

Tropical Cyclone Report  
Hurricane Howard  
30 August – 5 September 2004

Jack Beven  
National Hurricane Center  
13 December 2004

Howard was a category 4 hurricane on the Saffir-Simpson Hurricane Scale over the eastern North Pacific Ocean west of the coast of Mexico.

a. Synoptic History

Howard formed from a tropical wave that moved westward across the coast of Africa on 18 August. While there was no development as the wave crossed the Atlantic, an increase in the associated shower activity occurred on 26 August when the system reached the western Caribbean and the eastern North Pacific. The wave then moved west-northwestward parallel to the coast of Central America and Mexico. Shower activity increased in both coverage and organization on 29 August, and continued development resulted in the formation of a tropical depression around 1200 UTC 30 August about 350 n mi south-southwest of Acapulco, Mexico. The “best track” chart of the tropical cyclone’s path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1.

The depression moved west-northwestward on the southwest side of a mid-level ridge over Mexico and strengthened. It became a tropical storm early on 31 August and a hurricane on 1 September. Howard then strengthened rapidly and reached an estimated peak intensity of 120 kt on 2 September. This was followed by weakening as Howard moved northwestward over decreasing sea surface temperatures. Howard weakened to a tropical storm on 4 September and a tropical depression early on 5 September. The cyclone became a non-convective remnant low later that day about 230 n mi west-southwest of Punta Eugenia, Mexico.

The remnant low continued slowly northwestward until 6 September when it turned southwestward on the south east side of a low-level ridge. A general southwestward motion would continue until 10 September, when the low finally dissipated about 1000 n mi west-southwest of Cabo San Lucas, Mexico.

b. Meteorological Statistics

Observations in Howard (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA). Microwave satellite imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission

(TRMM), the NASA Aqua, the NASA QuikSCAT, and Defense Meteorological Satellite Program (DMSP) satellites were also useful in tracking Howard.

The only surface observation of tropical storm winds in Howard was from the ship **Strong Virginian** (call sign KSPH), which reported winds of 37 kt at 0600 UTC 4 September.

c. Casualty and Damage Statistics

There were no reports of damages or casualties associated with Howard.

d. Forecast and Warning Critique

Average official track errors (with the number of cases in parentheses) for Howard were 32 (22), 46 (20), 65 (18), 88 (16), 123 (12), 184 (8), and 193 (4) n mi for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. These errors are lower than the average official track errors for the 10-yr period 1994-2003<sup>1</sup> (38, 70, 100, 127, 180, 210, and 247 n mi, respectively), (Table 2). However, several of the track guidance models had lower average errors than the official forecast, most notably the GFDL and GUNS, which were better than the official forecast at all times. These models more accurately forecasted the northwestward motion of Howard early in its life while the official forecasts called for a west-northwesterly motion – a left bias – during that time.

Average official intensity errors were 9, 16, 20, 24, 27, 19 and 13 kt for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. For comparison, the average official intensity errors over the 10-yr period 1994-2003 are 6, 11, 15, 17, 20, 18, and 19 kt, respectively. The mostly larger than average intensity errors resulted from a combination of underforecasting how strong Howard would get early in its lifetime and overforecasting how strong it would remain later in its life.

Watches and warnings were not necessary for Howard.

---

<sup>1</sup> Errors given for the 96 and 120 h periods are averages over the three-year period 2001-3.

Table 1. Best track for Hurricane Howard, 30 August – 5 September 2004.

