



CENTRAL PACIFIC HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL CYCLONES 1999

Central Pacific Hurricane Center

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INTRODUCTION

During the 1999 Central Pacific tropical cyclone season, sea surface temperatures in the Eastern and Central Pacific were near normal, except near the equator and in a small area just southeast of the Hawaiian Islands, where there were negative anomalies between 1-2 degrees Celsius. In the vicinity of the Hawaiian Islands, sea surface temperatures were near normal.

Three tropical cyclones were observed in the Central Pacific during 1999, one tropical depression and two hurricanes. This is below the 37 year average of 4.5, but similar to 1998 when one hurricane and two tropical depressions occurred. However, the 1999 season was substantially less than the 9 tropical cyclones reported in 1997. The three tropical cyclones occurred from July 24 through August 19. This is in contrast to the 1999 Atlantic tropical cyclone

season in which there was a very active period from the latter part of August through the end of November.

There was excellent aerial reconnaissance support to the Central Pacific Hurricane Center (CPHC). U.S. Air Force Reserves made three flights for Eugene and two for Dora. Two tropical cyclone fixes were made for each flight. A NOAA Gulfstream IV flew a total of four missions, two for Hurricane Eugene and two for Hurricane Dora. During the Gulfstream IV flight for Dora, it made its first penetration of a hurricane.

Excellent wind analyses were provided by the Hurricane Research Division.

There were extensive outside contacts during Hurricanes Eugene and Dora. Numerous media interviews were provided by CPHC to all local network affiliate television stations. There was extensive media coverage of the NOAA Gulfstream IV flights by CNN and local television stations. Briefings were provided twice a day to all military organizations in Hawaii.

Tropical cyclones for 1999 began with Tropical Depression Four-E on July 24 and ended with Hurricane Dora on August 20.

TROPICAL DEPRESSION FOUR-E JULY 24, 1999

HISTORY. Tropical Depression Four-E formed in the Eastern Pacific near 14N 133W on the evening of July 22. It moved into the Central Pacific on the morning of July 24 and was already beginning to dissipate. The final advisory was issued at 1100 Hawaiian Standard Time on July 24. The system never reached tropical storm strength.

SYNOPTIC SITUATION (July 24, 1999)

SURFACE. A strong 1034 hectopascal (hPa) high pressure center was located near 43N 150W with a ridge extending southeast to 25N 120W and southwest through 32N 180. Although the high moved slowly east, the ridge remained nearly stationary and produced favorable conditions for the system to continue to move west.

Sea surface temperatures along the depression's track in the Central Pacific were near normal at approximately 26 degrees Celsius.

UPPER LEVELS. At 250 hPa, southwest winds near 30 knots prevailed over the Hawaiian Islands. Southeast of the Hawaiian Islands to the vicinity of the depression, winds were from the southeast near 15 knots. This southeast shear prevented the system from gaining tropical storm strength.

