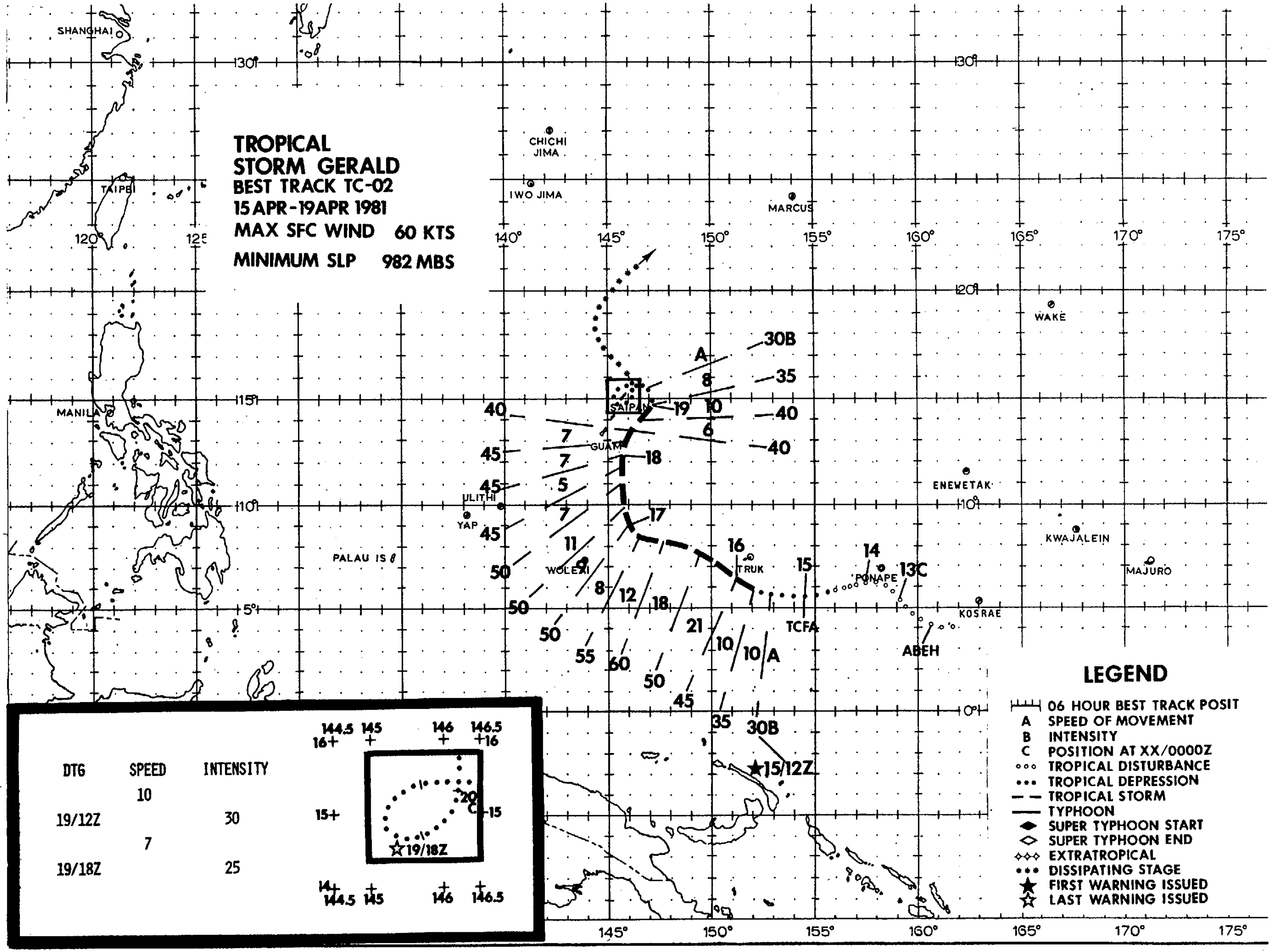
TROPICAL
STORM GERALD
BEST TRACK TC-02
15 APR-19APR 1981
MAX SFC WIND 60 KTS
MINIMUM SLP 982 MBS
SHANGHAI
TAIPEI
MANILA
PALAU IS
YAP
ULITHI
WOLEAI
GUAM
SAIPAN
CHICHI
JIMA
IWO JIMA
MARCUS
WAKE
ENEWETAK
KWAJALEIN
MAJURO
TRUK
PONAPE
KOSRAE
TCFA
ABEH
30B
35
40
40
A
8
19
10
6
18
17
16
15
14
13C
7
7
5
7
11
8
12
18
21
10
10 A
40
45
45
45
50
50
50
55
60
50
45
35
30B
★15/12Z
DTG
SPEED
INTENSITY
10
19/12Z
30
7
19/18Z
25
144.5
145
146
146.5
16
15
14
20
C
☆19/18Z
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
30°
20°
15°
10°
5°
0°
120°
125
140°
145°
150°
155°
160°
165°
170°
175°

