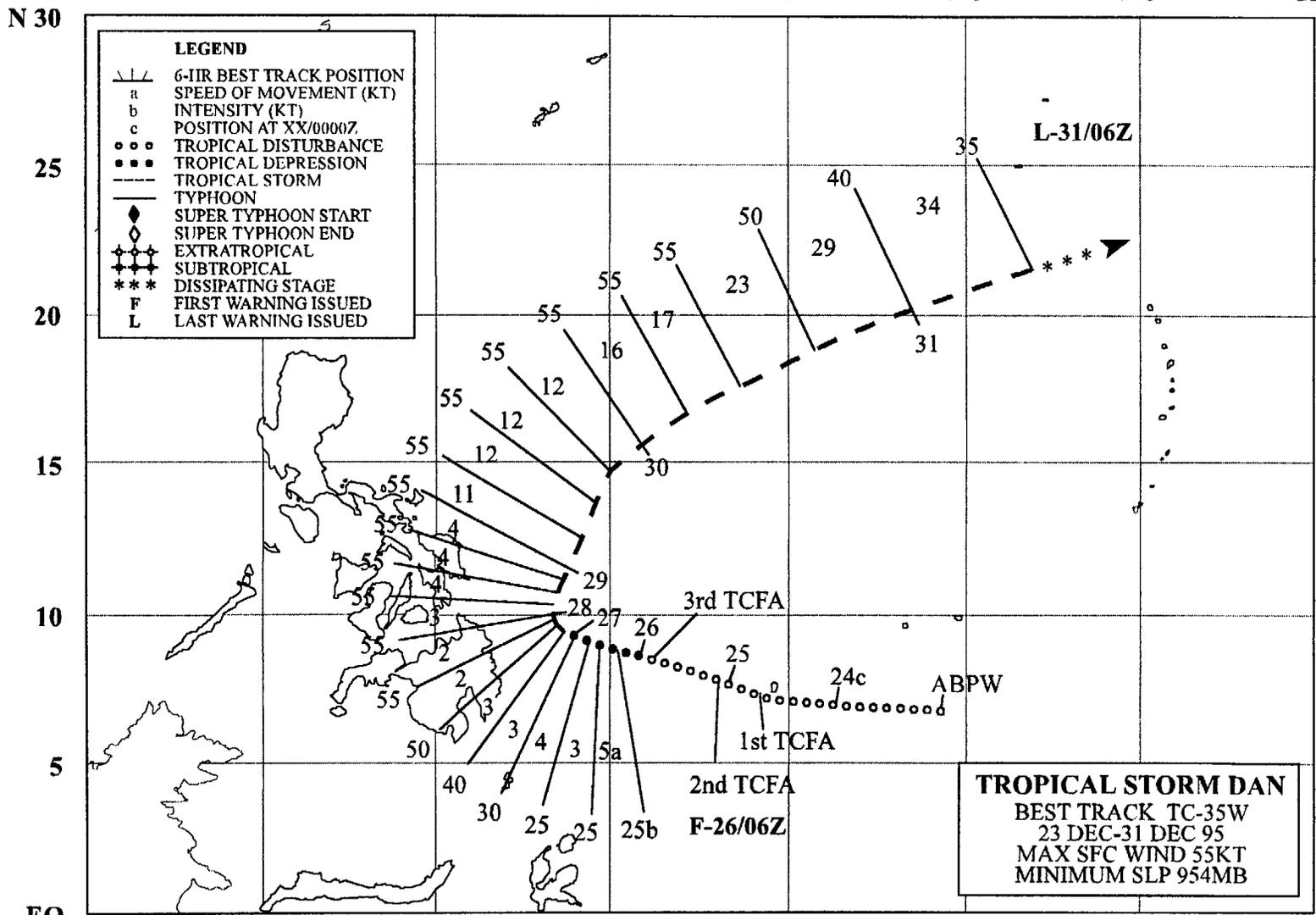


E 115 120 125 130 135 140 145 150 E



LEGEND

- /—/— 6-HR BEST TRACK POSITION
- r SPEED OF MOVEMENT (KT)
- b INTENSITY (KT)
- c POSITION AT XX/0000Z
- ○ ○ TROPICAL DISTURBANCE
- ● ● TROPICAL DEPRESSION
- - - TROPICAL STORM
- TYPHOON
- ◆ SUPER TYPHOON START
- ◇ SUPER TYPHOON END
- ⊕ ⊕ ⊕ EXTRATROPICAL
- ⊗ ⊗ ⊗ SUBTROPICAL
- *** DISSIPATING STAGE
- F FIRST WARNING ISSUED
- L LAST WARNING ISSUED