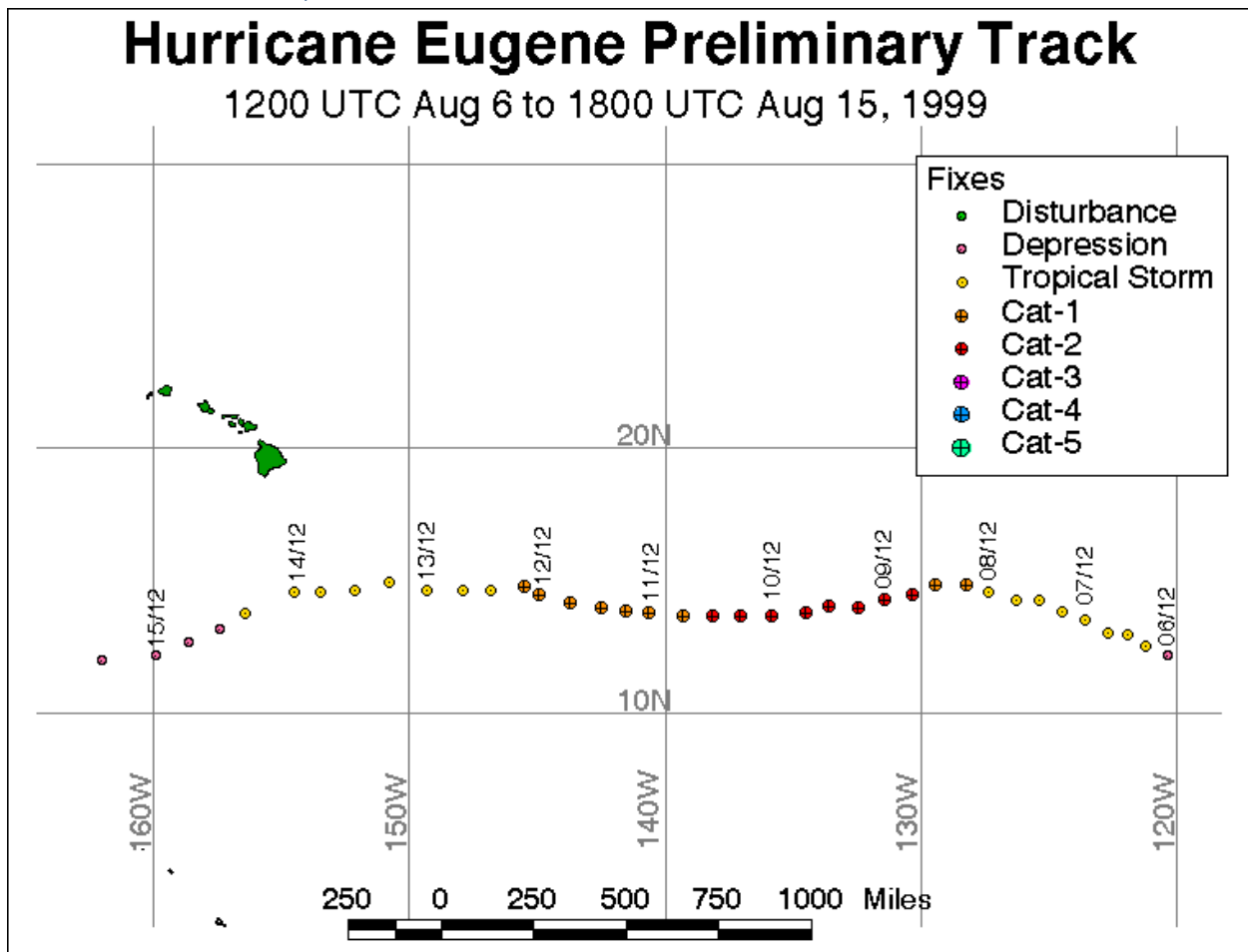
SATELLITE DATA. Tropical Depression Four-E crossed 140W with a poorly defined low level center and only minimal deep convection to the south and west of the center. As the system moved west, the deep convection dissipated southeast of the Hawaiian Islands.

The following are positions and wind values for Tropical Depression Four-E.

DATE/TIME(Z)	LATITUDE (N)	LONGITUDE (W)	MAX WINDS (KT)
07/24/1200	14.1	139.6	30
1800	14.2	141.5	30

Figure 1 on page 2 shows the track of Tropical Depression Four-E. For selected track points, the month and day are indicated at 1800Z, which is 0800 Hawaii Standard Time. For example, the number 072418 is July 24 at 1800Z.

HURRICANE EUGENE AUGUST 11-15, 1999



HISTORY. Tropical Depression Eight-E formed on August 5 approximately 1,200 miles south of Los Angeles near 12N 120W. It moved slightly north of west and became Tropical Storm Eugene on August 6 near 13N 121W. The storm intensified and became Hurricane Eugene on August 8 near 15N 128W. Maximum sustained winds peaked at 95 knots on August 9 and then began to weaken.

Eugene then moved slightly south of west and was downgraded to a tropical storm on August 12 near 15N 147W and a tropical depression on August 14 near 14N 156W.

