

PRELIMINARY REPORT  
Hurricane Chris  
16-23 August 1994

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National Hurricane Center  
21 September 1994

Hurricane Chris was a 65-knot hurricane in the Atlantic Ocean. It brushed by Bermuda with little consequence.

a. Synoptic History

Chris originated as a tropical wave that moved across the African coast and into the eastern tropical Atlantic on 11 August. Moving westward, the wave acquired significant convection and signs of rotation on the 15th and became a depression on the 16th, midway between Africa and the Lesser Antilles. The "best track" begins on this date as shown in Fig. 1 and as listed in Table 1.

The depression strengthened to a tropical storm by the 17th and to a hurricane on the 18th, while moving toward the northwest at 10 to 15 knots. This strengthening occurred even though there was evidence of vertical shearing from an upper-level low located to the northwest. Chris remained a hurricane for almost two days before the strong vertical wind shear significantly disrupted the circular symmetry of the cloud pattern and caused weakening.

The weakening storm turned northward on the 20th and northeastward on the 21st, moving on a trajectory around the western periphery of a persistent subtropical high pressure ridge anchored over the central north Atlantic Ocean. The center passed about 75 n. mi. east of Bermuda late on the 21st, but maximum winds were only 35 knots at this time and these winds were on the east side of the center. Sustained winds at Bermuda remained below 15 knots.

Accelerating northeastward, Chris strengthened again to 45 knots while staying ahead of a cold front. By the 24th, the storm merged with an extratropical baroclinic zone southeast of Newfoundland and shortly lost its identity.

b. Meteorological Statistics

Figures 2 and 3 show "best track" curves of minimum central pressure and maximum one-minute surface wind speed, respectively, as a function of time. The observations on which the curves are based are also plotted and consist of Dvorak-technique estimates using satellite imagery throughout the life of the hurricane as well as aircraft reconnaissance data on the 20th and 21st. The maximum flight level wind measured by reconnaissance aircraft was 61 knots at 700 millibars midday on the 20th. This was the first aircraft into Chris and, based on satellite intensity estimates, weakening had already begun. The central sea-level pressure by

then was up to 1009 millibars. Dvorak estimates give a minimum pressure of 979 millibars and a maximum one-minute surface wind speed of 70 knots on the 19th.

There were several ship reports which were useful in determining Chris' wind speed:

<u>ship name</u>	<u>date/time</u>	<u>lat.</u>	<u>lon.</u>	<u>wind</u>	<u>pressure</u>
unknown	17/1200	11.5	42.1	200/45	
unknown	17/1500	11.2	42.5	210/58	1001.0
unknown	17/1800	11.5	42.8	210/52	1010.0
Star Eagle	22/1800	37.5	60.5	210/34	1014.0
Adabelle Lykes	22/2100	37.1	58.2	190/40	1017.0

#### c. Casualty and Damage Statistics

There were no casualties or damage from Chris. However, Bermuda received 2.83 inches of rainfall from the passage of Chris.

#### d. Forecast and Warning Critique

There were 28 official forecasts issued while Chris was of tropical storm strength or higher. Track forecast errors were mostly near normal ranging from 44 n. mi. at 12 hours to 81 n. mi. at 24 hours to 317 n. mi. at 72 hours. There was a slight left track bias during the first few days while there was a possibility of Chris threatening the Lesser Antilles. The largest intensity errors were 40 knot over-forecasts at 72 hours. These forecasts were made while Chris was near maximum intensity and the subsequent weakening was not correctly anticipated.

A tropical storm watch was issued for Bermuda at 0300 UTC on the 21st and a tropical storm warning was issued at 0900 UTC on the same day. The warning was discontinued at 0000 UTC on the 22nd. Tropical storm conditions did not occur at Bermuda.

Table 1. Preliminary best track, Hurricane Chris,  
16 - 23 August 1994.