A developing mid- to uppper-level circulation southeast of Ponape became evident on satellite imagery on 12 April. At this time, the cirrus outflow pattern was extensive and the cloud system displayed good curvature. A surface circulation, however, was not apparent until the 15th following further significant improvement of the satellite signature. A Tropical Cyclone Formation Alert was issued, vice a warning, at 150000Z because island stations in the vicinity of the circulation reported that the minimum sea-level pressure was a still relatively high 1009 mb. Eight hours later a reconnaissance aircraft observed a very tight surface circulation with maximum winds of 30 kt (15m/sec) and a minimum sea-level pressure of 1000 mb. Based on this new information, the first warning on Tropical Depression 02 was issued at 151200Z.

Several factors influenced JTWC to forecast that Gerald would reach typhoon strength. First, upper-level wind analyses showed an extensive upper-level outflow pattern assocated with Gerald. An anticyclone was located near the system's center and outflow was unrestricted and extended well into the Southern Hemisphere. Second, low-level cross-equatorial inflow became fully established by the 15th. Third, reconnaissance aircraft reported 700-mb center temperatures of 21°C. This observation was 11° higher than the environment and higher than temperatures normally observed in a tropical cyclone at Gerald's stage of development. The high amount of latent heat was being released, which usually indicates impending intensification.

The reason that Gerald did not develop as forecast appears to be rooted in a radical change which occurred in the upper-level flow pattern. As previously mentioned, Gerald began with a well-defined upper-level anticyclone that afforded excellent outflow channels in all directions. Steady intensification did occur until 170000Z when a synoptic-scale upper-level anticyclone began developing east of Gerald near 10N 155E. This anticyclone continued to intensify and increase in areal extent as it shifted slowly to the southeast. Gerald's outflow channel to the east became restricted as the south and southeasterly shearing winds aloft increased in strength. As a result, Gerald began weakening as he passed about 70 nm (130 km) to the east of Guam at 180900Z. The Island received between 3 - 5 inches of rain. Andersen Air Force Base reported a minimum sea-level pressure of 1005.7 mb and a maximum wind of 49 kt (25 m/sec) in gusts.

After passing Guam, Gerald's convection continued to shear off to the northeast as the exposed low-level circulation center (Fig. 3-02-1) meandered northwestward where it was eventually absorbed by an extratropical trough moving eastward across the Pacific.

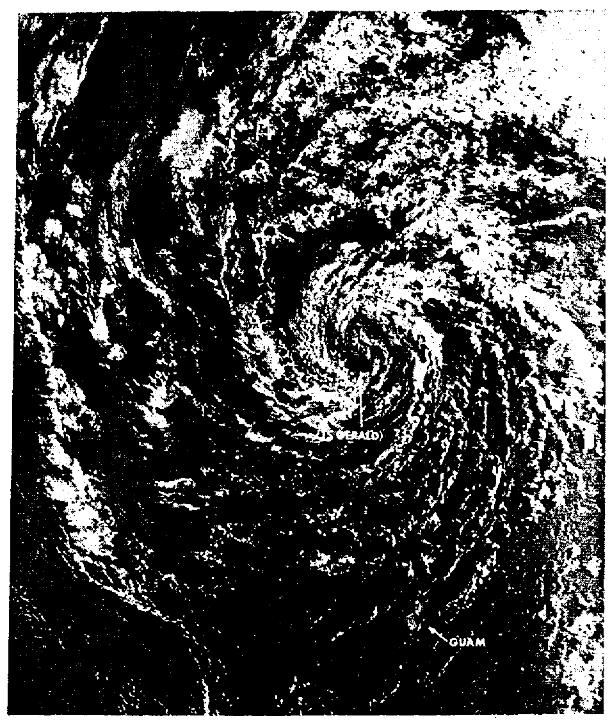


*FIGURE 3-02-1. Tropical Storm Gerald as an exposed low-level circulation center north of Guam, 20 April 1981, 2228Z. (NOAA 6 visual imagery)*

JTWC's better than average forecasting of Gerald's track was due in no small part to the extensive 500-mb synoptic track data provided by the 54th Weather Reconnaissance Squadron. Figures 3-02-2 through 3-03-5 show the evolution that occurred in the mid-level steering flow as indicated by aircraft data.