Date/Time (UTC)	Latitude (EN)	Longitude (EW)	Pressure (mb)	Wind Speed (kt)	Stage
30 / 1200	11.9	103.1	1008	25	tropical depression
30 / 1800	12.7	103.7	1007	30	"
31 / 0000	13.3	104.6	1005	35	tropical storm
31 / 0600	13.7	105.6	1003	40	"
31 / 1200	14.1	106.7	1000	45	"
31 / 1800	14.6	107.7	997	50	"
01 / 0000	15.0	108.5	994	55	"
01 / 0600	15.5	109.5	987	65	hurricane
01 / 1200	16.1	110.6	984	70	"
01 / 1800	16.5	111.4	980	75	"
02 / 0000	16.8	112.0	976	80	"
02 / 0600	17.3	112.6	960	100	"
02 / 1200	17.8	113.3	943	120	"
02 / 1800	18.3	113.9	943	120	"
03 / 0000	18.8	114.5	948	115	"
03 / 0600	19.2	114.9	960	100	"
03 / 1200	19.9	115.4	970	90	"
03 / 1800	20.8	115.9	976	80	"
04 / 0000	21.6	116.5	984	70	"
04 / 0600	22.4	117.0	987	65	"
04 / 1200	23.2	117.5	991	60	tropical storm
04 / 1800	23.9	118.0	995	50	"
05 / 0000	24.4	118.3	999	40	"
05 / 0600	24.8	118.5	1002	30	tropical depression
05 / 1200	25.5	118.7	1002	30	"
05 / 1800	26.0	118.8	1004	25	remnant low
06 / 0000	26.6	119.0	1005	25	"
06 / 0600	27.2	119.2	1007	25	"
06 / 1200	27.5	119.5	1007	20	"
06 / 1800	27.5	120.1	1010	20	"
07 / 0000	27.3	120.8	1010	20	"
07 / 0600	26.7	121.2	1010	20	"
07 / 1200	26.1	121.6	1011	20	"
07 / 1800	25.5	122.0	1011	20	"
08 / 0000	24.9	122.4	1009	20	"
08 / 0600	24.2	122.9	1010	20	"
08 / 1200	23.5	123.4	1009	20	"
08 / 1800	23.0	124.0	1009	20	"
09 / 0000	22.6	124.5	1009	20	"
09 / 0600	22.2	125.1	1009	20	"

Date/Time (UTC)	Latitude (EN)	Longitude (EW)	Pressure (mb)	Wind Speed (kt)	Stage
09 / 1200	21.8	125.8	1009	20	"
09 / 1800	21.1	126.5	1009	20	"
10 / 0000	20.4	127.1	1010	20	"
10 / 0600	19.6	127.5	1011	20	"
10 / 1200					dissipated
02 / 1200	17.8	113.3	943	120	minimum pressure

Table 2. Preliminary forecast evaluation (heterogeneous sample) for Hurricane Howard, 30 August – 5 September 2004. Forecast errors (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast (OFCL) are shown in bold-face type. Verification includes the depression stage, but does not include the extratropical stage, if any.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	35 (23)	70 (21)	100 (19)	148 (17)	219 (13)	257 (9)	248 (5)
GFDI	<b>26</b> (21)	<b>39</b> (19)	<b>53</b> (17)	<b>70</b> (15)	<b>98</b> (11)	<b>120</b> (7)	<b>112</b> (3)
GFDL*	<b>30</b> (22)	<b>44</b> (20)	<b>58</b> (18)	<b>69</b> (16)	<b>91</b> (12)	<b>110</b> (8)	<b>151</b> (4)
GFNI	38 (20)	74 (18)	103 (16)	131 (14)	163 (10)	205 (6)	<b>151</b> (1)
GFDN*	33 (19)	67 (17)	97 (15)	125 (13)	157 (9)	192 (5)	<b>132</b> (2)
AFII	34 (16)	46 (14)	<b>50</b> (12)	<b>67</b> (10)	159 (6)		
AFW1*	49 (9)	56 (8)	<b>62</b> (7)	<b>63</b> (6)	<b>107</b> (4)		
COEI	36 (20)	60 (18)	76 (16)	97 (14)			
COCE*	38 (10)	60 (10)	75 (9)	<b>82</b> (8)			
LBAR	36 (21)	75 (19)	106 (17)	146 (15)	250 (13)	331 (9)	428 (5)
P91E	33 (22)	53 (20)	<b>61</b> (18)	<b>66</b> (16)	<b>94</b> (12)	<b>117</b> (8)	<b>112</b> (5)
P9UK	<b>29</b> (11)	48 (10)	72 (9)	90 (8)	132 (7)		
BAMD	45 (23)	78 (21)	104 (19)	137 (17)	194 (13)	225 (9)	<b>146</b> (5)
BAMM	36 (23)	63 (21)	99 (19)	142 (17)	243 (13)	386 (9)	386 (5)
BAMS	35 (23)	59 (21)	97 (19)	142 (17)	259 (13)	433 (9)	540 (5)
NGPI	38 (21)	57 (19)	77 (17)	104 (15)	199 (11)	317 (7)	404 (3)
NGPS*	42 (22)	59 (20)	76 (18)	99 (16)	170 (12)	290 (8)	419 (4)
UKMI	32 (20)	59 (18)	79 (16)	99 (14)	132 (10)	<b>169</b> (6)	422 (2)
UKM*	43 (11)	60 (10)	81 (9)	<b>82</b> (8)	<b>121</b> (6)	<b>179</b> (4)	258 (2)
GFSI	39 (21)	73 (19)	109 (17)	141 (15)	248 (11)	365 (7)	462 (2)
GFS*	48 (22)	81 (20)	119 (18)	147 (16)	238 (12)	357 (8)	546 (3)
AEMI	<b>30</b> (21)	50 (19)	67 (17)	98 (15)	179 (11)	261 (7)	307 (3)
AEMN*	49 (22)	63 (20)	82 (18)	105 (16)	179 (12)	265 (8)	338 (4)
GUNS	<b>25</b> (20)	<b>39</b> (18)	<b>55</b> (16)	<b>77</b> (14)	<b>122</b> (10)	<b>102</b> (6)	<b>93</b> (2)
GUNA	<b>26</b> (20)	<b>42</b> (18)	<b>59</b> (16)	<b>85</b> (14)	141 (10)	<b>171</b> (6)	<b>106</b> (2)
CONU	<b>27</b> (21)	<b>45</b> (19)	<b>64</b> (17)	90 (15)	141 (11)	<b>157</b> (7)	<b>121</b> (3)
OFCI	<b>27</b> (21)	48 (19)	66 (17)	89 (15)	137 (11)	194 (7)	221 (3)
OFCL	32 (22)	46 (20)	65 (18)	88 (16)	123 (12)	184 (8)	193 (4)
NHC Official (1994-2003 mean)	38 (2746)	70 (2474)	100 (2196)	127 (1928)	180 (1476)	210 (283)	247 (179)

