

Tropical Cyclone Report  
Hurricane Darby  
26 July – 1 August 2004

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Darby reached category 3 status on the Saffir-Simpson Hurricane Scale over the open eastern North Pacific ocean.

a. Synoptic History

Darby formed from a tropical wave that moved westward across the coast of Africa on 12 July. The wave crossed the Atlantic and Caribbean with no development and reached the eastern North Pacific on 20 July. Moving westward, the system first showed signs of organization on 23 July. Continued slow development resulted in the formation of a tropical depression around 1200 UTC 26 July about 660 n mi south-southwest of Cabo San Lucas, 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 westward on the south side of the subtropical ridge and became a tropical storm early on 27 July. It turned west-northwestward later that day and continued to strengthen. Darby became a hurricane early on 28 July, and then reached an estimated peak intensity of 105 kt on 29 July. The hurricane started to weaken later that day due to a combination of cooler sea-surface temperatures and increasing westerly vertical shear. It became a tropical storm again on 30 July as it turned westward, and it weakened to a depression on 31 July. The depression crossed 140°W into the central North Pacific hurricane basin later that day. Darby dissipated as a tropical cyclone on 1 August about 740 n mi east of the Hawaiian Islands. The remnants of Darby continued westward in the low-level trade winds and caused heavy rains and flooding over portions of the Hawaiian Islands on 3-4 August.

b. Meteorological Statistics

Observations in Darby (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 Darby.

There were no surface observations of winds of tropical storm force from Darby.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

Average official track errors (with the number of cases in parentheses) for Darby were 19 (21), 36 (19), 58 (17), 80 (15), 127 (11), 206 (7), and 333 (3) 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) through 96 h, but much greater than the average 120 h error. The large errors at 120 h resulted from the early track forecasts being too far south and too slow.

Average official intensity errors were 7, 11, 13, 15, 21, 31 and 40 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 large errors at 96 and 120 h resulted from early intensity forecasts making Darby too strong.

Watches and warnings were not required for Darby.

*Acknowledgements*

The best track west of 140°W was provided by the Central Pacific Hurricane Center in Honolulu, Hawaii.

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<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 Darby, 26 July – 1 August 2004.

Date/Time (UTC)	Latitude (EN)	Longitude (EW)	Pressure (mb)	Wind Speed (kt)	Stage
26 / 1200	12.2	112.8	1008	25	tropical depression
26 / 1800	12.3	114.2	1007	30	"
27 / 0000	12.5	115.5	1003	35	tropical storm
27 / 0600	12.9	116.8	1000	45	"
27 / 1200	13.2	118.0	993	55	"
27 / 1800	13.6	119.1	990	60	"
28 / 0000	14.1	120.5	987	65	hurricane
28 / 0600	14.6	121.7	983	70	"
28 / 1200	15.2	122.8	977	80	"
28 / 1800	15.8	124.0	970	90	"
29 / 0000	16.3	125.2	964	95	"
29 / 0600	16.8	126.2	957	105	"
29 / 1200	17.4	127.2	960	100	"
29 / 1800	17.8	128.2	964	95	"
30 / 0000	18.1	129.2	980	75	"
30 / 0600	18.3	130.3	987	65	"
30 / 1200	18.4	131.7	994	55	tropical storm
30 / 1800	18.6	133.2	998	45	"
31 / 0000	18.7	134.6	1000	40	"
31 / 0600	18.8	136.0	1002	35	"
31 / 1200	18.8	137.3	1005	30	tropical depression
31 / 1800	18.9	138.8	1007	25	"
01 / 0000	19.0	140.4	1007	25	"
01 / 0600	19.3	142.0	1007	25	"
01 / 1200					dissipated
29 / 0600	16.8	126.2	957	105	minimum pressure

