

Tropical Cyclone Report  
Hurricane Flossie  
(EP092007)  
8-16 August 2007

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Flossie intensified into a category 4 hurricane (on the Saffir-Simpson Hurricane Scale) shortly before entering the central Pacific hurricane basin. It threatened the Hawaiian Islands, but passed to the south of those islands and dissipated soon thereafter.

a. Synoptic History

Flossie's genesis was probably triggered by an ill-defined tropical wave that moved from Africa into the eastern tropical Atlantic on 21 July. This wave moved across the Atlantic basin with little associated deep convection, and crossed Central America on 1 August. An area of showers and thunderstorms then developed near the Gulf of Tehuantepec on 2 August. The disturbed weather area moved generally westward with little change in organization during the next couple of days. There was some increase in the organization of the deep convection on 4 August, while the disturbance was centered roughly 800 n mi south of Cabo San Lucas, Mexico. Little further change in the system occurred until 6 August, when it acquired nearly enough organization to be considered a tropical depression. However, deep convection failed to persist near the low-level circulation center. The disturbance continued to move generally westward and, by 1800 UTC 8 August, the system exhibited sufficiently organized and persistent deep convection to designate the formation of a tropical depression that was centered about 1700 n mi east-southeast of the Big Island of Hawaii. 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.

Within an environment of diffluent upper-level anticyclonic flow, low vertical shear, and warm ocean waters, the tropical cyclone strengthened and became a tropical storm by 0000 UTC 9 August. For the next several days, environmental conditions remained conducive for intensification, and Flossie strengthened into a hurricane by 1200 UTC 10 August, when an eye became evident in both infrared and visible satellite imagery. A subtropical ridge persisted to the north of the cyclone, which forced a continued westward motion. Flossie continued to intensify and by 1200 UTC 11 August, just before it entered the central Pacific hurricane basin, the system became a category 4 hurricane on the Saffir-Simpson Hurricane Scale. Flossie reached its peak intensity of 120 kt early on 12 August, while centered about 850 n mi east-southeast of the Big Island. The hurricane moved west-northwestward over the next couple of days while maintaining category 4 strength. By early on 14 August, increasing vertical shear caused weakening. As Flossie neared the Big Island, it turned westward while continuing to lose strength. Flossie's center passed about 90 n mi south of South Point on the Big Island early on

15 August. Continuing westward, and well to the south of the remaining Hawaiian Islands, the cyclone steadily weakened in an environment of strong upper-level southwesterly winds. Flossie weakened to a tropical storm by 1200 UTC 15 August and to a depression by early on 16 August. The system then quickly degenerated into a remnant low and dissipated.

b. Meteorological Statistics

Observations in Flossie (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB), as well as flight-level and dropwindsonde observations from flights of the 53<sup>rd</sup> Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command. Microwave satellite imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT, and Defense Meteorological Satellite Program (DMSP) satellites, among others were also useful in tracking Flossie. The hurricane's peak intensity of 120 kt is supported by objective Dvorak T-numbers.

No ship reports of winds of tropical storm force associated with Flossie over the eastern North Pacific basin have been received. Flossie generated very large waves on the Big Island of Hawaii and also produced sustained tropical storm force winds at South Point on that island.

c. Casualty and Damage Statistics

Flossie's impacts on the Hawaiian Islands were minimal. There were no reports of casualties or significant damage.

d. Forecast and Warning Critique

The weather disturbance that eventually developed into Flossie was first mentioned in the Tropical Weather Outlook (TWO) at 2300 UTC 2 August, nearly 6 days prior to genesis, with a statement that environmental conditions appeared favorable for some development during the following couple of days. The system did not change much in organization for a few days and the TWOs temporarily became less enthusiastic about the prospect for development. By 5 August, around 3 days before genesis, the possibility of tropical depression formation was stated in the TWO.

