

1992 NATIONAL HURRICANE CENTER FORECAST VERIFICATION

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Abstract

The National Hurricane Center issues a 72-hour track and intensity forecast, every six hours, for all tropical cyclones in the Atlantic and eastern Pacific basins. Forecasts are verified by comparison with a best-track post analysis of all available track and intensity data. Verification statistics for 1992 are presented.

1. Atlantic

Official track errors by storm are listed in Table 1.1 along with the yearly average for all storms and a comparison with the previous ten-year average. This year's track errors are smaller than the previous ten-year average for all forecast periods. Also note that the average errors for Hurricane Andrew were quite small at all forecast periods.

Tables 1.2.1 and 1.2.2 are homogeneous comparisons of various track guidance models. Table 1.2.1 does not include the GFDL model and has a larger number of cases. The Aviation model has the smallest errors except at 12 hours and the BAM medium layer model has the next smaller errors. The smaller sample in Table 1.2.1 shows the GFDL model with very small errors at 12 and 24 hours and it also performs well at longer forecast periods.

Official maximum one-minute wind speed forecast errors are given in Table 1.3. The average bias for the year is slightly positive at all forecast periods compared to a larger negative bias for the previous ten years. The average absolute wind speed errors are somewhat larger than the previous ten years after 24 hours. Tables 1.4.1 and 1.4.2 are homogeneous comparisons of various intensity guidance models. The newer SHIPS model has about the same errors as SHIFOR except a little smaller at 72 hours. The GFDL model performs rather well for this limited sample.

2. Eastern Pacific

Tables 2.1 through 2.3 are similar verification statistics for the eastern Pacific basin. The 1992 average official track errors are similar to the 1988-1991 averages (the NHC started advisories in the eastern Pacific in 1988) except the 1992 errors at 72 hours are slightly larger. P91E, a statistical/dynamical model, has the lowest guidance model errors except at 72 hours in a homogeneous comparison, but is followed closely by the QLM and The BAM medium layer model. Note that improvement over the CLIPER model is more difficult to achieve in the eastern Pacific than in the Atlantic.

The 1992 official wind speed bias error is smaller than in prior years and the mean absolute errors are slightly less than the 1988-1991 average.

Table 1.1. Official track forecast errors (average in nautical miles), Atlantic, 1992.

storm	forecast period (hours)					
	0	12	24	36	48	72
Subtropical One (no. of cases)	15 (5)	61 (5)	124 (5)	196 (5)	290 (3)	- (0)
Andrew	10 (39)	34 (39)	67 (39)	108 (38)	152 (36)	242 (32)
Bonnie	8 (48)	37 (42)	77 (42)	126 (41)	179 (40)	293 (39)
Charley	11 (21)	42 (20)	76 (20)	114 (20)	162 (19)	249 (15)
Danielle	11 (15)	40 (14)	98 (12)	164 (10)	195 (8)	340 (4)
Earl	11 (16)	54 (16)	123 (14)	192 (12)	275 (9)	420 (3)
Frances	12 (15)	53 (15)	114 (14)	180 (11)	222 (9)	210 (7)
Total	10 (159)	41 (151)	85 (146)	135 (137)	182 (124)	270 (100)
1982-1991 average	17	54	104		206	309
1992 departure from 1982-1991 average	-41%	-24%	-18%		-12%	-13%
1992 range	0-45	6-110	9-274	24-383	28-443	11-639

Table 1.2.1 Track model forecast errors (average in nautical miles), Atlantic, 1992, homogeneous comparison.

model	forecast period (hours)				
	12	24	36	48	
Official	38	86	131	171	
Aviation Model	50	77	105	132	
BAM(medium)	42	85	123	160	
CLIPER	45	104	176	254	
NHC90	43	94	158	223	
QLM	56	97	147	201	
VICBAR	46	92	145	234	
(number of cases)	(48)	(48)	(45)	(40)	(29)

