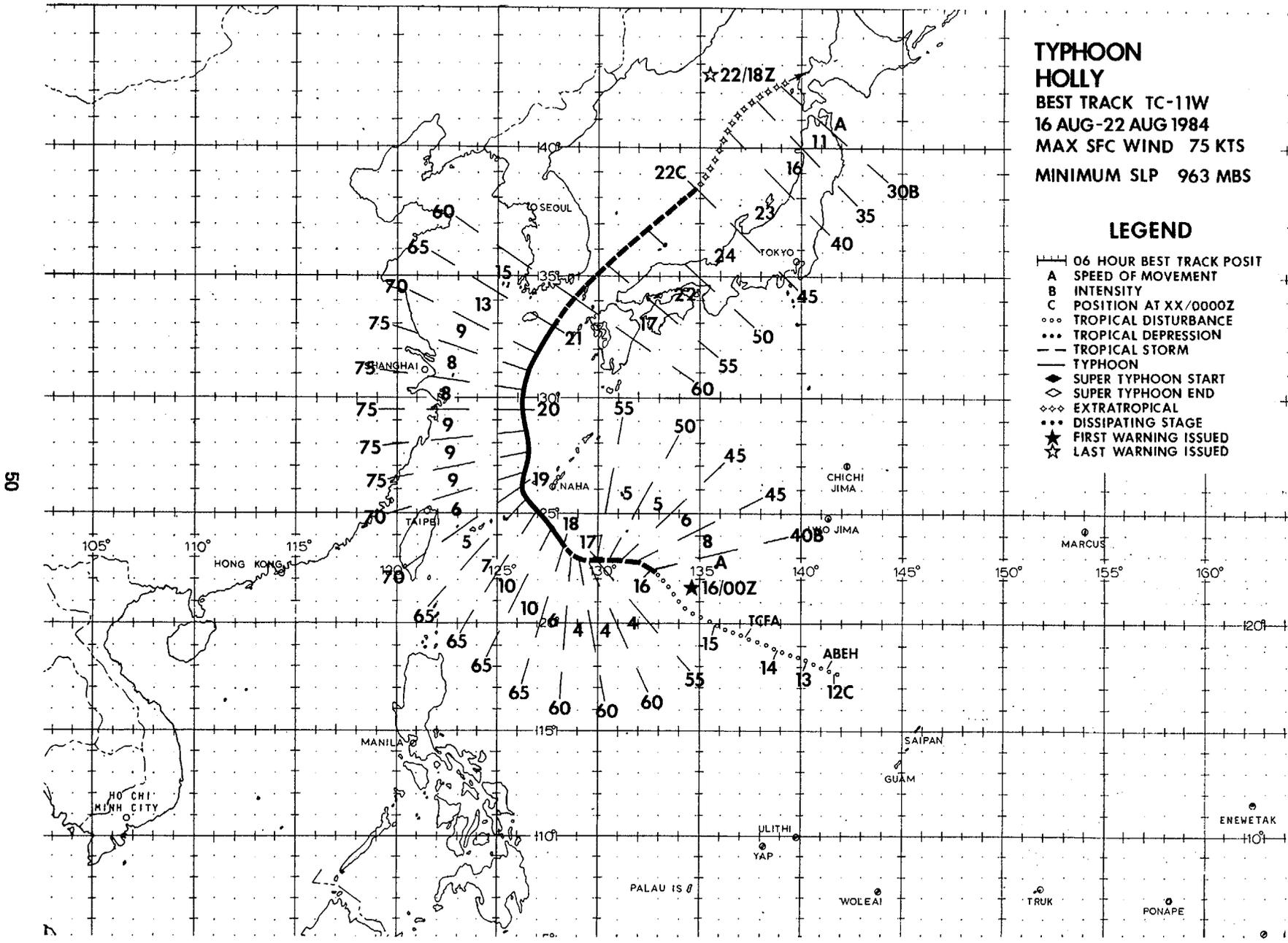


**TYPHOON  
HOLLY**  
 BEST TRACK TC-11W  
 16 AUG-22 AUG 1984  
 MAX SFC WIND 75 KTS  
 MINIMUM SLP 963 MBS

**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



TYPHOON HOLLY (11W)

Typhoon Holly formed in the eastern extension of the monsoon trough at the same time that Tropical Storm Gerald was forming in the South China Sea. It was the fourth significant tropical cyclone to develop in the trough in less than two weeks. Holly was unusual in that it never was, by definition, a tropical depression. Because it evolved from a very active monsoon trough, Holly was already at tropical storm strength when it finally attained a closed circulation. Despite only reaching a maximum intensity of 75 kt (39 m/s), Holly significantly affected much of the western North Pacific due to its large wind field.

Even as Tropical Depression 09W was transiting the Luzon Straits, synoptic data indicated that a very active trough with poorly organized convection persisted to the east. At 131200Z the monsoon trough extended from the weakening Tropical Depression 09W eastward to just northwest of Guam. By 141200Z the eastern end of the trough had moved northwest and become sharper. Synoptic data indicated the trough had deepened with an MSLP near 1000 mb. Numerous 20 to 35 kt (10 to 18 m/s) ship reports existed south of the trough axis in the active southwest monsoon. Organization of the convection over the trough also improved during this period, and suggested that a surface circulation was forming. These developments prompted the issuance of the first of two TCFAs at 141515Z.

