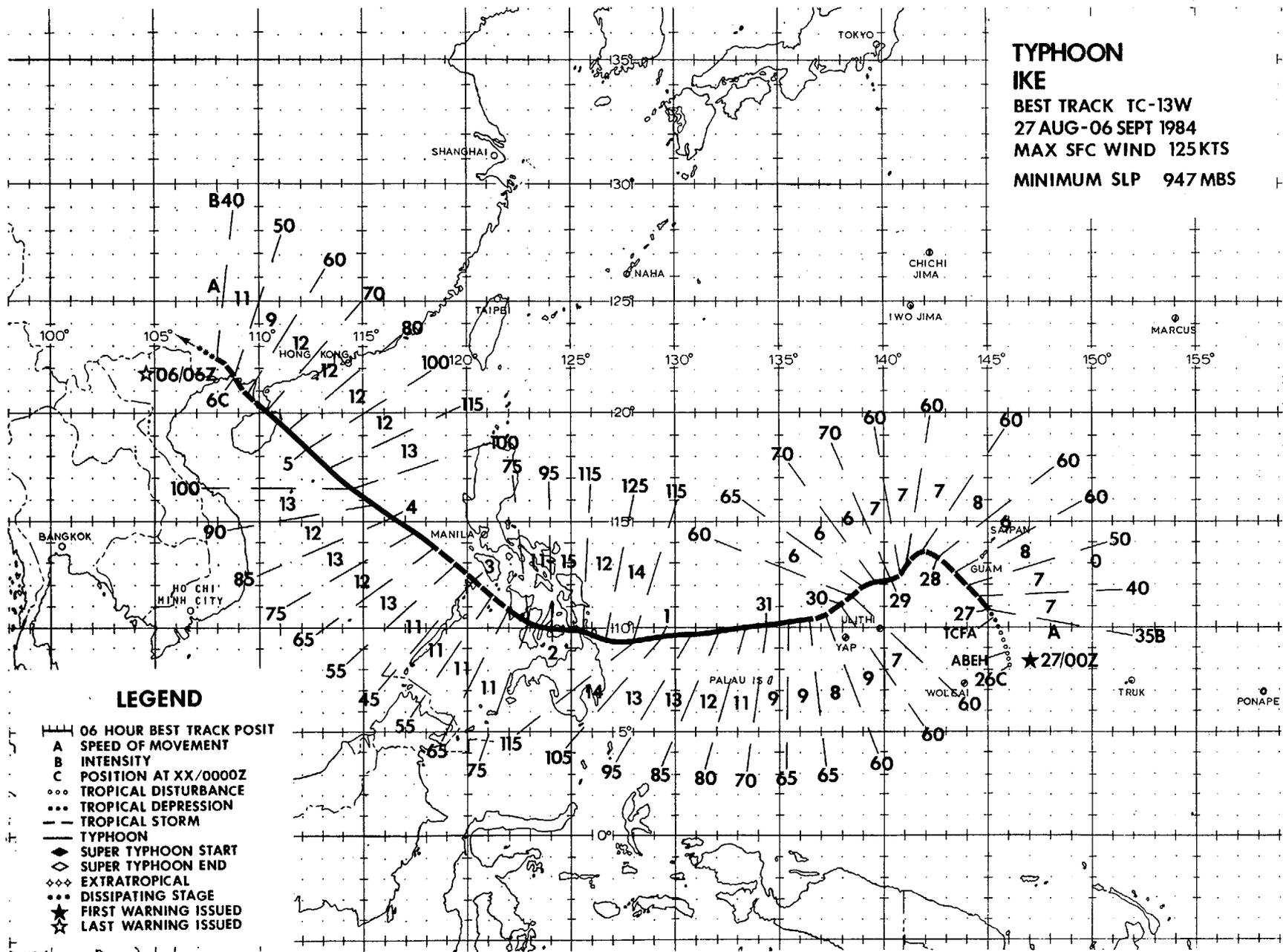


**TYPHOON  
IKE**  
BEST TRACK TC-13W  
27 AUG-06 SEPT 1984  
MAX SFC WIND 125KTS  
MINIMUM SLP 947 MBS

58



## TYPHOON IKE (13W)

The deadliest typhoon to strike the Philippines this century began innocently enough as a weak disturbance on the eastern end of the monsoon trough. After passing Guam as a developing tropical storm, Ike turned to the west-southwest and gradually intensified. Four days later, Ike attained an intensity of 125 kt (64 m/s) and crossed the central Philippines causing extensive damage and over 2000 deaths. After wrecking havoc on the Philippines, a weakened Ike moved into the South China Sea where it reintensified to 115 kt (59 m/s) before making landfall and finally dissipating over mainland China.

As early as 21 August, a weak surface circulation was being analyzed southeast of Guam on the eastern extension of the monsoon trough. From the 21st through the 25th, various Trust Territory of the Pacific Islands reporting stations and ship observations indicated that a weak 1009 mb low persisted in this area. The lack of development of this circulation during this period was attributed to the strong winds aloft from the same anticyclone that sheared Tropical Depression 12W.