Available synoptic data, although sparse, suggested that the subtropical mid-tropospheric ridge was weak north of the developing Gerald. Thus, the initial forecast track called for recurvature well to the west of Guam. Aircraft data on the 15th defined a small anticyclone north of Guam (Fig. 3-02-2) which supported the subsequent forecast of passage southwest of Guam before recurvature. Because this was the first time this cell had been analyzed, there was no way to determine if the cell was moving or quasi-stationary. The 500-mb data 24 hours later (Fig. 3-02-3) showed that the major break in the ridge still existed to the west of Guam; thus, recurva-

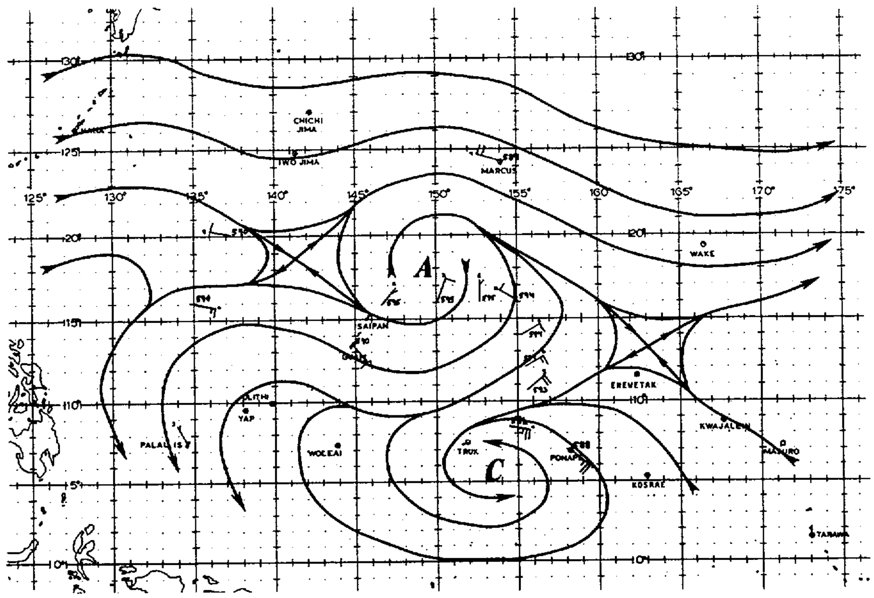


FIGURE 3-02-2. The 151200Z April 1981 500 mb streamline analysis. Wind data are a combination of RAOBS, AIREPS, and satellite derived winds ( ←—\ ). Wind speeds are in knots.

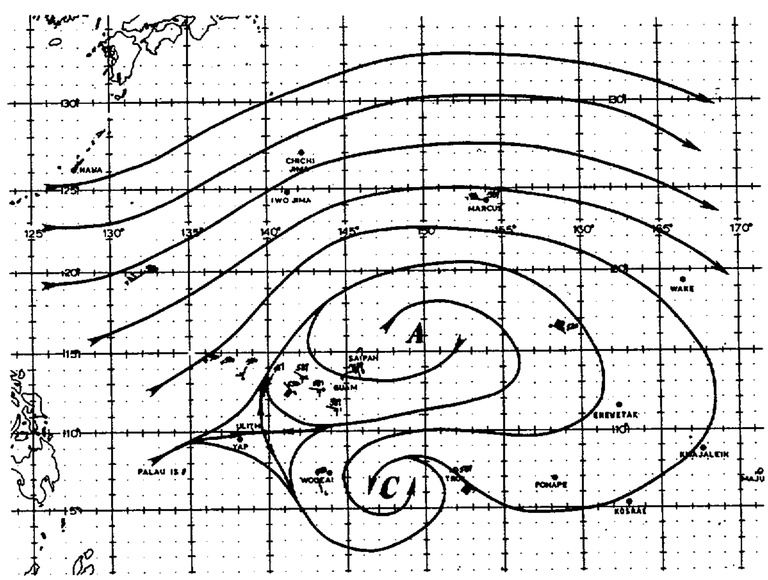


FIGURE 3-02-3. The 161200Z April 1981 500-mb streamline analysis. Wind data are a combination of RAOBS, AIREPS, and satellite derived winds [ ←—\ ]. Wind speeds are in knots.

ture west of Guam still appeared to be the best forecast. By 171200Z, however, it became apparent that the anticyclone north of Guam had shifted farther to the east, allowing the break in the ridge to re-orient itself north of Guam (Fig. 3-02-4). At that time, the forecast track was altered to call for passage east of Guam, and, indeed, post-analysis shows that Gerald had actually begun to follow a more northward track about 12 hours earlier. The mid-level analysis at 181200Z, which combines both 400 and 500-mb aircraft data, shows Gerald's mid-level circulation being absorbed by the long wave trough (Fig. 3-02-5).