Date/Time (UTC)	Position		Pressure (mb)	Wind Speed (kt)	Stage
	Lat. (°N)	Lon. (°W)			
16/1200	11.3	39.4	1010	30	Trop. Depression
1800	11.5	40.3	1008	30	"
17/0000	11.7	41.2	1006	35	Trop. Storm
0600	12.1	42.2	1003	40	"
1200	12.6	43.3	1000	50	"
1800	13.3	44.5	994	60	"
18/0000	13.9	45.6	988	60	"
0600	14.5	46.8	987	65	Hurricane
1200	15.2	48.0	987	65	"
1800	16.0	49.3	987	65	"
19/0000	17.0	50.6	985	70	"
0600	18.0	51.9	979	70	"
1200	19.0	53.2	979	70	"
1800	20.1	54.4	980	70	"
20/0000	21.3	55.6	984	65	"
0600	22.6	56.8	995	60	Trop. Storm
1200	23.8	58.2	1009	50	"
1800	24.9	59.7	1010	45	"
21/0000	26.1	61.0	1011	40	"
0600	27.3	62.3	1012	35	"
1200	28.7	63.1	1013	35	"
1800	30.4	63.1	1013	35	"
22/0000	32.2	62.8	1012	35	"
0600	33.8	62.8	1008	35	"
1200	35.0	63.0	1006	35	"
1800	36.2	62.3	1004	40	"
23/0000	37.9	60.7	1003	40	"
0600	39.9	58.4	1003	40	"
1200	42.2	55.5	1003	45	"
1800	44.7	52.0	1003	45	"
24/0000	merged with extratropical low pressure system				
19/1200	19.0	53.2	979	70	Minimum Pressure

Table 2. Chance of the center of Hurricane Chris passing within 65 miles of listed locations by date and time (AST) indicated; probabilities in percent with X for less than 2 percent.

	ADVISORY ISSUE TIME: 17/5AM	17/11AM	17/5PM	17/11PM	18/11AM
	PROBABILITY END TIME: 20/2AM	20/8AM	20/2PM	20/8PM	21/8AM
TTPP 106N 614W	3	3	3	X	X
TTPT 112N 608W	4	5	4	X	X
TGPY 120N 618W	3	4	4	X	X
TBPB 131N 595W	8	9	8	3	X
TVSV 131N 612W	5	6	6	X	X
TLPL 138N 610W	6	7	7	2	2
TFFF 146N 610W	6	7	8	4	3
TDPR 153N 614W	6	7	8	5	4
TFFR 163N 615W	6	7	9	7	6
TAPA 171N 618W	6	7	9	8	8
TKPK 173N 627W	5	5	7	6	7
TNCM 181N 631W	4	5	7	6	8
TISX 177N 648W	2	3	5	2	4
TIST 183N 650W	2	2	4	3	5
TJPS 180N 666W	X	X	2	X	2
TJSJ 184N 661W	X	X	3	X	3
ST CROIX VI	2	3	5	2	4
ST THOMAS VI	2	2	4	3	5
SAN JUAN PR	X	X	3	X	3
PONCE PR	X	X	2	X	2

	ADVISORY ISSUE TIME: 18/11AM	18/5PM	18/11PM	19/5AM	19/11AM
	PROBABILITY END TIME: 21/8AM	21/2PM	21/8PM	22/2AM	22/8AM
TLPL 138N 610W	2	X	X	X	X
TFFF 146N 610W	3	2	X	X	X
TDPR 153N 614W	4	2	X	X	X
TFFR 163N 615W	6	4	3	X	X
TAPA 171N 618W	8	6	5	X	X
TKPK 173N 627W	7	5	4	X	X
TNCM 181N 631W	8	6	6	3	X
TISX 177N 648W	4	3	3	X	X
TIST 183N 650W	5	3	4	2	X
TJPS 180N 666W	2	X	2	X	X
TJSJ 184N 661W	3	2	3	X	X
ST CROIX VI	4	3	3	X	X
ST THOMAS VI	5	3	4	2	X
SAN JUAN PR	3	2	3	X	X
PONCE PR	2	X	2	X	X
BERMUDA	X	2	2	12	17

	ADVISORY ISSUE TIME: 19/5PM	19/11PM	20/5AM	20/11AM	20/5PM
	PROBABILITY END TIME: 22/2PM	22/8PM	23/2AM	23/8AM	23/2PM
BERMUDA	16	16	15	15	21
SABLE ISLAND NS	X	X	2	9	8
ST JOHN NB	X	X	X	3	2
MONCTON NB	X	X	X	3	2
YARMOUTH NS	X	X	X	4	2
HALIFAX NS	X	X	X	5	4
EASTPORT ME	X	X	X	2	X
SYDNEY NS	X	X	X	5	5
EDDY POINT NS	X	X	X	6	5
PTX BASQUES NFLD	X	X	X	4	3
BURGEON NFLD	X	X	X	4	4
ILE ST PIERRE	X	X	X	4	5
CAPE RACE NFLD	X	X	X	3	4

Table 2(cont.)