Late on the 25th the upper-level shearing began to decrease. This resulted in a rapid increase in the convection over the low-level circulation center. By 260000Z the disturbance, which was to develop into Ike, began to show continuity. Synoptic data at 261200Z indicated the disturbance was intensifying with 20 to 35 kt (10 to 18 m/s) winds being reported on the southern periphery of the circulation center. The MSLP of the disturbance was estimated to be near 1006 mb.

At 2100Z on the 26th, a TCFA was issued based on the earlier mentioned synoptic reports and satellite imagery which showed rapid development of a compact circulation (Figure 3-13-1). Due to the persistent improvement in organization and the proximity of the disturbance to Guam, the first warning on Ike was issued a few hours later at 270000Z.

The initial forecast track called for Ike to move to the northwest. This forecast was based on persistence and the One-Way Interactive Tropical Cyclone Model (OTCM), the best forecast aid currently available to the Joint Typhoon Warning Center. Based on the location of the system and the forecast track, Guam was placed in Condition of Readiness III at 270530Z. This was the first time since 1 December 1982 that Guam had been in other than Condition of Readiness IV. (At that time Typhoon Pamela was approaching from the east.)

The first aircraft reconnaissance flight into Ike fixed the center at 270510Z approximately 120 nm (222 km) south of Guam with an MSLP of 997 mb and estimated the maximum surface winds at 35 kt (18 m/s). Ike continued moving to the northwest at a speed of 7 to 9 kt (13 to 17 km/hr) during the next 24 hours and intensified. The storm remained compact as it passed 90 nm (167 km) southwest of Guam. At its closest point of approach to Guam, Ike supported winds of 50 to 60 kt (26 to 31 m/s) but due to the compact circulation, Guam suffered no ill effects from the storm. The Naval Oceanography Command Center (NAVOCEANCOMCEN) on Nimitz Hill recorded only 15 kt (8 m/s) sustained winds with a peak gust to 21 kt (11 m/s) during Ike's passage. Guam returned to Condition of Readiness IV at 272130Z based on the 271800Z warning position and forecast track.

After passing to the southwest of Guam, Ike continued tracking to the northwest for the next 12 hours. At approximately 0600Z on the 28th, Ike reached the northern most latitude it would attain in the Philippine Sea. At that time Ike was located 160 nm (296 km) due west of Guam. For the next four days Ike would track towards the Philippines on a west-southwest course.



Figure 3-13-1. Early morning picture of Ike at the time the TCFA was issued. A developing upper-level anticyclone is providing good outflow channels to the south and west (262131Z August NOAA visual imagery).

This change in track was due to the effects of the subtropical ridge south of Japan. From the 26th to the 28th, this ridge was orientated from east to west. However, as Tropical Storm June (which developed over the western Philippine Sea on 28 August) moved westward, the ridge built south in June's wake and took on a more north-south orientation. This forced Ike on a generally west-southwest course until it neared the central Philippines. Between 271800Z and 281800Z, Ike did not increase in intensity due to strong shearing of the convection from the north.

Late on the 28th, the shearing decreased slightly which allowed Ike to intensify to typhoon strength. During this intensification the Atkinson and Holliday (1977) pressure-wind relationship did not hold. For example, at 282341Z aircraft reconnaissance reported surface and flight level winds of 75 kt (39 m/s), yet the MSLP was only 991 mb. This would normally be expected to support winds of 45 kt (23 m/s), some 30 kt (15 m/s) less than what was being observed. After moving almost due west for 12 hours, Ike again turned to the southwest. During this time Ike weakened to below typhoon force due to the persistent strong shearing aloft. However, this weakening was to be temporary.

As Ike turned more to the west on the 30th, the upper-level anticyclone over Ike redeveloped and the weakening trend ceased. By 301200Z Ike had regained typhoon intensity. During this second intensification

period the pressure-wind relationships were in better agreement. At 302310Z aircraft reconnaissance found the MSLP had decreased to 971 mb and reported 700 mb flight level winds of 65 kt (33 m/s). This was in much better agreement with the 70 kt (36 m/s) winds expected by Atkinson and Holliday (1977). During this second intensification, Ike's circulation became larger - more typical of a WESTPAC typhoon.

For the next two days Ike tracked toward the central Philippines at an average speed of 12 kt (22 km/hr) and doubled in intensity. Figure 3-13-2 shows Ike as it neared the Philippines. On the 1st of September just prior to hitting the Philippines, the last aircraft reconnaissance flight was made. The lowest MSLP found was 947 mb at 010845Z and 700 mb flight level winds of 117 kt (60 m/s) were measured in the eyewall of a 25 nm (46 km) circular eye. The maximum surface winds were estimated at 120 to 130 kt (62 to 67 m/s).

For the next 30 hours Ike cut a path of death and destruction across the central Philippine Islands that is unequalled in recent history (Figure 3-13-3). In the wake of its path, Ike left a reported 1026 people dead, with 1147 people missing and presumed dead. Published figures for the number of people left homeless in the central Philippines range from 200,000 to 480,000. The worst hit region was the Surigao del Norte Province of Northern Mindanao where approximately 1000 people died (Figure 3-13-4).