As it entered the Central Pacific near 14N 140W, Hurricane Eugene maintained hurricane intensity for 24 hours with maximum sustained winds of 70 knots. It then gradually weakened and the final bulletins were issued on the morning of August 15 when it was located near 12N 162W or about 550 miles southeast of Johnston Atoll. Some deep convection remained as the remnants of Eugene moved into the Western Pacific.

Hurricane Eugene had little impact on weather conditions over the Hawaiian Islands. Minor surf occurred along the east and southeast shores of the Big Island of Hawaii. Reported rainfall totals over windward sections of Maui and the Big Island were near two inches for 24 hours.

SYNOPTIC SITUATION (August 11-15, 1999)

SURFACE. A moderate 1028 hPa high pressure center was located near 43N 158W with a ridge extending to the southwest through 10N 165E. Although the high pressure center weakened and the ridge moved north, there was little change in the pressure gradient over the islands. This favored a movement to the west.

Sea surface temperatures near the system were near normal between 25 and 26 degrees Celsius.

UPPER LEVELS. At 250 hPa, light south winds between 20 and 25 knots were occurring east of the Hawaiian Islands. Over the Hawaiian Islands and west through 170W, winds were from the southwest between 30 and 50 knots. As the system approached 155W, it was sheared by the southwest winds.

SATELLITE DATA. Hurricane Eugene crossed 140W with a well defined low level circulation center. A broad area of cumulus and stratocumulus clouds extended about 350 miles northwest of the center. A 60 mile wide spiral of deep convection out to 150 miles from the center. When the system was south of the Hawaiian Islands, most of the cumulus and stratocumulus had dissipated and there were a few thunderstorms out to 120 miles west of the center.

The following is the best track data for Hurricane Eugene. A best track is a subjectively smoothed path, used to represent tropical cyclone movement. Included are the maximum sustained wind values for each period.

DATE/TIME(Z)	LATITUDE (N)	LONGITUDE (W)	MAX WINDS (KT)
08/11/1200	13.9	140.4	75
1800	14.0	141.5	75
08/12/0000	14.2	142.5	75
0600	14.4	143.6	75

1200	14.6	144.6	75
1800	14.8	145.8	65
08/13/0000	14.8	146.9	55
0600	14.7	148.0	55
1200	14.7	149.3	55
1800	14.7	150.7	50
08/14/0000	14.7	152.1	45
0600	14.5	153.6	45
1200	14.1	155.0	35
1800	13.7	156.3	30
08/15/0000	13.1	157.5	30
0600	12.5	158.8	30
1200	12.2	160.3	30
1800	12.1	161.8	30