	ADVISORY ISSUE TIME: 20/11PM PROBABILITY END TIME: 23/8PM	21/5AM 24/2AM	21/11AM 24/8AM	21/5PM 24/2PM	21/11PM 24/8PM
BERMUDA	38	41	45	17	26
SABLE ISLAND NS	9	10	12	12	13
ST JOHN NB	5	6	5	5	X
MONCTON NB	5	6	6	6	X
YARMOUTH NS	6	7	6	6	X
HALIFAX NS	7	8	8	8	4
EASTPORT ME	4	5	4	4	X
SYDNEY NS	6	8	9	9	7
EDDY POINT NS	7	8	9	9	7
PTX BASQUES NFLD	5	7	8	8	6
BURGEO NFLD	5	7	9	9	8
ILE ST PIERRE	5	8	10	10	10
CAPE RACE NFLD	4	7	10	11	12
PROVIDENCE RI	2	3	X	X	X
NANTUCKET MA	3	4	2	2	X
HYANNIS MA	3	4	2	2	X
BOSTON MA	2	3	X	X	X
PORTLAND ME	2	3	2	2	X
BAR HARBOR ME	3	4	3	3	X
HIBERNIA OILFLD	2	5	9	10	12
MONTAUK POINT NY	X	2	X	X	X

	ADVISORY ISSUE TIME: 22/5AM PROBABILITY END TIME: 25/2AM	22/11AM 25/8AM	22/5PM 25/2PM	22/11PM 25/8PM	23/5AM 26/2AM
BERMUDA	6	X	X	X	X
SABLE ISLAND NS	6	18	20	7	X
HALIFAX NS	X	3	2	X	X
SYDNEY NS	2	6	8	2	X
EDDY POINT NS	X	5	6	X	X
PTX BASQUES NFLD	X	4	5	2	X
BURGEO NFLD	2	6	9	4	X
ILE ST PIERRE	5	11	18	10	2
CAPE RACE NFLD	9	14	25	17	13
HIBERNIA OILFLD	5	7	22	5	24

