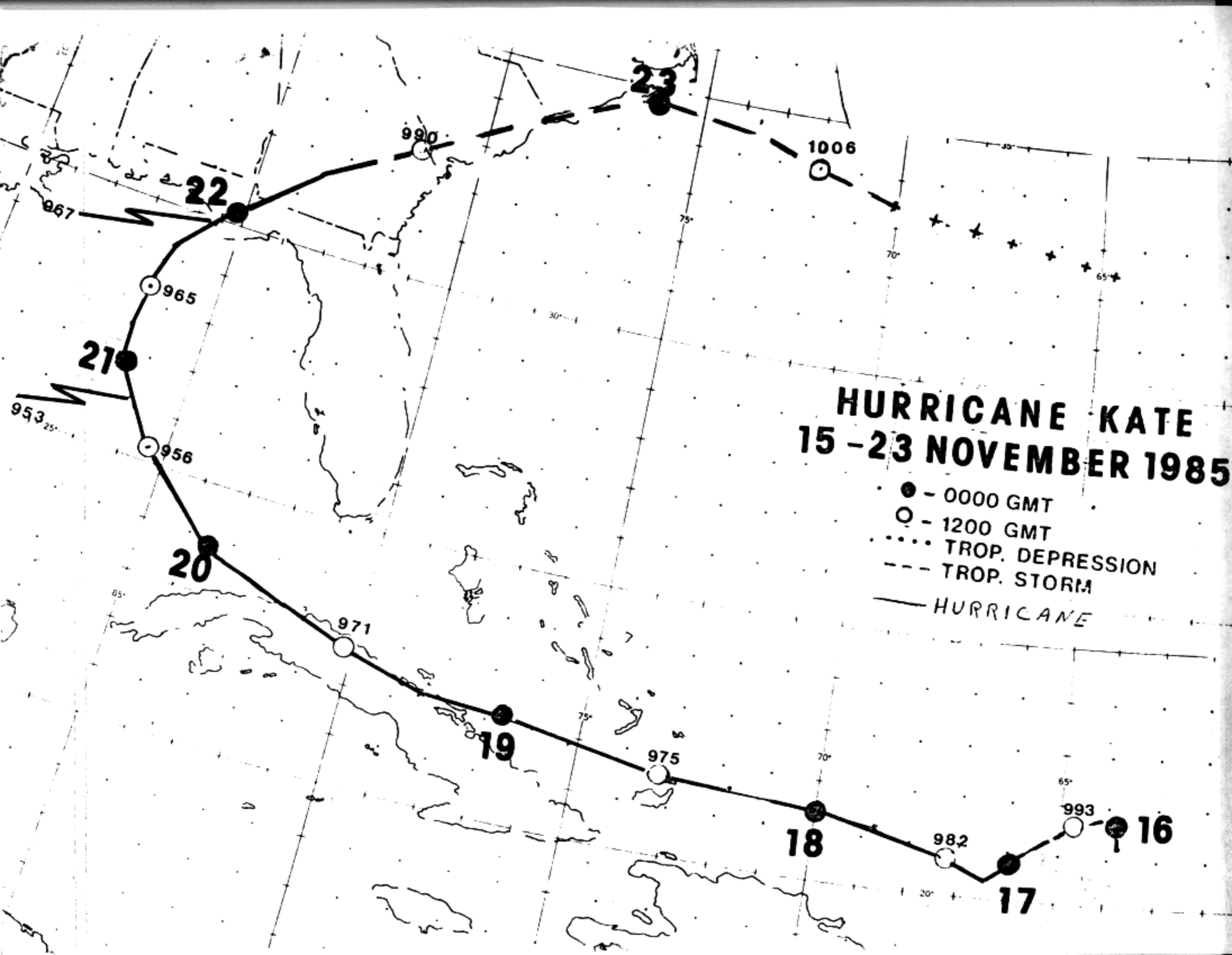
WIND SPEED [KNOTS]

- SATELLITE**
□ - MIAMI
■ - AFGWC
- AIRCRAFT**
△ - FLT. LEVEL
▽ - SURFACE
▲ - SUP. VORTEX
▼ - ASDL/IWRS
- - PRESS./ WIND
X - SFC. OBS.