Flossie's track was well-predicted by the National Hurricane Center (NHC). A verification of official and guidance model track forecasts for this tropical cyclone is given in Table 2. Average official track errors were 25, 41, 50, 52, 52, 63, and 104 n mi for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. There were 12 forecasts from 12 through 120 h. These errors are smaller than the average long-term official track errors (Table 2) through 24 h, and considerably smaller than the long-term averages beyond 24 h. It is worth noting that the mean official track forecast was better than any of the numerical guidance beyond 48 h, save for CLIPER at 120 h which had a slightly lower mean error than the official.

In contrast to the track forecasts, the intensity of Flossie was very poorly predicted by the NHC. The average official intensity errors for Flossie were 13, 22, 33, 46, 56, 48, and 35 kt for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. In comparison, the average long-term official intensity errors are 11, 14, 17, 19, 18, and 19 kt, respectively. The environment of Flossie was not analyzed to be nearly as conducive for strengthening as it actually was; consequently many of the official intensity forecasts had a large negative bias. In fact, several of the official 3- to 5-day wind speed forecasts were too low by 70 kt or more. As can be seen in Table 3, most of the numerical guidance for intensity also had large errors.

The Central Pacific Hurricane Center issued a hurricane watch and a tropical storm warning for the Big Island of Hawaii on 13 August. The watch and warning were discontinued on 15 August.

Table 1. Best track for Hurricane Flossie, 8-16 August 2007. Best track data west of 140°W produced by the Central Pacific Hurricane Center (CPHC).

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
08 / 1800	13.4	126.4	1007	30	tropical depression
09 / 0000	13.2	127.8	1000	35	tropical storm
09 / 0600	13.1	129.1	1000	45	"
09 / 1200	12.9	130.4	997	45	"
09 / 1800	12.7	131.8	995	55	"
10 / 0000	12.6	133.1	994	55	"
10 / 0600	12.6	134.3	991	60	"
10 / 1200	12.6	135.4	984	70	hurricane
10 / 1800	12.6	136.6	977	80	"
11 / 0000	12.6	137.7	970	90	"
11 / 0600	12.6	138.7	965	100	"
11 / 1200	12.7	139.7	950	115	"
11 / 1800	12.9	140.6	950	115	"
12 / 0000	13.2	141.7	949	120	"
12 / 0600	13.4	143.0	950	120	"
12 / 1200	13.5	144.0	953	120	"
12 / 1800	13.7	145.2	955	120	"
13 / 0000	13.9	146.4	958	115	"
13 / 0600	14.2	147.6	958	115	"
13 / 1200	14.6	148.9	955	120	"
13 / 1800	15.1	150.1	957	115	"
14 / 0000	15.7	151.4	960	110	"
14 / 0600	16.2	152.6	970	100	"
14 / 1200	16.6	153.6	973	95	"
14 / 1800	16.9	154.4	978	90	"
15 / 0000	17.3	155.2	980	85	"
15 / 0600	17.4	156.0	993	65	"
15 / 1200	17.3	157.0	1003	50	tropical storm
15 / 1800	17.4	158.0	1006	40	"
16 / 0000	17.4	159.0	1007	35	"
16 / 0600	17.1	160.2	1008	30	tropical depression
16 / 1200	17.1	161.5	1009	25	"
16 / 1800					dissipated
12 / 0000	13.2	141.7	949	120	minimum pressure