Table 2. Preliminary forecast evaluation (heterogeneous sample) for Hurricane Darby, 26 July – 1 August 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	29 (22)	58 (20)	93 (18)	130 (16)	125 (12)	<b>204</b> (8)	<b>322</b> (4)
GFDI	28 (22)	55 (20)	85 (18)	115 (16)	179 (12)	292 (8)	458 (4)
GFDL*	31 (20)	53 (18)	72 (17)	97 (15)	151 (11)	250 (7)	368 (3)
GFNI	28 (16)	45 (16)	<b>55</b> (14)	<b>72</b> (12)	<b>117</b> (8)	<b>205</b> (4)	
GFDN*	33 (8)	54 (8)	68 (8)	<b>71</b> (7)	<b>103</b> (5)	<b>181</b> (3)	<b>321</b> (1)
AFII	37 (15)	67 (13)	117 (11)	177 (9)	272 (5)		
AFW1*	54 (8)	80 (7)	100 (6)	144 (5)	259 (3)		
COEI	65 (2)	120 (1)	125 (1)				
COCE*	89 (1)	139 (1)					
LBAR	30 (22)	52 (20)	83 (18)	113 (16)	156 (12)	<b>127</b> (8)	<b>160</b> (4)
P91E	26 (22)	51 (20)	89 (18)	125 (16)	178 (12)	222 (8)	<b>311</b> (4)
P9UK	27 (11)	51 (10)	83 (9)	105 (8)	<b>116</b> (6)		
BAMD	41 (22)	81 (20)	124 (18)	164 (16)	243 (12)	316 (8)	395 (4)
BAMM	27 (22)	55 (20)	84 (18)	101 (16)	126 (12)	<b>179</b> (8)	<b>264</b> (4)
BAMS	32 (22)	50 (20)	70 (18)	86 (16)	121 (12)	<b>127</b> (8)	<b>167</b> (4)
NGPI	39 (22)	74 (20)	103 (18)	129 (16)	160 (10)	291 (6)	468 (2)
NGPS*	32 (21)	60 (19)	85 (17)	114 (15)	151 (11)	259 (7)	433 (3)
UKMI	28 (19)	51 (17)	64 (15)	<b>67</b> (13)	<b>69</b> (9)	<b>86</b> (5)	<b>62</b> (1)
UKM*	47 (10)	66 (9)	86 (8)	86 (7)	<b>71</b> (5)	<b>103</b> (3)	<b>83</b> (1)
GFSI	42 (20)	86 (17)	111 (15)	131 (13)	191 (10)	227 (6)	<b>174</b> (2)
GFS*	58 (21)	86 (18)	107 (14)	128 (12)	171 (10)	<b>201</b> (5)	<b>201</b> (3)
AEMI	34 (15)	60 (13)	72 (11)	83 (9)	138 (7)	<b>180</b> (3)	
AEMN*	39 (16)	72 (14)	81 (12)	83 (10)	<b>104</b> (8)	<b>108</b> (4)	
GUNS	22 (19)	39 (17)	<b>56</b> (15)	<b>74</b> (13)	<b>109</b> (9)	<b>191</b> (5)	<b>286</b> (1)
GUNA	22 (19)	42 (16)	<b>52</b> (14)	<b>67</b> (12)	<b>86</b> (9)	<b>144</b> (5)	<b>234</b> (1)
CONU	30 (22)	55 (20)	73 (18)	92 (16)	<b>94</b> (10)	<b>153</b> (6)	<b>276</b> (2)
OFCI	22 (20)	42 (18)	66 (16)	90 (14)	138 (10)	221 (6)	363 (2)
OFCL	19 (21)	36 (19)	58 (17)	80 (15)	127 (11)	206 (7)	333 (3)
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.