HURRICANE KATE 15 - 23 NOVEMBER 1985

- - 0000 GMT
- - 1200 GMT
- TROP. DEPRESSION
- TROP. STORM
- HURRICANE



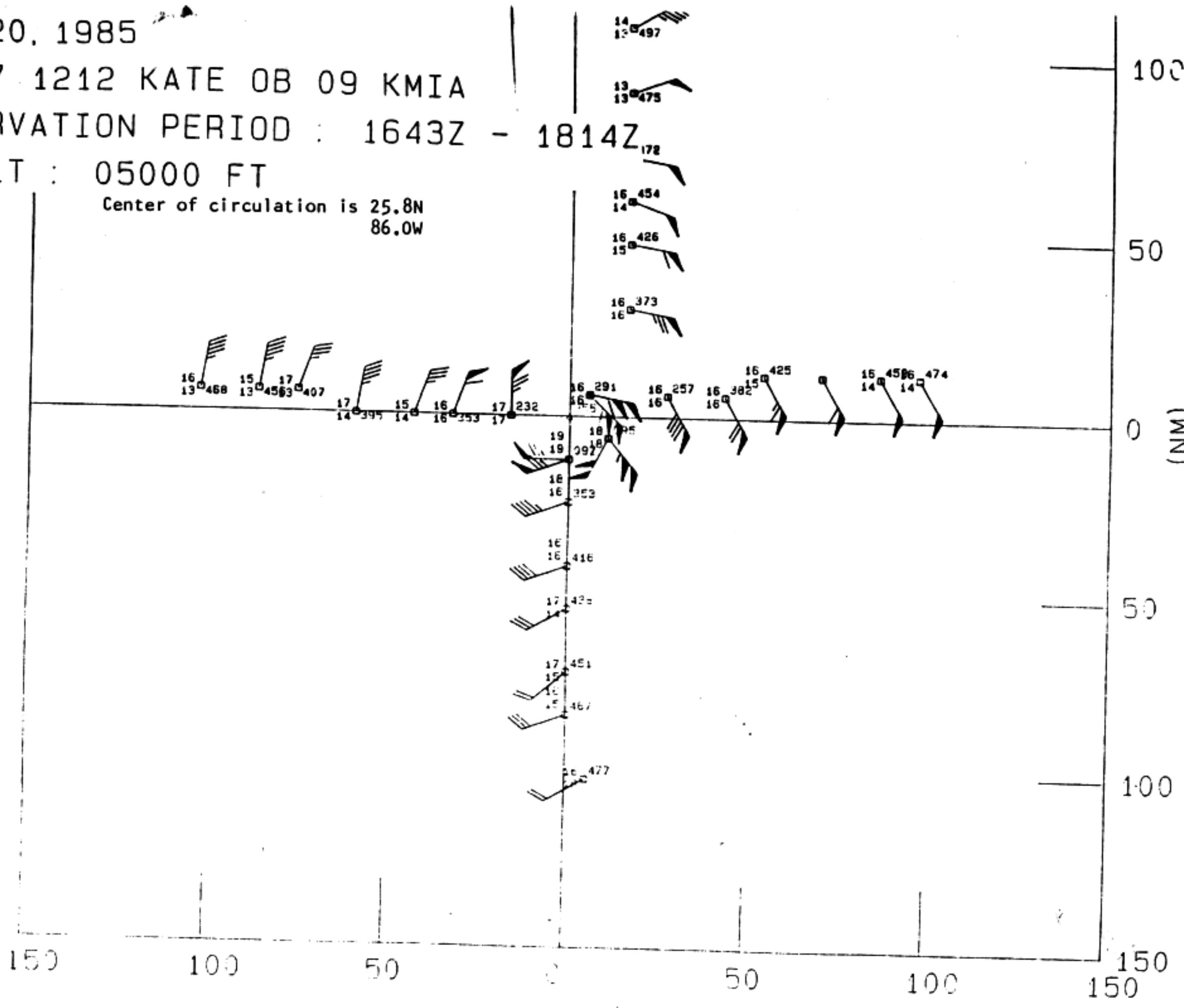
NOV 20, 1985

AF967 1212 KATE OB 09 KMIA

OBSERVATION PERIOD : 1643Z - 1814Z

FLTALT : 05000 FT

Center of circulation is 25.8N
86.0W



CHANCES OF CENTER OF KATE PASSING WITHIN 65 MILES OF
 LISTED LOCATIONS THROUGH ~~7 PM EST WED NOV 20 1963~~
 by TIME + DATE
 CHANCES EXPRESSED IN PER CENT...TIMES EST