Table 2. Preliminary track forecast evaluation (heterogeneous sample) for Hurricane Flossie, 8-16 August 2007, for forecasts made when Flossie was in the eastern North Pacific. Forecast errors (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	30 (12)	50 (12)	66 (12)	78 (12)	97 (12)	106 (12)	<b>103</b> (12)
GFNI	38 (10)	61 (10)	75 (10)	77 (10)	71 (9)	89 (8)	234 (7)
GFDI	33 (12)	52 (12)	61 (12)	75 (12)	95 (12)	113 (12)	162 (12)
HWFI	39 (12)	61 (12)	76 (12)	93 (12)	111 (12)	118 (12)	116 (12)
GFSI	<b>23</b> (12)	<b>38</b> (12)	51 (12)	76 (12)	125 (12)	143 (12)	142 (12)
AEMI	<b>21</b> (12)	<b>38</b> (12)	52 (12)	77 (12)	174 (12)	224 (2)	348 (2)
NGPI	39 (10)	70 (10)	111 (10)	148 (10)	201 (10)	287 (10)	452 (10)
UKMI	<b>24</b> (10)	45 (10)	62 (10)	67 (10)	89 (10)	213 (10)	259 (8)
BAMD	40 (12)	67 (12)	85 (12)	102 (12)	123 (12)	136 (12)	239 (12)
BAMM	32 (12)	54 (12)	69 (12)	86 (12)	125 (12)	171 (12)	204 (12)
BAMS	35 (12)	62 (12)	78 (12)	97 (12)	132 (12)	147 (12)	150 (12)
CONU	28 (12)	44 (12)	54 (12)	58 (12)	62 (12)	88 (12)	154 (12)
GUNA	<b>23</b> (10)	<b>38</b> (10)	51 (10)	58 (10)	66 (10)	93 (10)	151 (8)
FSSE	<b>23</b> (11)	<b>40</b> (11)	<b>48</b> (11)	<b>48</b> (11)	63 (11)	92 (11)	135 (11)
OFCL	25 (12)	41 (12)	50 (12)	52 (12)	52 (12)	63 (12)	104 (12)
NHC Official (2002-2006 mean)	33 (1349)	57 (1192)	79 (1039)	99 (897)	140 (655)	188 (465)	233 (311)

Table 3. Preliminary intensity forecast evaluation (heterogeneous sample) for Hurricane Flossie, 8-16 August 2007, for forecasts made when Flossie was in the eastern North Pacific. Forecast errors (kt) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
SHF5	13.2 (12)	22.6 (12)	<b>31.5</b> (12)	<b>38.9</b> (12)	<b>43.8</b> (12)	<b>38.1</b> (12)	<b>30.8</b> (12)
GHMI	17.8 (12)	32.0 (12)	42.6 (12)	48.3 (12)	<b>46.9</b> (12)	<b>36.2</b> (12)	<b>26.1</b> (12)
HWFI	17.7 (12)	28.0 (12)	35.8 (12)	<b>45.2</b> (12)	<b>54.2</b> (12)	55.3 (12)	41.5 (12)
SHIP	12.8 (12)	<b>21.3</b> (12)	<b>31.5</b> (12)	<b>41.6</b> (12)	<b>51.0</b> (12)	<b>42.2</b> (12)	<b>28.1</b> (12)
DSHP	12.8 (12)	<b>21.3</b> (12)	<b>31.5</b> (12)	<b>41.6</b> (12)	<b>51.0</b> (12)	<b>42.2</b> (12)	<b>28.1</b> (12)
FSSE	12.6 (11)	22.7 (11)	33.4 (11)	<b>43.7</b> (11)	<b>50.5</b> (11)	<b>44.4</b> (11)	35.0 (11)
ICON	16.0 (12)	27.3 (12)	36.6 (12)	<b>44.7</b> (12)	<b>50.0</b> (12)	<b>44.4</b> (12)	<b>32.9</b> (12)
OFCL	12.5 (12)	21.7 (12)	32.9 (12)	45.8 (12)	56.3 (12)	48.3 (12)	34.6 (12)
NHC Official (2002-2006 mean)	6.3 (1349)	11.0 (1192)	14.6 (1039)	16.9 (896)	18.9 (655)	18.5 (465)	19.3 (311)