\* Output from these models was unavailable at forecast time.

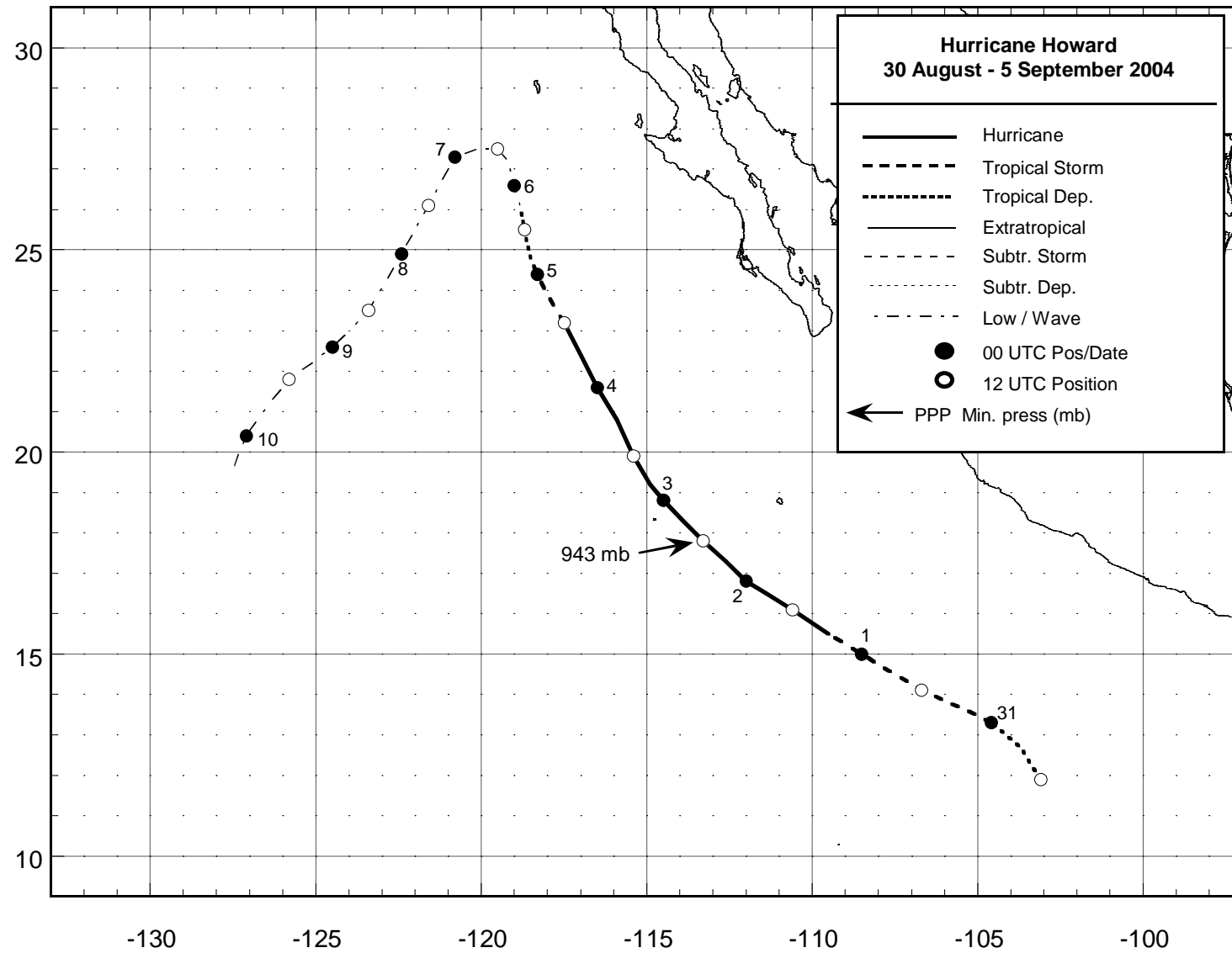


Figure 1. Best track positions for Hurricane Howard, 30 