COASTAL LOCATIONS	TOTAL THRU 20 NOV 7 PM WED	THRU 21 NOV 1 AM THU	21 NOV THRU 7 AM THU	21 NOV THRU 1 PM THU	21 NOV THRU 7 PM THU	22 NOV THRU 1 AM FRI	22 NOV THRU 7 AM FR
MARATHON FL	12	20	25	33	47	20	16
MIAMI FL	12	18	21	20	11	4	
W PALM BEACH FL	11	15	16	14	6	4	
FT PIERCE FL	9	13	13	12	6	5	
COCOA BEACH FL	8	11	11	10	6	6	
DAYTONA BEACH FL	6	9	9	9	6	7	
JACKSONVILLE FL	4	7	7	8	6	7	
SAVANNAH GA	3	4	4	5	4	5	
CHARLESTON SC	2	3	3	4	3	4	
MYRTLE BEACH SC	2		2	3	2	3	
WILMINGTON NC				2		2	
MOREHEAD CITY NC				2			
KEY WEST FL	11	19	23	31	52	44	51
MARCO ISLAND FL	10	16	19	20	17	8	6
FT MYERS FL	9	15	16	17	13	9	6
VENICE FL	8	13	14	15	13	10	8
TAMPA FL	7	12	12	13	10	10	8
CEDAR KEY FL	5	9	10	11	9	10	9
ST MARKS FL	3	7	8	9	9	10	10
APALACHICOLA FL	4	7	8	10	10	12	11
PANAMA CITY FL	3	7	8	9	10	11	11
PENSACOLA FL	2	5	6	8	9	11	11
MOBILE AL		4	5	7	8	10	11
GULFPORT MS		4	5	7	9	10	11
BURAS LA		5	6	8	10	10	12
NEW ORLEANS LA		4	5	6	9	12	13
NEW IBERIA LA		3	4	5	7	10	12
PORT ARTHUR TX		2	3	3	5	8	10
GALVESTON TX		2	3	3	5	6	8
FREEPORT TX			2	3	5	6	8
PORT O CONNOR TX			2	3	5	5	7
CORPUSCHRISTI TX			2	2	4	4	6
BROWNSVILLE TX			2	2	4	3	5
GULF 29N 85W		9	10	11	11	4	5
GULF 29N 87W		7	9	10	12	13	12
GULF 28N 89W		7	8	10	13	14	14
GULF 28N 91W		5	7	8	11	15	16
GULF 28N 93W		3	5	6	9	12	14
GULF 28N 95W		2	3	4	6	9	11
GULF 27N 96W		2	3	3	6	6	8
GULF 25N 96W		2	4	3	6	5	7