The first aircraft reconnaissance mission into the disturbance at 0000Z on the

15th found only a sharp trough with 25 kt (13 m/s) surface winds and an MSLP of 998 mb. At 151200Z synoptic data indicated that the southwest monsoon along with a tight pressure gradient between the monsoon trough and the subtropical ridge to the northeast, were now generating gale force winds both north and south of the trough axis. This occurred before any closed circulation was analyzed. These areas of gale force winds were contained in a NAVOCEANCOMCEN Guam (WWPN PGTW) extratropical wind warning bulletin.

The second aircraft investigative mission into the disturbance closed-off a circulation center at 160225Z and found that the MSLP had decreased to 992 mb. Gale force winds were observed within two degrees of the center. The first warning, valid at 160000Z, was issued shortly thereafter with Holly at tropical storm strength.

Determination of the initial intensities of Holly and its associated 30 kt (15 m/s) wind radii were difficult since the gale force monsoon flow extended for hundreds of miles to the south and east of the storm. At first, the monsoon flow was included as a gale area in the NAVOCEANCOMCEN Guam extratropical wind warnings. However, as Holly developed, it took the monsoon flow into its circulation and subsequently became a very large storm. Figure 3-11-1, the 180600Z surface analysis, shows the very large area influenced by Holly. Aircraft and satellite data also indicated that Holly was abnormally large.

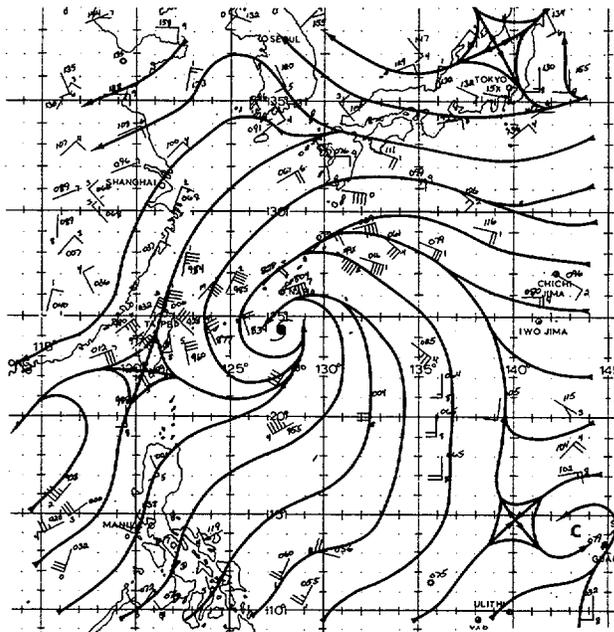


Figure 3-11-1. Surface analysis at 180600Z showing the large circulation of Typhoon Holly. Holly was still consolidating the monsoonal flow into its circulation at this time.

Figure 3-11-2 shows the wind field associated with Holly as reported by reconnaissance aircraft on 18 August. This flight was representative of the data obtained on many of the missions while Holly was a typhoon. The center was characterized by a large area of lighter winds. It was not until the aircraft was more than 60 nm (111 km) from the center that it encountered winds above 50 kt (26 m/s). Generally throughout the life of Holly, the highest winds were found in a band 60 to 150 nm (111 to 278 km) from the center. Within this band, the strongest winds were usually observed in the northern and eastern portions of the storm. The winds observed at Kadena AB, Okinawa confirmed the aircraft reports. The strongest winds observed at Kadena were

in two different periods: from 171300Z to 180900Z and from 190200Z to 191700Z when gusts above 50 kt (26 m/s) were reported. Lighter winds, corresponding to the passage of the huge center, were reported between these periods. The maximum sustained wind reported at Kadena was 50 kt (26 m/s) at 191355Z with a peak gust to 72 kt (37 m/s) at 190850Z. Fortunately, despite the strong winds and the 16.76 in (425 mm) of rain, there were no deaths or serious damage reported on Kadena AB. However, some 16,000 air and ferry travelers were stranded on the island during Holly's passage. Figure 3-11-3 shows Holly as it passed west of Okinawa. Notice the very large area covered by Holly's circulation.