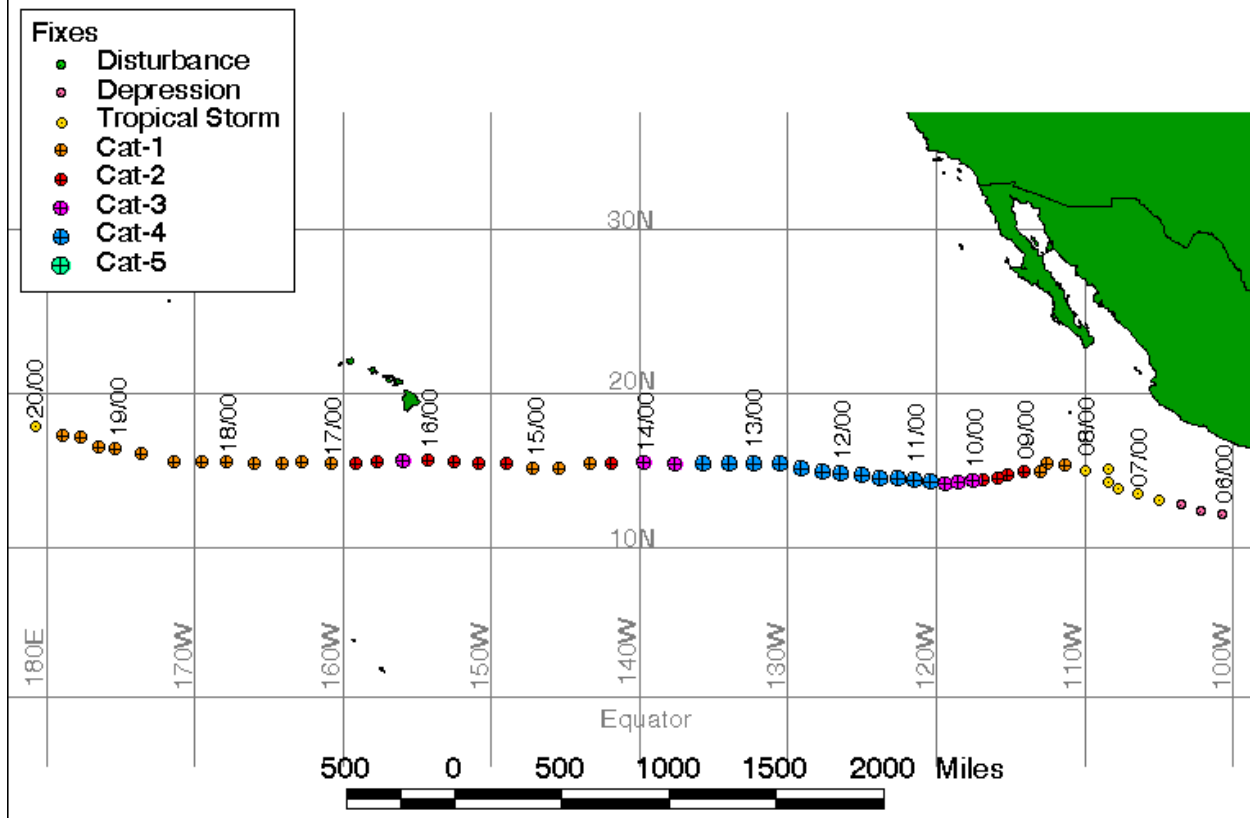
Figure 2 on page 6 shows a satellite image of Hurricane Eugene.

Figure 3 on page 7 shows the track of Hurricane Eugene. For selected track points, the month and day are indicated at 0000Z, which is 1400 Hawaii Standard Time on the previous day. For example, 081300 is August 8 at 0000 UTC.

HURRICANE DORA AUGUST 13-19, 1999

Hurricane Dora Preliminary Track

0000 UTC Aug 6 to 0000 UTC Aug 20, 1999



HISTORY. Tropical Depression Seven-E developed on August 5 about 300 miles south of Acapulco, Mexico, near 12N 101W. It moved toward the west northwest and became Tropical Storm Dora on August 6 near 13N 105W. It continued toward the west northwest and became Hurricane Dora on August 8 near 15N 112W. The system then moved toward the west and continued to intensify, reaching maximum sustained winds between 115 and 120 knots from August 10 through the morning of August 13. Hurricane Dora rapidly weakened to 75 knots when it entered the Central Pacific on the evening of August 13 near 16N 142W.

The hurricane reintensified on August 15 as the center of Dora passed about 200 miles south of South Point on the Island of Hawaii. It reached maximum sustained winds of 100 knots on August 16 and then began to weaken during the next 24 hours to near 65 knots on August 17.

Hurricane Dora then moved toward Johnston Atoll. The center passed about 80 miles to the south of the atoll on the evening of August 18. The system maintained an intensity of 65 knots until it crossed the international dateline on August 19 as a tropical storm with maximum sustained winds of 60 knots.

Hurricane Dora's impacts on Hawaii and Johnston Atoll were minor. Surf along the southeast and northeast shores of the Big Island ranged between 8 and 12 feet. Wind gusts were between 40 and 50 knots on the southern part of the Big Island at elevations near 5,000 feet. Rainfall

was mostly light. The automatic station at Johnston Atoll reported wind gusts between 35 and 40 knots for two hours.