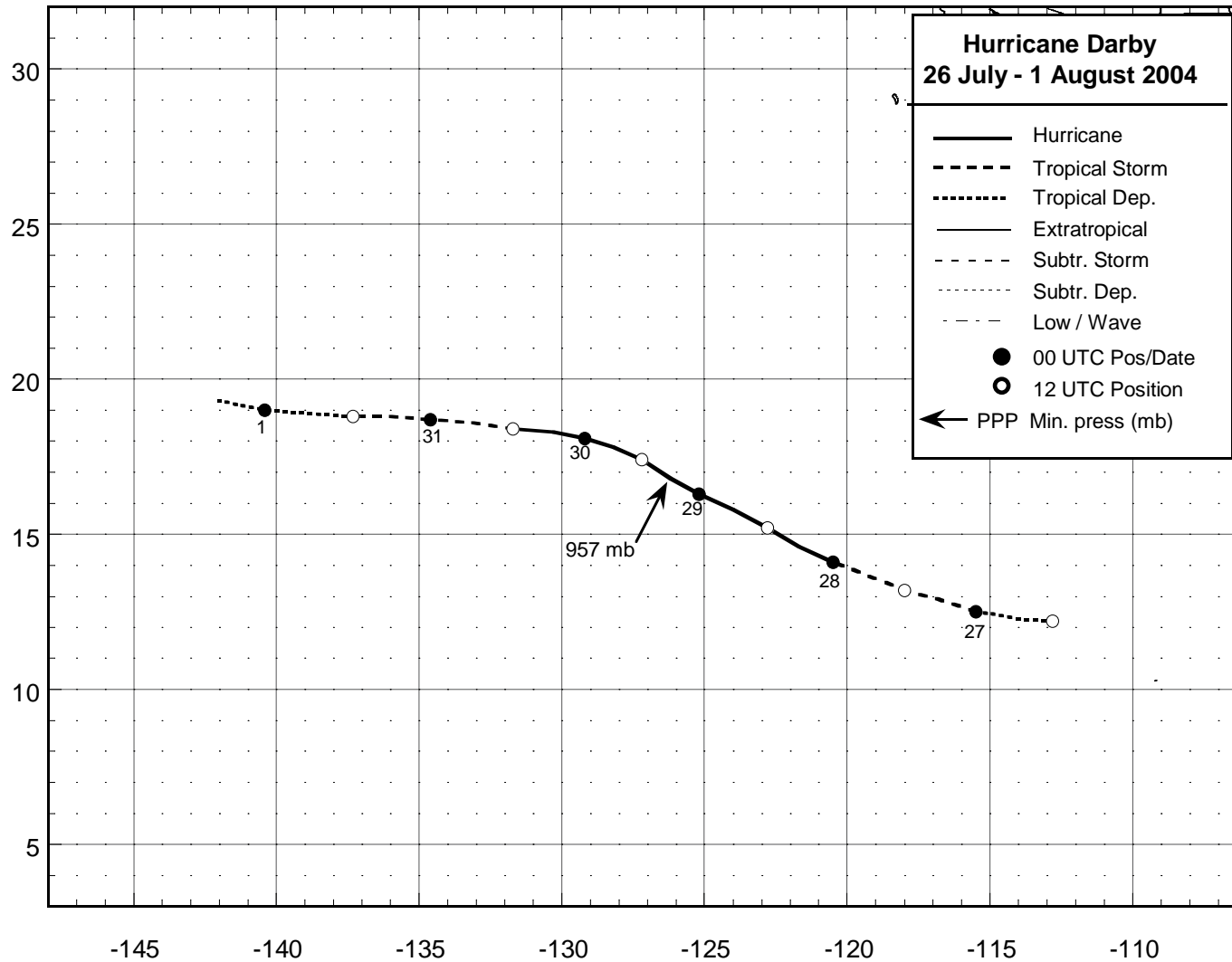


Figure 1. Best track positions for Hurricane Darby, 26 July – 1 August 2004. The best track west of 140°W was provided by the Central Pacific Hurricane Center in Honolulu, Hawaii.