TROPICAL STORM DAN
 BEST TRACK TC-35W
 23 DEC-31 DEC 95
 MAX SFC WIND 55KT
 MINIMUM SLP 954MB

194

EQ

TROPICAL STORM DAN (35W)

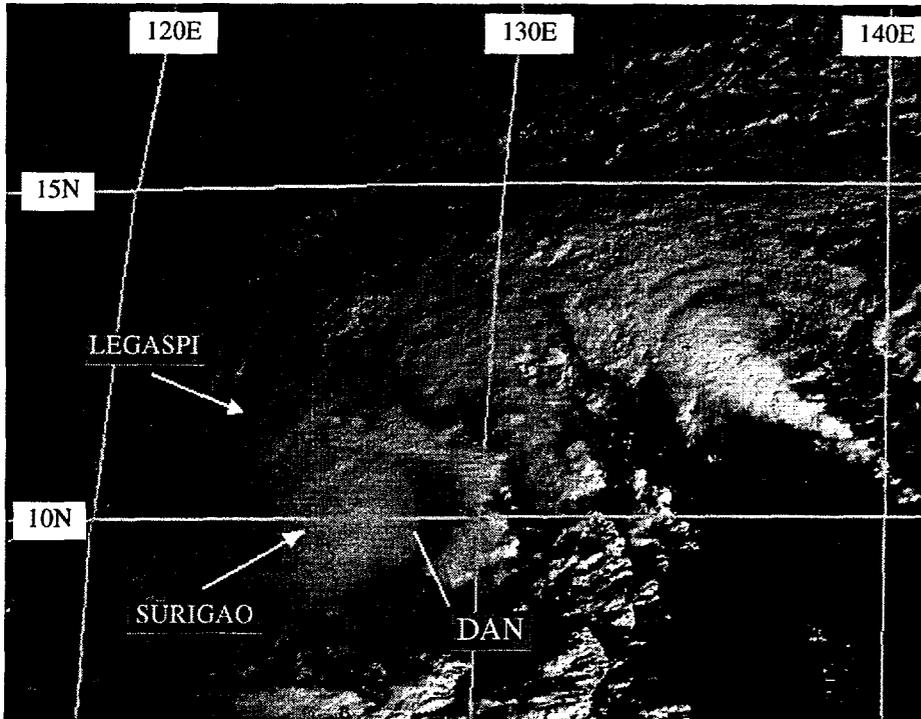


Figure 3-35-1 Tropical Storm Dan at peak intensity of 55 kt (28 m/sec). The low-level circulation center, located on the east side of the CDO, is obscured by dense cirrus (272331Z December visible GMS imagery).

I. HIGHLIGHTS

Dan was the last significant tropical cyclone to occur in the western North Pacific during 1995. Like many other tropical cyclones during 1995, Dan did not develop until it had tracked westward to near the Philippines. Tracking Dan by satellite was difficult because of its large cirrus canopy, obscuring its low-level circulation center. Microwave imagery from a DMSP satellite proved to be important in determining the location and structure of Dan.