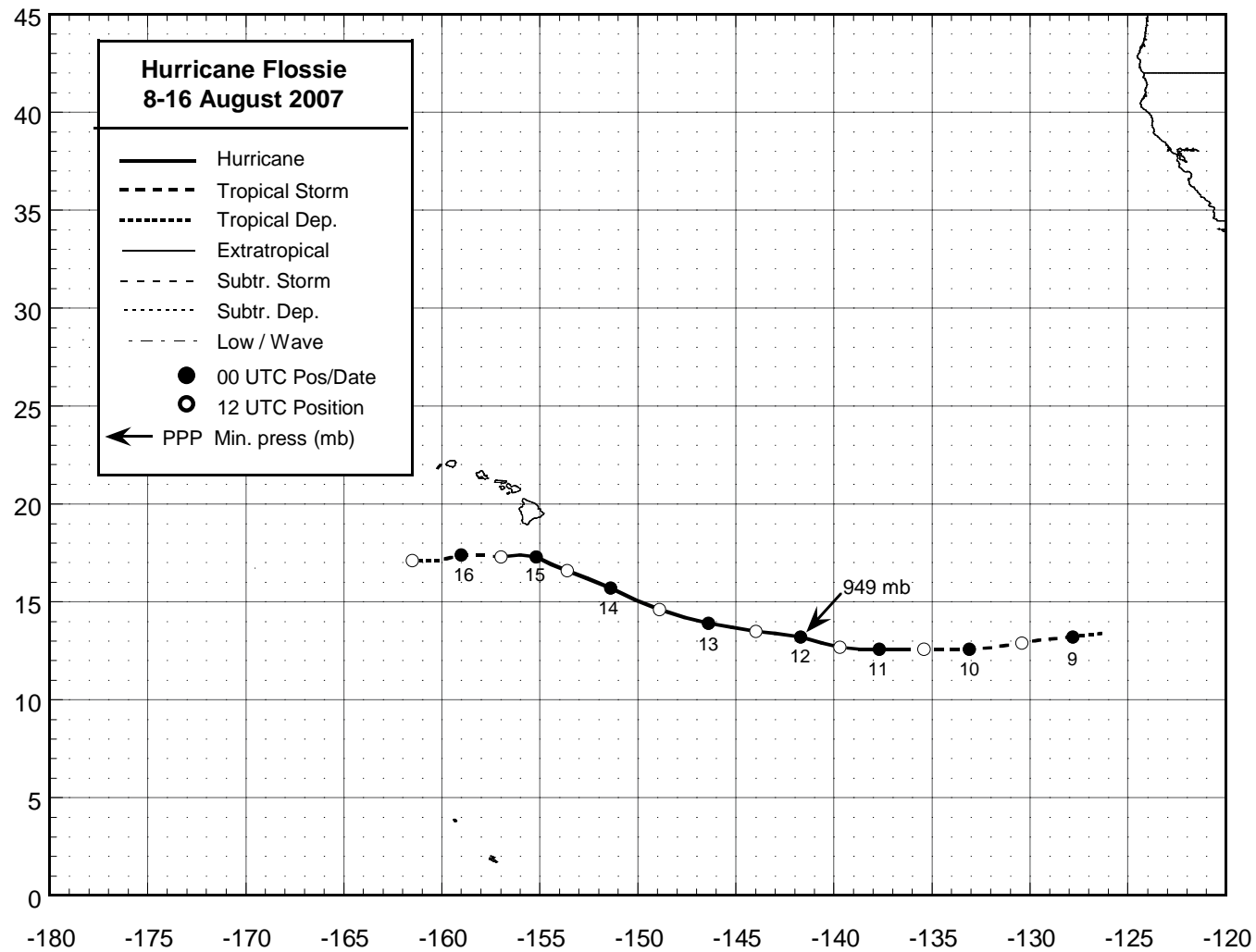


Figure 1. Best track positions for Hurricane Flossie, 8-16 August 2007. Best track data west of 140°W were produced by the CPHC.

