

## 1985 Tropical Cyclone Forecast Verification

Miles Lawrence and Barry Damiano  
National Hurricane Center

Track and intensity forecasts are issued by the National Hurricane Center, every six hours, for all tropical cyclones in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico. These forecasts consist of an initial center position and maximum sustained surface wind speed and forecast positions and speeds for 12, 24, 48 and 72 hours.

Errors are computed by comparing forecasts with a "best track" estimate of the forecast parameters, for all tropical cyclones whose "best track" maximum sustained wind speed is greater than 33 knots. A track forecast error is defined as the great circle distance between the forecast position and the "best track" position.

Table 1 gives the average track forecast errors for 1985. The range of errors is also given, along with the number of cases or forecasts. Also, a comparison with the previous ten-year averages is shown. Average errors for 1985 range from 6 to 13 percent smaller than the previous ten-year averages at all time periods.

Table 2 gives the 1985 average track errors by individual storm. Errors vary considerably from storm to storm. For example, the average official track forecast error for 24 hours was 57 n.m. for Tropical Storm Isabel and ranged up to 181 n.m. for Tropical Storm Ana.

Track errors are also computed for a variety of statistical and dynamical guidance models. These errors are given in Table 3, where the errors have been adjusted for initial position error. The National Meteorological Center MFM model has the smallest errors at 24, 48 and 72 hours and the NHC83 model also has smaller errors at these forecast time periods. Statistics for the past ten years are shown in Table 4 and these numbers confirm that the MFM model has been the best performer at 24, 48 and 72 hours. The MFM is currently not available until after the forecast has been coordinated (initial time plus 2.5 hours), but is used for the next forecast.

Finally, wind speed verification statistics are in Table 5. There is a negative bias that increases with time and the mean absolute wind speed error peaks at 48 hours.

Table

Official Track Forecast Errors  
great circle distance in nautical miles)

	forecast period hours				
	initia	2	24	48	72
1985 average	7	56	10	224	
range	0-85	5-305	8-402	6-62	5-724
(no. of cases)	(166	162)	37	(87	
1975-1984 average	18	60	23	256	38
(avg. no. of cases)	131)	128)		(82	
percent improvement	+06%	+07%	1%	+13%	+13%

ab

985 Ave Tr  
(E

---

(no 75 (6) ?)

10) 32

**Claude**

(21  
33 (4)

ab1

55

**Isabe**

35 (8

**Kate**

42

56  
(16

100

Table 3

Average displacement forecast errors  
(great circle distance in nautical mil

all forecasts  
all models  
adjusted for initial position error

model	initial	forecast period (hours)			
		12	24	48	72
Official (no. of cases)	17 (166)	49 (162)	103 (137)	219 (87)	329 (55)
NHC67	16 (16)	53 (161)	8 (41)	255 (100)	454 (68)
NHC72	7 170	55 (168)	127 (144)	281 (104)	404 (73)
HURRAN	10 63	50 (61)	07 (49)	216 (36)	261 (30)
CLIPER	7	168	122 (144)	279 (104)	418 (73)
NHC73	16 (76)	51 (76)	12 (66)	259 (46)	486 (30)
SANBAR	7	51 (66)	109 (56)	248 (39)	425 (26)
MFM	10	62 (52)	88 (46)	137 (32)	215 (20)
NHC83		50	93 26	195 (89)	296 (61)

Table 4

976-1985

Average Track Forecast Errors  
(great circle distance in nautical miles)

homogeneous comparison

model	initial	forecast period (hours)			
		12	24	48	72
Official	11	<u>47</u>	99	206	275
NHC72	1	52	109	237	319
CLIPER	11	53	114	252	302
NHC73	11	48	104	218	408
SANBAR	1	52	107	252	395
MFM	12	60	97	<u>163</u>	<u>202</u>
(no. of cases)	(173)	(172)	54	5	30

Table 5

1985 Verification  
 Official wind speed forecast errors knots

	forecast period (hours)				
	initial	12	24	48	72
mean error	0.3	-0.7	-3.0	-9.5	-12.2
mean absolute error	5.1	8.2	2.7	18.5	17.5
standard error	8.5	11.5	16.6	22.5	21.6
(no. of cases	171)	(169)	(146)	(92)	58