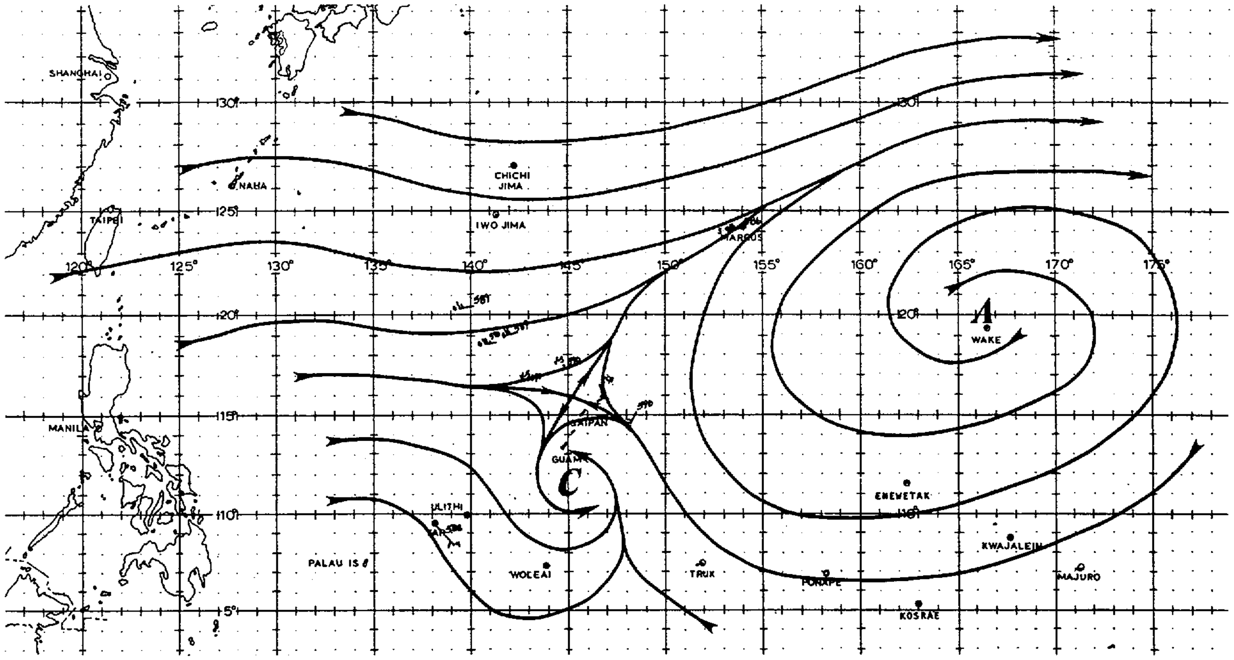


*FIGURE 3-02-4. The 171200Z April 1981 500-mb streamline analysis. Wind data are a combination of RAOBS, AIREPS, and satellite derived winds (◄——). Wind speeds are in knots.*

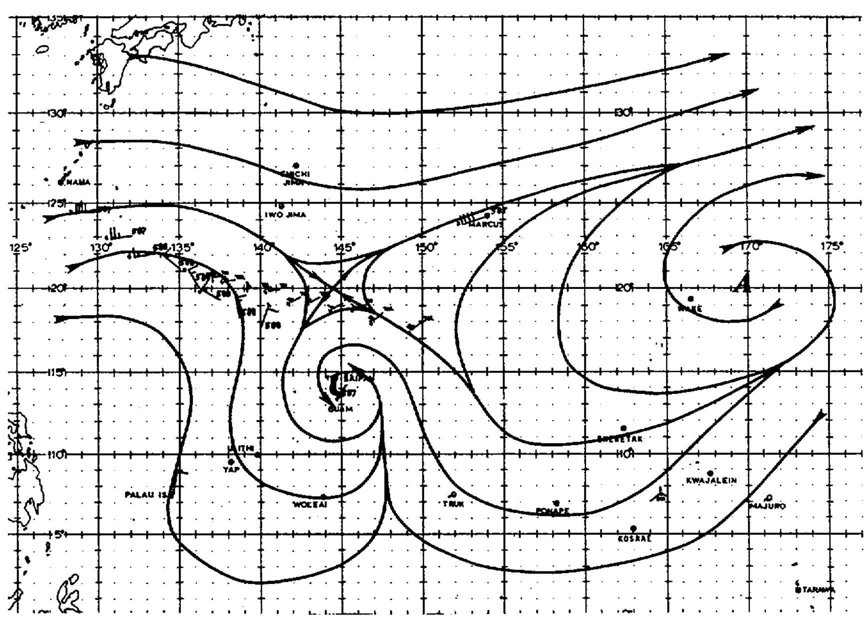


*FIGURE 3-02-5. The 181200Z April 1981 mid-level streamline analysis based on 400- and 500-mb aircraft reconnaissance data.*