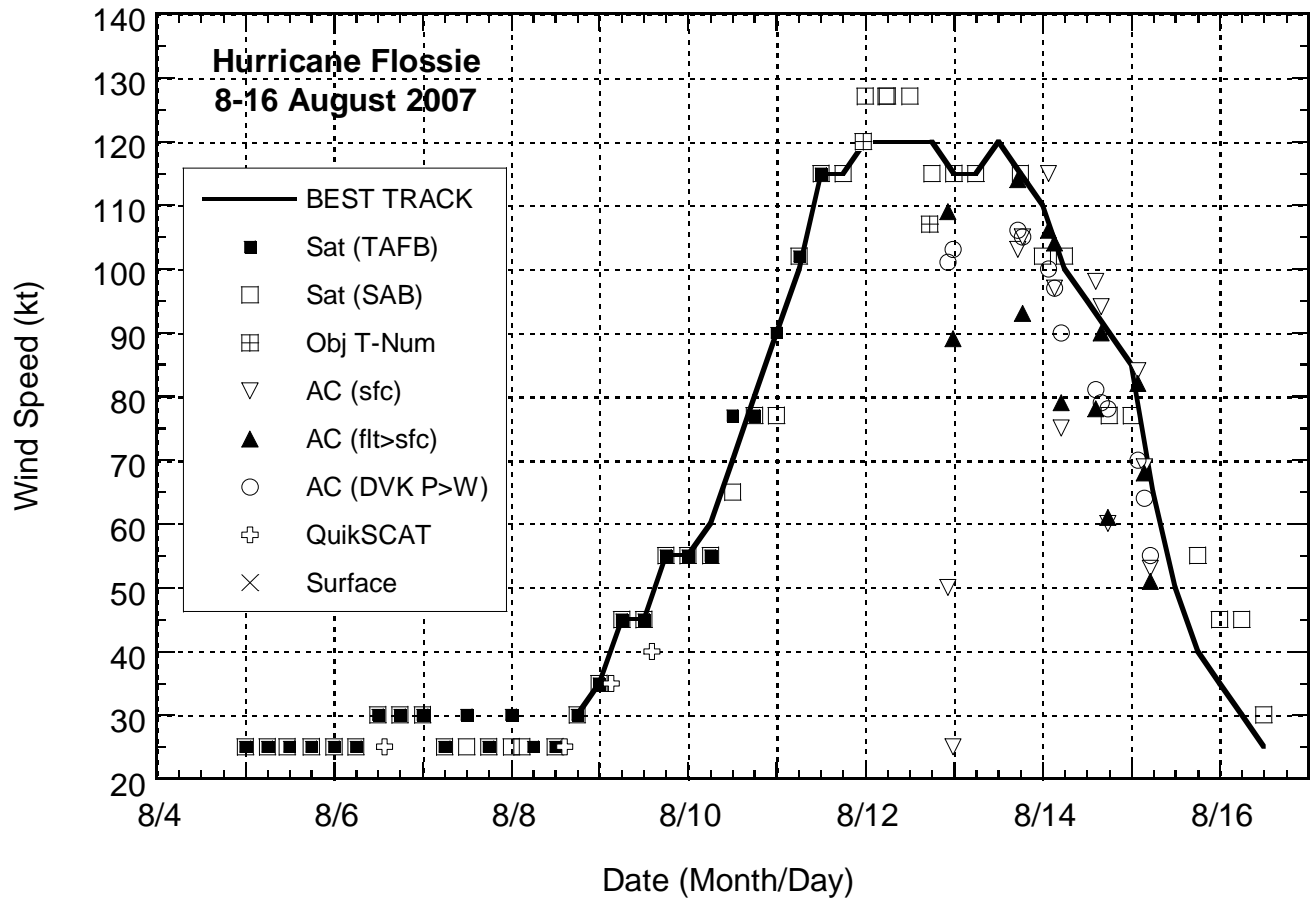


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Flossie, 8-16 August 2007. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% reduction factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Objective Dvorak estimates represent linear averages over a three-hour period centered on the nominal observation time. Best track data after 1200 UTC 11 August were produced by the CPHC.