SYNOPTIC SITUATION (August 13 - August 19, 1999)

SURFACE. A ridge of high pressure remained nearly stationary north of the Hawaiian Islands near 32N with maximum center pressures near 1026 hPa. This favored a westward movement of the system toward the west.

Sea surface temperatures along the path of Hurricane Dora were near normal at 26 degrees Celsius.

UPPER LEVELS. The upper level wind flow was light at all levels along the path of Dora east of 170W. At 250 HPa west of 170W, winds were from the southeast, resulting in an eventual turn of the system toward the west northwest.

SATELLITE DATA. Hurricane Dora had a well developed eye when it entered the Central Pacific. There were thunderstorms within 120 miles of the center in all quadrants. By August 16, the eye disappeared. On August 19 when the storm crossed the international dateline as a tropical storm, thunderstorms were within 120 miles of a line from 15N 178W through 22N 180.

The following is the best track data for Hurricane Dora. A best track is a subjectively smoothed path, used to represent tropical cyclone movement. Included are sustained wind values for each period.

DATE/TIME(Z)	LATITUDE (N)	LONGITUDE (W)	MAX WINDS (KT)
08/14/0600	15.5	141.7	75
1200	15.4	143.5	70
1800	15.3	145.4	70
08/15/0000	15.3	147.1	70
0600	15.4	149.0	90
1200	15.5	150.8	95
1800	15.6	152.5	95
08/16/0000	15.7	154.2	95
0600	15.7	155.8	100
1200	15.6	157.4	90
1800	15.5	159.1	85

08/17/0000	15.5	160.8	80
0600	15.5	162.5	75
1200	15.5	164.2	75
1800	15.5	166.0	70
08/18/0000	15.6	167.8	65
0600	15.7	169.6	65
1200	15.9	171.5	65
1800	16.1	173.3	65
08/19/0000	16.3	174.9	65
0600	16.6	176.5	65
1200	16.9	177.8	65
1800	17.3	179.2	65
08/20/0000	17.9	179.4E	60

Figure 4 on page 10 shows a satellite image of Hurricane Dora and Tropical Depression Eugene. Figure 5 on page 11 shows the track of Hurricane Dora. For selected track points, the month and day are indicated at 0000Z, which is 1400 Hawaii Standard Time on the previous day. For example, 081800 is August 18 at 0000 UTC.

VERIFICATION STATISTICS

This section contains track forecast and intensity verification statistics for Hurricanes Eugene and Dora.

The following track forecast verification statistics are for Hurricane Eugene for 12, 24, 36, 48, and 72 hours. The first number is the position error in nautical miles and the number in parentheses is the number of forecasts.

FORECASTER/MODEL	12	24	36	48	72
CPHC	41(16)	71(14)	105(12)	126(10)	192(6)
BAMD	45(14)	78(13)	106(11)	121(9)	219(6)

BAMM	41(14)	71(13)	106(11)	121(9)	183(6)
P91E	35(13)	75(12)	96(11)	112(9)	237(6)
LBAR	36(14)	73(13)	110(11)	142(9)	265(6)
GFDL	62(10)	87(10)	92(9)	109(8)	138(5)

The following intensity verification statistics are for Hurricane Eugene for 12, 24, 36, 48, and 72 hours. The first number is the intensity error in knots and the number in parentheses is the number of forecasts.

FORECASTER/MODEL	12	24	36	48	72
CPHC	5.3(16)	6.1(14)	9.2(12)	8.0(10)	20.8(6)
SHIP	8.6(14)	13.5(13)	18.6(11)	23.9(9)	35.8(6)

The following track forecast verification statistics are for Hurricane Dora for 12, 24, 36, 48, and 72 hours. The first number is the position error in nautical miles and the number in parentheses is the number of forecasts.