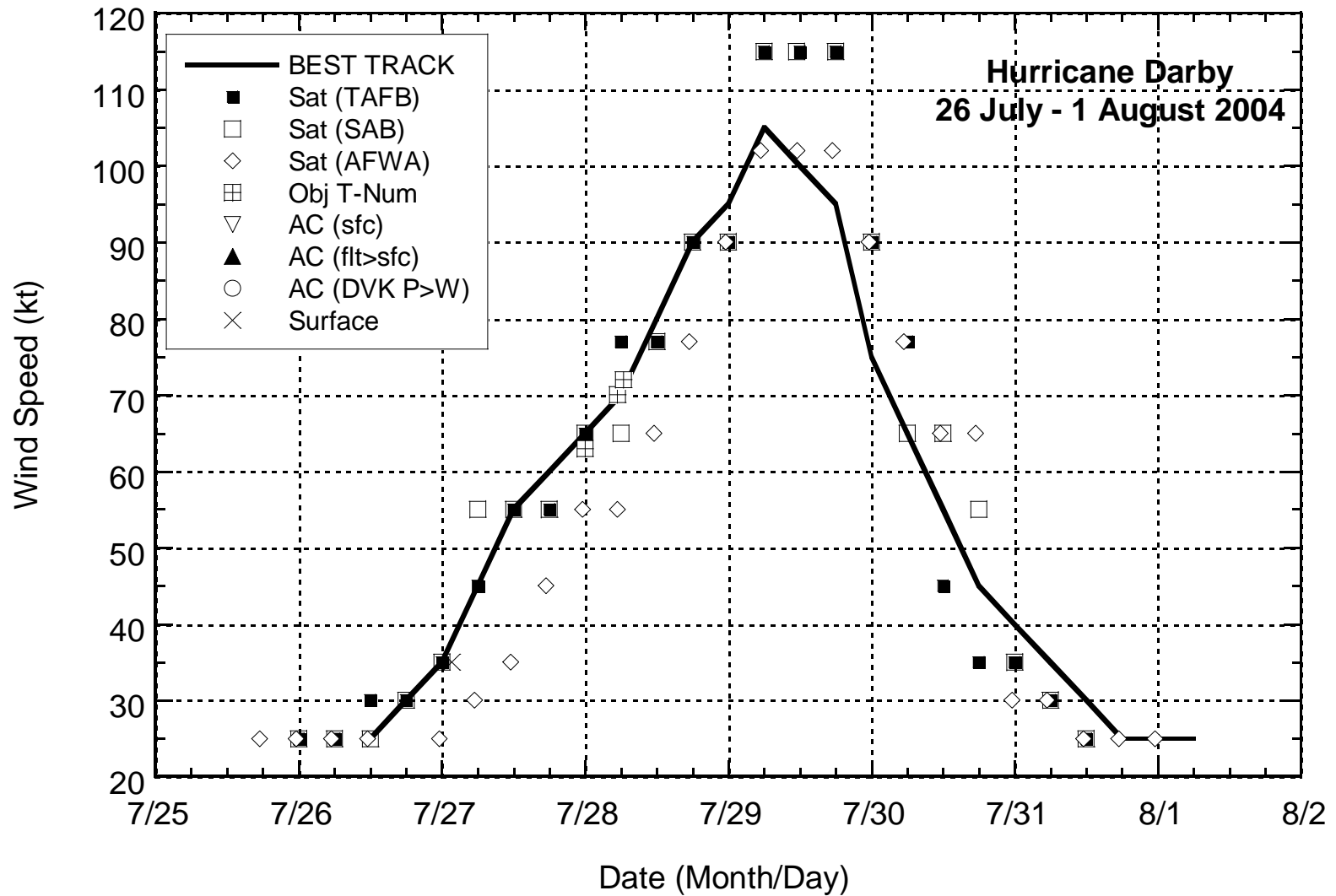


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Darby, 26 July – 1 August 2004. Objective Dvorak estimates represent linear averages over a three-hour period centered on the nominal observation time. The best track west of 140°W was provided by the Central Pacific Hurricane Center in Honolulu, Hawaii.