	ADVISORY ISSUE TIME: 23/11AM PROBABILITY END TIME: 26/8AM	23/5PM 26/2PM
CAPE RACE NFLD	8	3
HIBERNIA OILFLD	32	52

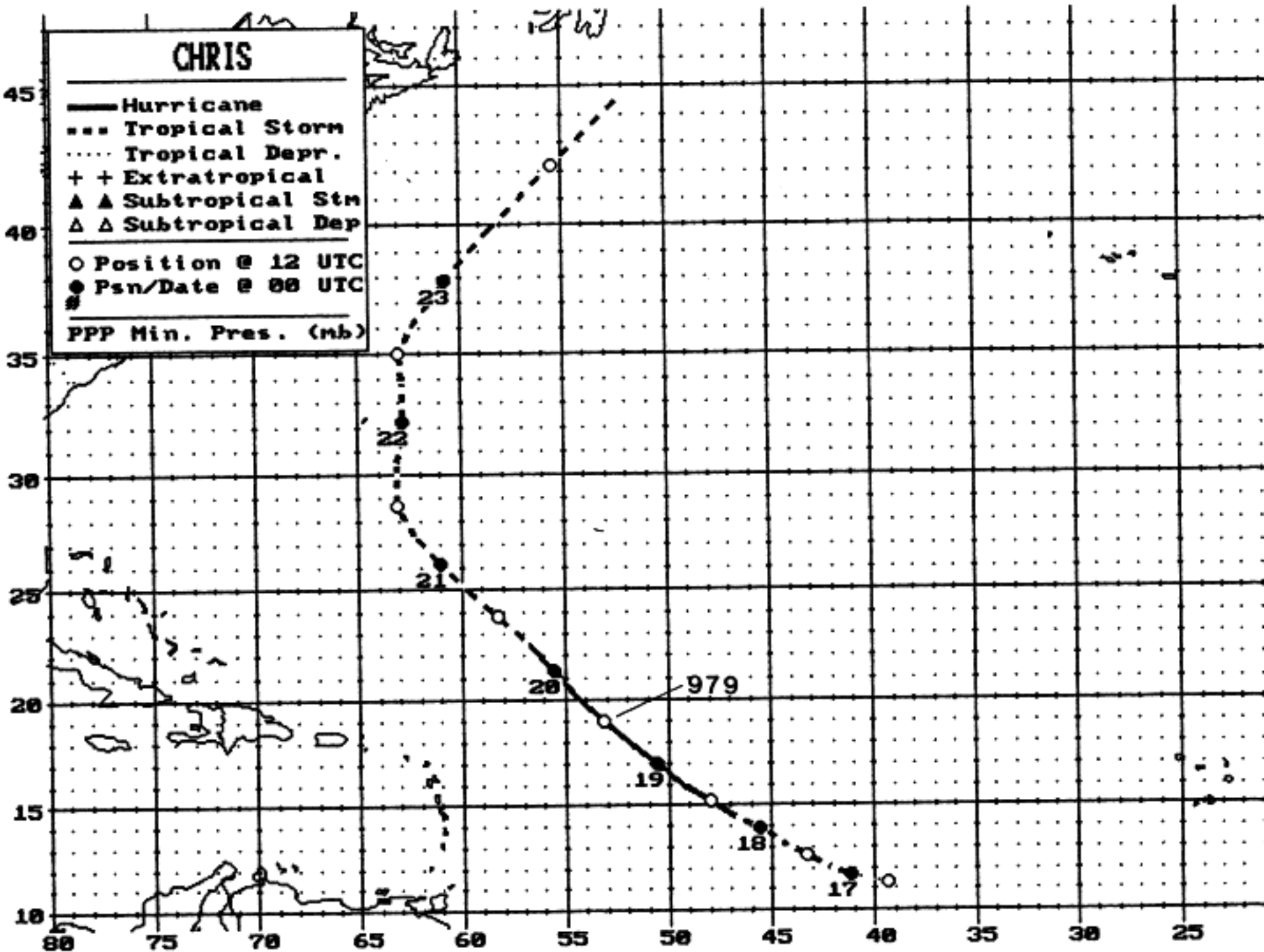


Fig. 1. Best track positions for Hurricane Chris, 16-23 August, 1994.