August – 5 September 2004.

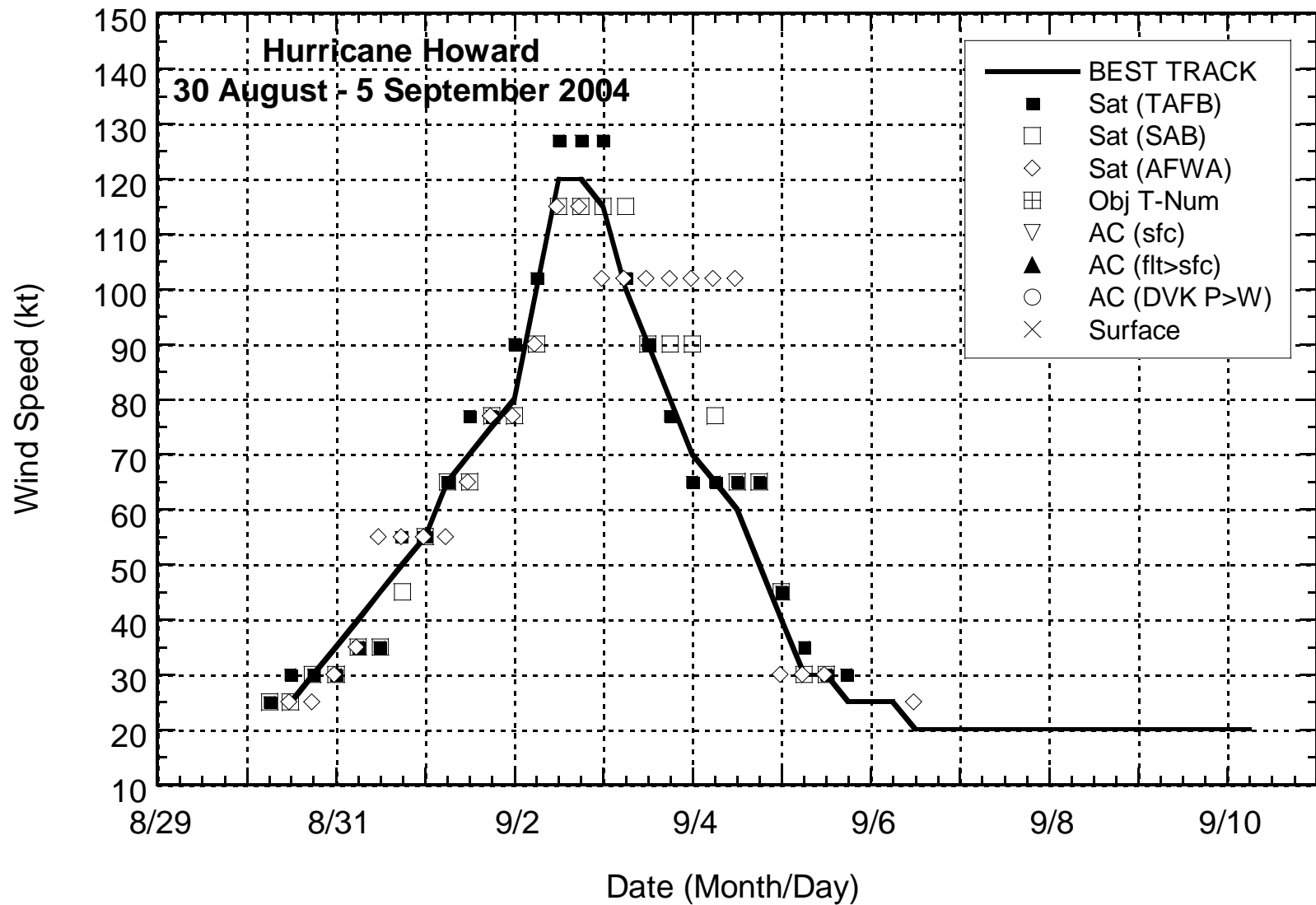


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Howard, 30 August – 5 September 2004.