X MEANS LESS THAN ONE PERCENT

CHANCES OF CENTER OF KATE PASSING WITHIN 65 MILES OF LISTED LOCATIONS THROUGH 6 PM ~~CST SAT NOV 23 1985~~

by date + time

CHANCES EXPRESSED IN PER CENT...TIMES CST

COASTAL LOCATIONS	22 NOV	22 NOV	23 NOV	23 NOV	23 NOV	23 NOV
	THRU 1 PM FRI	THRU 7 PM FRI	THRU 12 AM SAT	THRU 6 AM SAT	THRU 12 PM SAT	THRU 6 PM SAT
MARATHON FL	12					
MIAMI FL	2					
W PALM BEACH FL	3					
FT PIERCE FL	4	4				7
COCOA BEACH FL	5	5	7		6	9
DAYTONA BEACH FL	7	7	9		9	14
JACKSONVILLE FL	8	9	11		12	19
SAVANNAH GA	7	9	11		16	17
CHARLESTON SC	5	7	9		15	15
MYRTLE BEACH SC	4	6	8		13	13
WILMINGTON NC	3	5	7		12	12
MOREHEAD CITY NC	2	4	6		11	11
CAPE HATTERAS NC	2	3	5		9	10
NORFOLK VA		3	4		8	9
OCEAN CITY MD		2	3		7	8
ATLANTIC CITY NJ			2		6	7
NEW YORK CITY NY					4	6
MONTAUK POINT NY					3	5
PROVIDENCE RI					2	4
NANTUCKET MA					2	4
HYANNIS MA					2	4
BOSTON MA					2	3
PORTLAND ME						2
BAR HARBOR ME						2
EASTPORT ME						
KEY WEST FL	64			2		
MARCO ISLAND FL	5	4	5	5		
FT MYERS FL	6	5	6	7		6
VENICE FL	8	7	8	9		8
TAMPA FL	9	9	10	12	9	13
CEDAR KEY FL	10	11	13	16	12	23
ST MARKS FL	12	14	16	19	19	36
APALACHICOLA FL	13	15	18	23	27	48
PANAMA CITY FL	14	16	19	23	36	47
PENSACOLA FL	13	16	19	20	35	25
MOBILE AL	13	16	18	16	24	13
GULFPORT MS	13	16	17	14	16	8
BURAS LA	15	17	21	13	12	6
NEW ORLEANS LA	13	15	15	10	9	4
NEW IBERIA LA	10	11	10	5	7	2
PORT ARTHUR TX	7	7	4	2	4	
GALVESTON TX	7	6	3	2	2	
FREERPORT TX	6	5	3			
PORT O CONNOR TX	5	3	2			
CORPUSCHRISTI TX	4	2				
ROWNSVILLE TX	4	2				
GULF 29N 85W	14	16	18			
GULF 29N 87W	17	20	27	27	40	54
GULF 28N 89W	19	25	35	33	45	52
GULF 28N 91W	15	16	15	18	12	6
GULF 28N 93W	10	10	7	7	4	3
GULF 28N 95W	7	5	3	3	2	
GULF 27N 96W		4	2			
GULF 25N 96W		3				

X MEANS LESS THAN ONE PERCENT

CHANCES OF CENTER OF KATE PASSING WITHIN 65 MILES OF LISTED LOCATIONS ~~THROUGH 12 AM CST SUN NOV 24 1985~~

by DATE & TIME.

CHANCES EXPRESSED IN PER CENT...TIMES CST

COASTAL LOCATIONS	24 NOV	24 NOV
	THRU 12 AM SUN	THRU 6 AM SUN
FT PIERCE FL	4	5
COCOA BEACH FL	6	7
DAYTONA BEACH FL	10	13
JACKSONVILLE FL	15	20
SAVANNAH GA	15	19
CHARLESTON SC	13	16
MYRTLE BEACH SC	12	14
WILMINGTON NC	11	13
MOREHEAD CITY NC	10	12
CAPE HATTERAS NC	9	11
NORFOLK VA	9	11
OCEAN CITY MD	8	9
ATLANTIC CITY NJ	7	8
NEW YORK CITY NY	5	6
MONTAUK POINT NY	4	5
PROVIDENCE RI	4	5
NANTUCKET MA	4	4
HYANNIS MA	4	4
BOSTON MA	3	4
PORTLAND ME	2	3
BAR HARBOR ME	2	2
FT MYERS FL	4	
VENICE FL	6	6
TAMPA FL	9	10
CEDAR KEY FL	16	22
ST MARKS FL	29	42
APALACHICOLA FL	39	58
PANAMA CITY FL	43	62
PENSACOLA FL	31	30
MOBILE AL	19	11
GULFPORT MS	13	7
BURAS LA	9	5
NEW ORLEANS LA	7	4
NEW IBERIA LA	4	2
GULF 29N 85W	42	58
GULF 29N 87W	64	74
GULF 28N 89W	9	4
GULF 28N 91W	4	2
GULF 28N 93W	2	

X MEANS LESS THAN ONE PERCENT