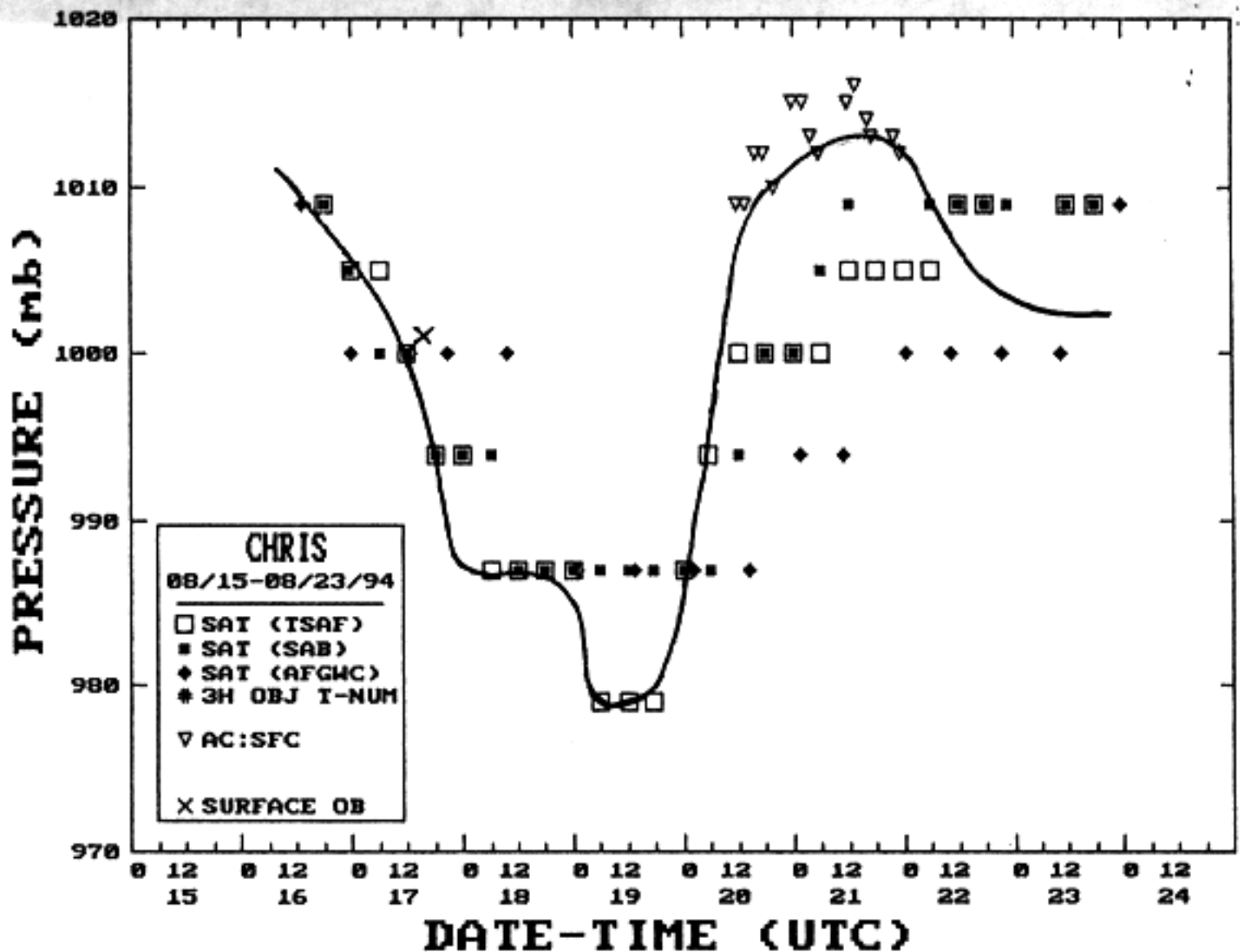


Fig. 2. Best track minimum central pressure curve for Hurricane Chris.

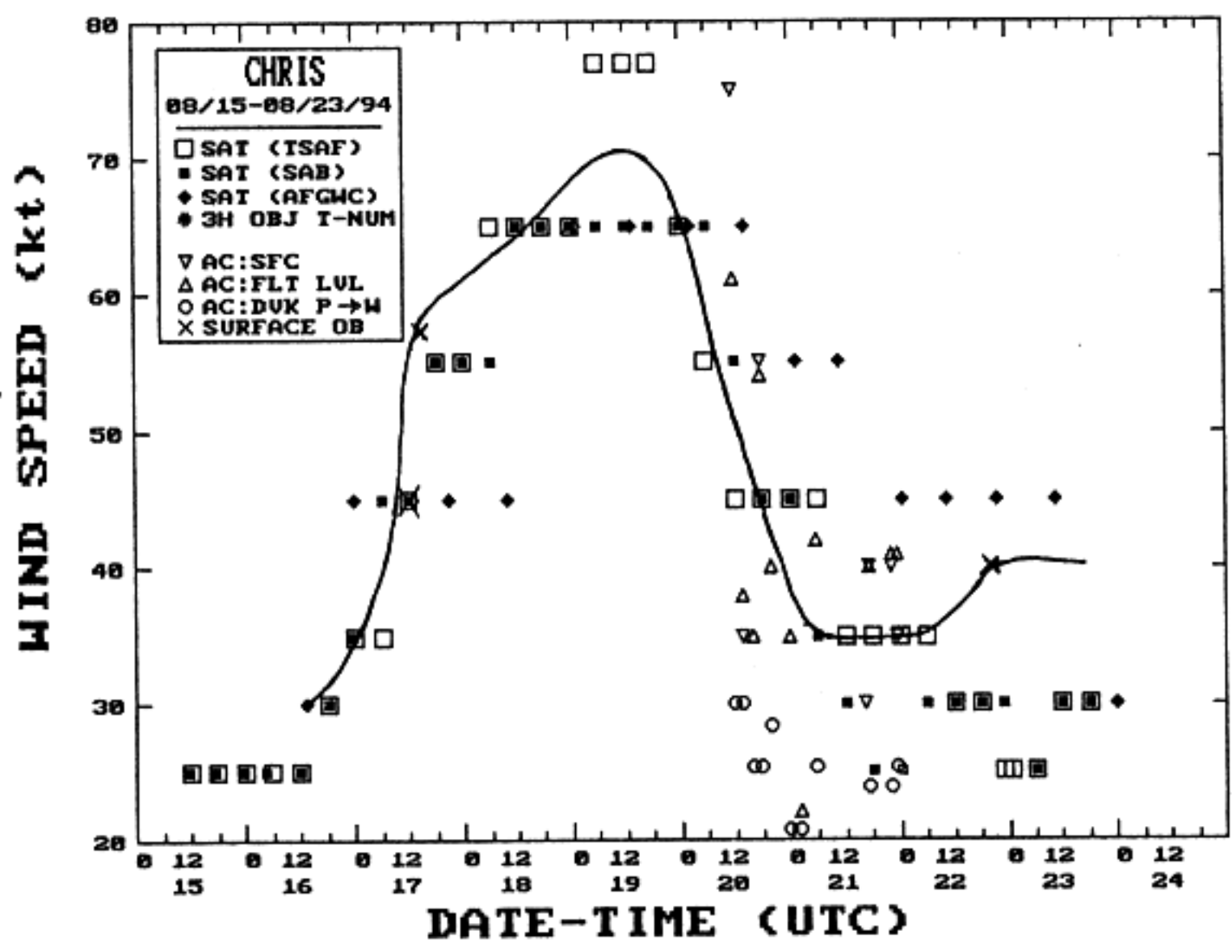


Fig. 3. Best track one-minute surface wind speed curve for Hurricane Chris.