FORECASTER/MODEL	12	24	36	48	72
CPHC	25(22)	49(20)	68(18)	98(16)	149(12)
BAMD	30(22)	43(20)	56(18)	77(16)	154(12)
BAMM	28(22)	52(20)	79(18)	104(16)	130(12)
P91E	26(21)	41(19)	55(17)	86(15)	206(11)
LBAR	24(10)	52(10)	68(9)	102(8)	172(4)
GFDL	26(12)	87(11)	88(11)	114(10)	173(6)

The following intensity verification statistics are for Hurricane Dora for 12, 24, 36, 48, and 72 hours. The first error is the intensity error in knots and the number in parentheses is the number of forecasts.

FORECASTER/MODEL	12	24	36	48	72
CPHC	6.1(22)	5.8(20)	12.8(18)	13.8(16)	9.6(12)
SHIP	7.0(10)	15.5(10)	18.5(10)	16.0(10)	7.5(10)

The following track forecast verification statistics are the combined values for Hurricanes Eugene and Dora for 12, 24, 36, 48, and 72 hours. The first number is the position error in nautical miles and the number in parentheses is the number of forecasts.

FORECASTER/MODEL	12	24	36	48	72
CPHC	32(38)	58(34)	83(30)	109(26)	163(18)
BAMD	36(36)	57(33)	75(29)	93(25)	176(18)
BAMM	33(36)	60(33)	89(29)	110(25)	148(18)
P91E	29(34)	54(31)	71(28)	96(24)	217(17)
LBAR	31(24)	64(23)	89(20)	123(17)	228(10)
GFDL	42(22)	72(11)	90(20)	112(18)	157(11)

The following intensity verification statistics are the combined values for Hurricanes Eugene and Dora for 12, 24, 36, 48, and 72 hours. The first error is the intensity error in knots and the number in parentheses is the number of forecasts.

FORECASTER/MODEL	12	24	36	48	72
CPHC	5.8(38)	5.9(34)	11.3(30)	11.5(26)	13.3(18)
SHIP	7.9(24)	14.3(23)	18.6(21)	19.7(19)	18.1(16)

ACRONYMS that may have been used in this report.

Acronym	Full Spelling/Definition
AOR	Area of Responsibility
AVNO	Operation global forecast system model
BAMD	Deep Layer Beta Advection Model (mean layer averaged between 850 hPa and 250 hPa)
BAMM	Medium Layer Beta Advection Model (mean layer averaged between 850 hPa and 400 hPa)
BAMS	Shallow Layer Beta Advection Model (mean layer averaged between 850 hPa and 700 hPa)

CLIP	Climatology and Persistence
CPHC	Central Pacific Hurricane Center
GFDL	Geophysical Fluid Dynamics Laboratory model
hPa	Hectopascal (formerly millibar)
ITCZ	Inter-tropical Convergence Zone
JTWC	Joint Typhoon Warning Center
kts	knots
LBAR	Barotropic limited area sine transform
mb	millibars
NA	Not Available
NGPS	NOGAPS (Navy Operational Global Atmospheric Prediction System) Vortex Tracking Routine
NHC	National Hurricane Center
nm	nautical miles
P91E	Pacific Statistical Dynamic Model (adapted from NHC90 for the Eastern Pacific)
SHIFR	Statistical Hurricane Intensity Forecast
SHIP	Statistical Hurricane Intensity Prediction
SST	Sea Surface Temperature
TD	Tropical Depression
TPC	Tropical Prediction Center, Miami, FL
TUTT	Tropical Upper Tropospheric Trough
UTC	Universal Time Coordinated
WFO	Weather Forecast Office

TRACK MAPS

The above maps show tracks of tropical cyclones that crossed into or formed in the Central Pacific. The strength of the storm (HURRICANE, TYPHOON, DEPRESSION) is the maximum strength, regardless of location in the Pacific. The maximum sustained winds (MAX SUST WINDS) occurred: (1) in the Eastern Pacific before crossing into the Central Pacific or (2) in the Central Pacific for systems that formed in the Central Pacific. For each track point, the top five or six numbers give the month, day, and time (Z) and the bottom number indicates the maximum sustained speed in knots.

For example, the numbers 71218 and 25 define the following: July 12 at 1800Z and sustained winds of 25 knots.