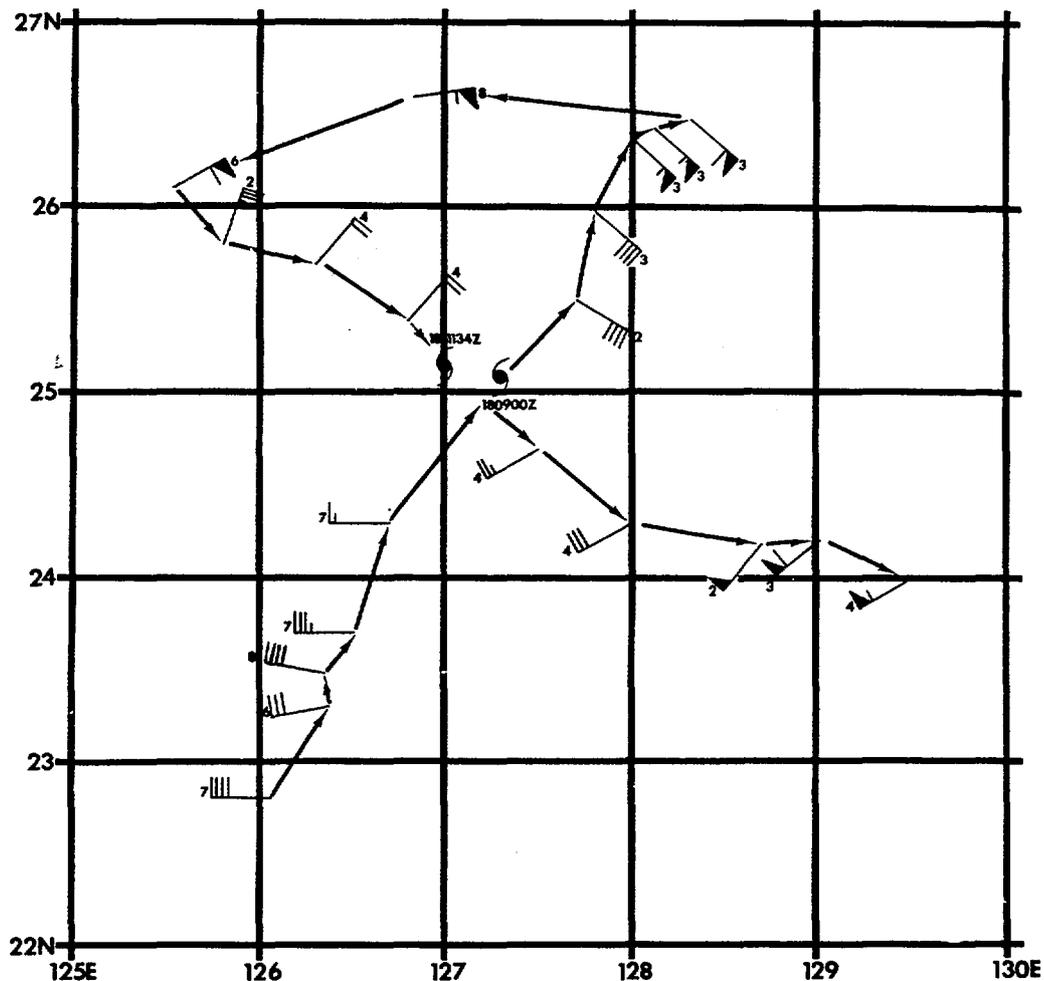


Figure 3-11-2. Plot of aircraft reconnaissance data from the seventh mission into Typhoon Holly. Holly's center was fixed at 180900Z and 181134Z August. Wind barbs are the measured 700 mb winds. The tens digit in the wind direction is plotted with the wind barb.

Holly initially moved to the west under the influence of the subtropical ridge, reaching typhoon intensity at 180000Z. At that time Holly had turned to the northwest, a course it maintained for almost 30 hours. After passing west of Okinawa, Holly turned to the north as it moved around the western periphery of the weakening subtropical ridge. Holly plodded to the north for the next twenty-four hours with no significant intensity changes. At this point the westerlies began to influence the storm. Holly was steered to the northeast and began to accelerate. Holly's forward speed peaked at 24 kt (49 km/hr) just prior to its transition to an extratropical low.

As Holly passed through the Korean Strait, it inflicted considerable damage on the Korean peninsula and the Japanese island of Kyushu. News reports indicated at least one person killed, nine missing and eleven injured. Property damage was estimated initially at one million dollars. Heavy rainfall accompanied the storm. Miyazake (WMO 47830) on Kyushu recorded 15 inches (381 mm) of rain during a twenty-four hour

period. Extensive flooding and landslides were also reported.

Holly weakened as it transited the Korean Strait due to interaction with the rugged terrain. As Holly entered the Sea of Japan, it began transitioning to an extratropical system. Figure 3-11-4 shows Holly shortly after completing the extratropical transition. What little convection remains is associated with the front while the exposed low-level circulation is composed of stable stratocumulus clouds. The final warning was issued at 221800Z as Holly neared the island of Hokkaido.

Overall, the JTWC forecasts on Typhoon Holly provided good decision assistance to JTWC's customers. Kadena AB was provided the time needed to evacuate its planes, and South Korea and Japan had sufficient warning time to prepare and thus minimize damage. Even though Holly was not one of the strongest storms of the season, it definitely had a major impact on much of the northwest Pacific.



Figure 3-11-3. Typhoon Holly passing just west of Okinawa. Notice the large area covered by Holly's circulation (182303Z August NOAA visual imagery).



Figure 3-11-4. Holly after completing its extratropical transition. The low-level center is surrounded by stable stratocumulus clouds. What little convection remains is located southeast of the center and is due to the frontal system and orographic effects (220526Z August NOAA visual imagery).