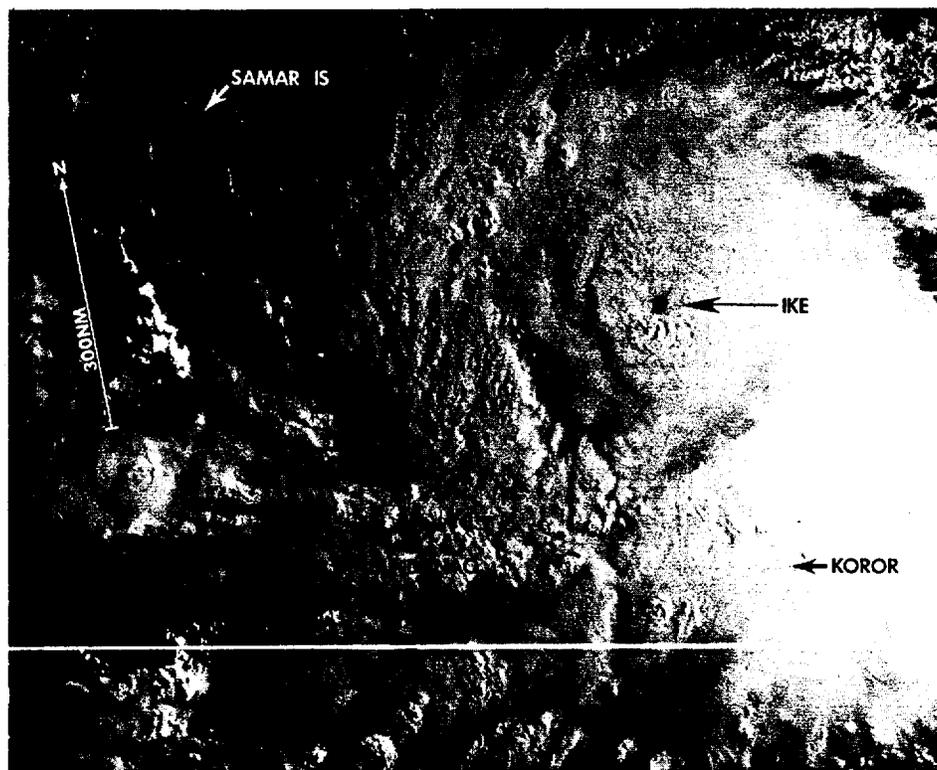


Figure 3-13-2. Typhoon Ike intensifying as it nears the Philippines. At this time Ike was supporting winds of about 105 kt (54 m/s) (312252Z August NOAA visual imagery).

Ike tracked to the west-northwest and then to the northwest at an average speed of 11 kt (20 km/hr) as it crossed the Philippines and weakened. At 0000Z on the 3rd of September Ike had weakened to 45 kt (23 m/s). Ike quickly reintensified as it moved into the South China Sea attaining typhoon intensity by 031200Z. Aircraft reconnaissance penetrating the 30 nm (56 km) wide eye at 030843Z found 65 kt (33 m/s) winds at the surface and 68 kt (35 m/s) winds at 700 mb. Ike continued to track steadily to the northwest at 12 to 13 kt (22 to 24 km/hr) reaching an intensity of 115 kt (59 m/s) at 041800Z. Ike gradually lost intensity from this point on, due to the proximity of land restricting the inflow, and shearing from a trough passing to the north.

Ike transited across Hainan Island on 5 September still packing winds of 70 to 80 kt (36 to 41 m/s). Shortly after 0000Z on the 6th, Ike crossed the coast of mainland China, as a tropical storm, approximately 60 nm (111 km) south-southeast of Nan-Ning (WMO 59431). News reports indicate Ike was responsible for at least 13 deaths in China. Extensive flooding and crop damage were also reported as Ike moved inland and dissipated.

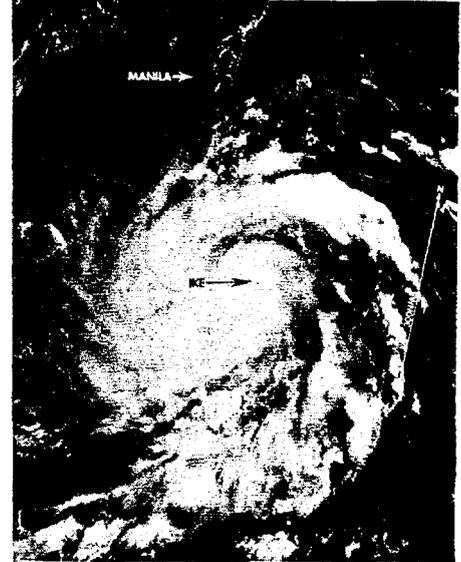


Figure 3-13-3. Ike as it crossed the central Philippines. At this time Ike was supporting winds of about 90 kt (46 m/s) (020141Z September DMSF visual imagery).



Figure 3-13-4. Aerial reconnaissance photo of a town in Northern Mindanao showing some of the damage caused by Typhoon Ike. (Photo provided by CDR M. McCallister, Naval Oceanography Command Facility, Cubi Point).