Table 1.2.2 Track model forecast errors (average in nautical miles), Atlantic, 1992, homogeneous comparison.

model	forecast period (hours)				
	12	24	36	48	72
Official	39	98	116	163	
Aviation Model	55	80	96	116	
BAM(medium)	44	87	110	151	
CLIPER	47	113	176	268	481
GFDL	36	72	104	156	256
NHC90	45	104	164	222	
QLM	51	92	135	196	282
VICBAR	41	83	137	222	
(number of cases)	(16)	(16)	(14)	(14)	(12)

Table 1.3. Official wind speed forecast errors (knots),
Atlantic, 1992. Error = forecast - observed

	forecast period (hours)				
	12	24	36	48	72
1992 mean Official	0.0	+0.9	+1.4	+2.2	+3.8
1992 mean absolute Official	6.9	11.6	15.8	19.4	26.9
(Official no. of cases)	(151)	(145)	(138)	(122)	(100)
Official max. error	+40	+50 -45	+70 -60	+70 -60	+85 -75
Official 1982-1991 mean	-1.9	-2.8		-5.6	-6.4
Official 1982-1991 mean absolute	8.0	11.5		16.0	19.5
1992 departure from 1982-1991 mean absolute	-14%	+01%		+21%	+38%

Table 1.4.1. Wind speed model mean absolute forecast errors (knots)
Atlantic, 1992, homogeneous comparison.

model	forecast period (hours)				
	12	24	36	48	72
Official	7.0	11.7	16.1	19.6	27.4
SHIFOR	8.3	13.7	18.4	23.3	28.7
SHIPS	8.3	13.8	19.0	22.9	25.5
No. of cases	(142)	(135)	(124)	(110)	(87)

Table 1.4.2. Wind speed model mean absolute forecast errors (knots),
Atlantic, 1992, homogeneous comparison.

model	forecast period (hours)				
	12	24	36	48	72
Official	6.9	9.1	13.4	21.8	33.3
SHIFOR	7.8	11.1	17.1	24.4	43.8
SHIPS	8.5	11.9	18.1	25.6	35.8
Aviation	41.7	46.6	48.4	48.5	48.4
GFDL	14.6	14.9	15.1	16.9	24.9
No. of cases	(16)	(16)	(16)	(14)	(12)

Table 2.1. Official track forecast errors (average in nautical miles), eastern Pacific, 1992.

storm	forecast period (hours)					
	0	12	24	36	48	72
Agatha (no. of cases)		74 (12)	124 (12)	176 (10)	175 (8)	106 (4)
		70 (2)	- (0)	- (0)	- (0)	- (0)
Celia		24 (37)	44 (37)	65 (37)	82 (35)	102 (33)
Darby		61 (22)	124 (22)	181 (21)	229 (19)	323 (15)
Estelle		34 (27)	73 (27)	112 (25)	146 (23)	236 (19)
Frank		30 (33)	55 (33)	84 (33)	112 (32)	163 (28)
Georgette		33 (36)	73 (36)	126 (36)	181 (36)	301 (36)
Howard		46 (13)	90 (11)	121 (9)	152 (7)	153 (3)
Isis		20 (14)	38 (14)	50 (12)	57 (10)	86 (6)
Javier		39 (23)	74 (23)	101 (23)	123 (23)	179 (23)
		41 (9)	73 (9)	114 (9)	151 (8)	205 (4)
Lester		51 (12)	102 (12)	172 (11)	288 (9)	742 (5)
Madeline		43 (11)	66 (9)	92 (7)	131 (5)	226 (1)
Newton		45 (13)	71 (11)	74 (9)	65 (7)	164 (3)
Orlene		35 (38)	65 (38)	109 (38)	161 (38)	257 (36)

Table 2.1. (cont.) Official track forecast errors (average in nautical miles), eastern Pacific, 1992.