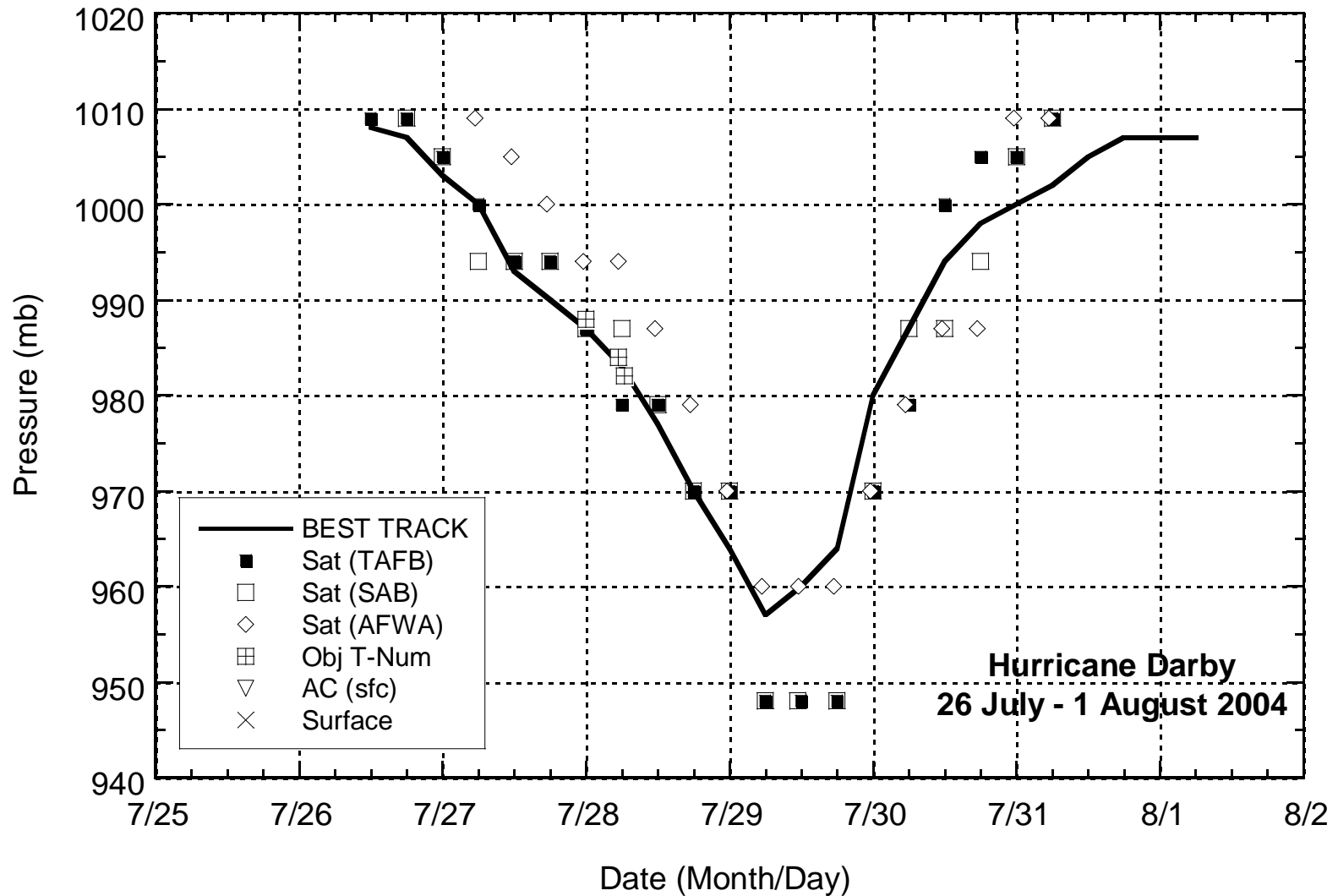


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Darby, 26 July – 1 August 2004. Objective Dvorak estimates represent linear averages over a three-hour period centered on the nominal observation time. The best track west of 140°W was provided by the Central Pacific Hurricane Center in Honolulu, Hawaii.