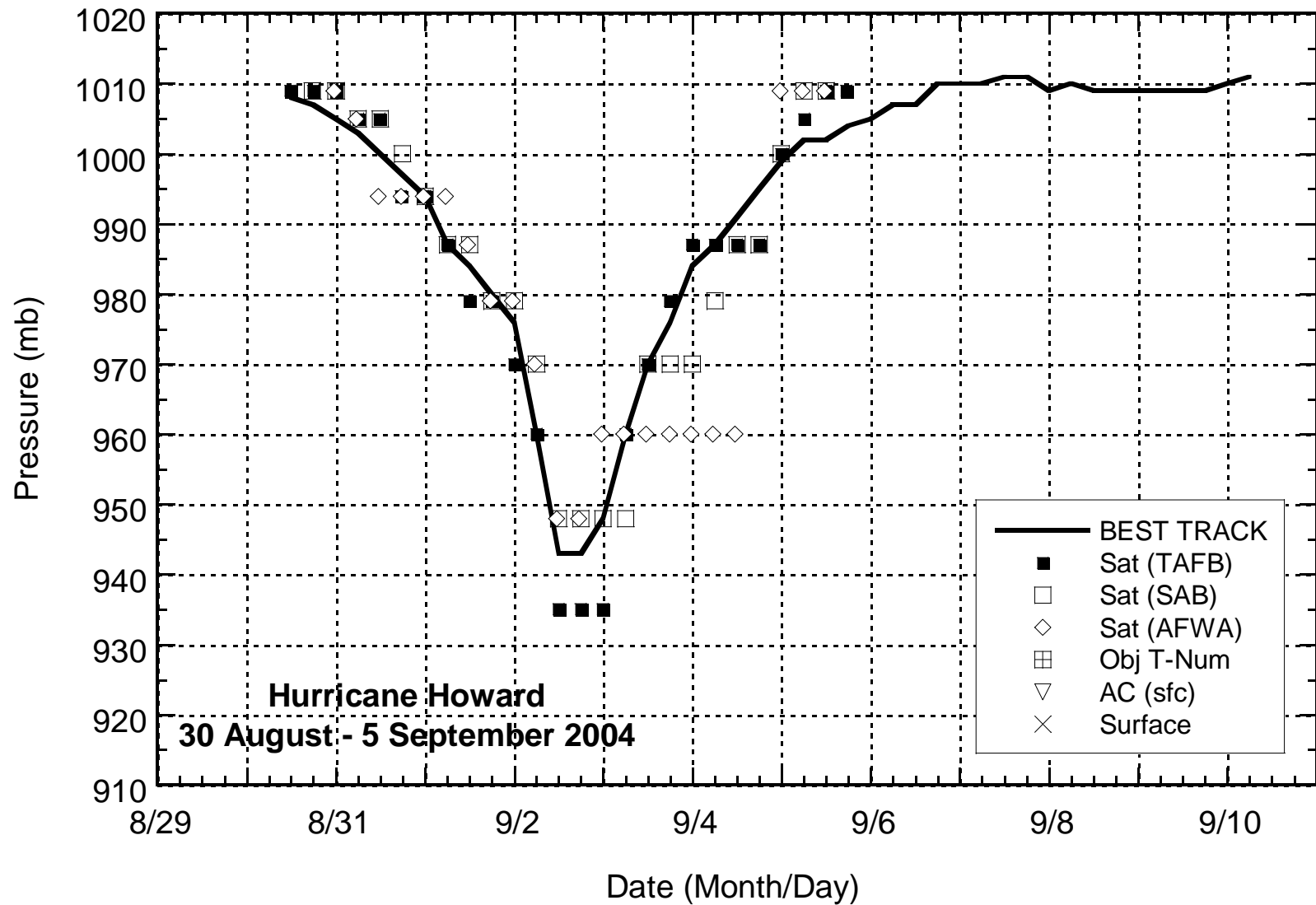


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Howard, 30 August – 5 September 2004.