storm	forecast period (hours)					
	0	12	24	36	48	72
Paine		56 (18)	120 (16)	185 (14)	252 (12)	376 (8)
Roslyn		47 (40)	78 (40)	105 (40)	129 (40)	154 (40)
Seymour		32 (30)	63 (30)	97 (30)	134 (30)	195 (24)
Tina		34 (75)	64 (75)	102 (75)	140 (75)	226 (70)
Virgil		36 (12)	53 (12)	66 (11)	70 (9)	116 (5)
Winifred		50 (11)	98 (9)	136 (7)	183 (5)	414 (1)
Xavier		59 (3)	58 (1)	- (0)	- (0)	- (0)
Yolanda		46 (18)	88 (18)	134 (18)	168 (17)	208 (14)
Zeke		42 (15)	92 (13)	174 (10)	285 (8)	267 (4)
Total		39 (524)	73 (508)	111 (485)	147 (456)	217 (382)
1988-1991 average	14	40	73	108	143	200
1992 departure from 1988-1991 average		-02%	00%	+03%	+03%	+08%
1992 range		0-272	0-428	6-489	6-499	6-879

Table 2.2. Track model forecast errors (average in nautical miles), eastern Pacific, 1992, homogeneous comparison.

model	forecast period (hours)				
	12	24	36	48	72
Official	42	76	117	159	226
Aviation Model	63	103	146	195	293
BAM(medium)	48	87	130	172	238
CLIPER	43	85	134	185	282
PSDE	43	83	123	163	262
PSS	42	84	138	193	287
P91E	41	77	116	154	239
QLM	51	88	126	160	236
(number of cases)	(112)	(107)	(99)	(92)	(73)

The following comparison is without the Aviation Model:

Official	39	74	112	151	219
BAM(medium)	48	86	127	167	244
CLIPER	43	80	124	169	261
PSDE	42	79	125	158	247
PSS	42	81	130	178	270
P91E	41	74	111	146	222
QLM	49	88	124	158	228
(number of cases)	(216)	(209)	(199)	(185)	(153)

Table 2.3. Official and SHIFOR wind speed forecast errors (knots), eastern Pacific, 1992. Error = forecast - observed.

	forecast period (hours)				
	12	24	36	48	72
1992 mean Official	-0.8	-0.5	-1.0	-0.9	+0.6
1992 mean SHIFOR	-2.3	-3.9	-5.8	-7.4	-9.1
1992 mean absolute Official	6.8	11.1	14.0	16.0	19.0
1992 mean absolute SHIFOR	7.9	12.5	15.5	17.7	19.7
(Official no. of cases)	(524)	(507)	(482)	(437)	(377)
Official max. error	+55 -55	+75 -75	+75 -65	+85 -60	+55 -65
Official 1988-1991 mean	-1.5	-2.4	-3.6	-5.3	-5.7
Official 1988-1991 mean absolute	7.0	11.4	15.2	18.2	20.6
1992 departure from 1988-1991 mean absolute	-03%	-03%	-08%	-12%	-08%
1991 mean	0.0	-0.6	-1.6	-2.4	-4.6
1991 mean absolute (no. of cases)	6.4 (305)	11.4 (281)	15.3 (257)	18.1 (232)	21.7 (182)
1990 mean	-2.0	-3.2	-4.6	-6.0	-5.5
1990 mean absolute (no. of cases)	7.1 (416)	11.2 (380)	15.1 (343)	17.8 (306)	20.6 (235)
1989 mean	-1.7	-2.7	-4.1	-8.8	-11.6
1989 mean absolute (no. of cases)	7.9 (215)	12.7 (182)	17.0 (150)	21.1 (118)	21.0 (77)
1988 mean	-2.7	-3.4	-4.5	-6.0	-2.7
1988 mean absolute (no. of cases)	6.5 (170)	10.2 (147)	13.3 (126)	16.1 (108)	17.5 (75)