II. TRACK AND INTENSITY

During December 1995, strong tradewinds dominated the tropics of the western North Pacific. A persistent tradewind convergence zone developed along 5°N, extending from 170°W to 140°E. Several tropical disturbances formed in the convergence zone and moved across the southern islands of Micronesia. These disturbances, coupled with the penetration of shear lines into low latitudes, produced heavier than normal rainfall across Guam and the Northern Mariana Islands. One of these disturbances, mentioned on the 230600Z December Significant Tropical Weather Advisory, became Tropical Storm Dan. The disturbance moved toward the west, but similar to the evolution of many other tropical cyclones during 1995 remained poorly organized until it moved west of 130°E. Between 241300Z and 260000Z, three Tropical Cyclone Formation Alerts were issued. On 26 December, the amount and organization of deep convection improved, prompting the JTWC to issue the first warning on Tropical Depression 35W (TD 35W), valid at 260600Z. With the development of persistent central deep convection, and extensive bands of deep convection to its north and east, satellite intensity estimates increased, and TD 35W was upgraded to Tropical Storm Dan on the 270600Z warning. Dan reached its peak intensity of 55 kt (28 m/sec) at 271800Z (Figure 3-35-1). At this time, Dan turned toward the north and

maintained its 55 kt (28 m/sec) intensity for the next 60 hours (271800Z to 301200Z). Early on 30 December, Dan began to accelerate toward the northeast. The final warning was issued on Dan, valid at 310600Z, when the system transitioned into an extratropical low and was moving to the northeast in excess of 30 kt (55 km/hr).

III. DISCUSSION

a. Large positioning errors

Tracking Dan by satellite was difficult because of its large central dense overcast (CDO), which obscured the low-level circulation center. Dan's low-level circulation center was sheared to the east of the center of its large cirrus canopy, but the amount of shear was not easily determined until the night of 28 December when microwave imagery (Figure 3-35-2) showed the large extent of the shear. The difference between the low-level circulation center inferred from infrared satellite imagery and that revealed beneath the cirrus canopy by microwave imagery at nearly the same time was over 100 nm (185 km). Average fix errors were over 74 nm (137 km) as compared to 29 nm (54 km) for all of 1995. Most of the fixes with large errors were significantly west of the actual location of the low-level circulation center. The large errors of the fixes led to a large average initial position error of 44 nm (82 km), with individual errors as high as 95 nm (176 km). Also, the large positioning errors resulted in larger than normal forecast track errors, especially for forecast periods less than 36 hours.

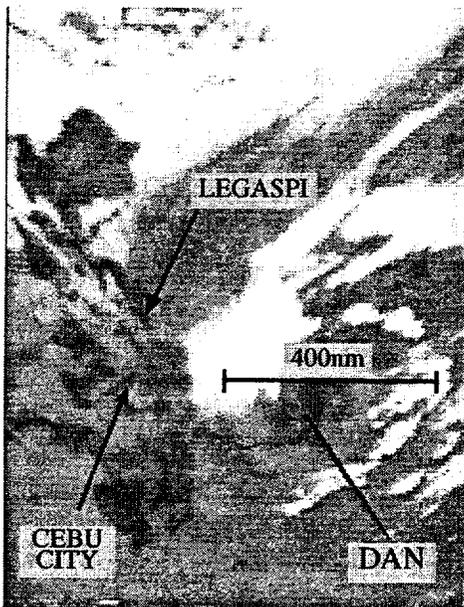


Figure 3-35-2 Microwave imagery acquired from the special sensor microwave/imager (SSM/I) reveals that the low-level circulation center of Dan is displaced to the southeast of the deep convection (281335Z December horizontally polarized 85 GHz microwave DMSP imagery). The low-level center was obscured by dense cirrus in conventional visible and infrared satellite imagery.

b. Large wind asymmetries

As Dan reached its closest point of approach to the Philippines and made its sharp turn to the north, a large area of gales formed in the Philippine Sea to Dan's north (Figure 3-35-3). Such large asymmetries are common when late-season tropical cyclones approach the Asian mainland where the sea-level pressure is very high. The high pressure over the Asian mainland is responsible for the northeast monsoon that occupies the South China Sea during the late fall and winter. Similar wind asymmetries were noted in the case of Tropical Depression 34W (see its summary).

IV. IMPACT

Dan caused heavy rain and high surf in northern and eastern Mindanao. Waves as high as 7 feet (2.1 m) destroyed some houses in Cagayan de Oro. Several thousand people in the region were evacuated because of high surf.

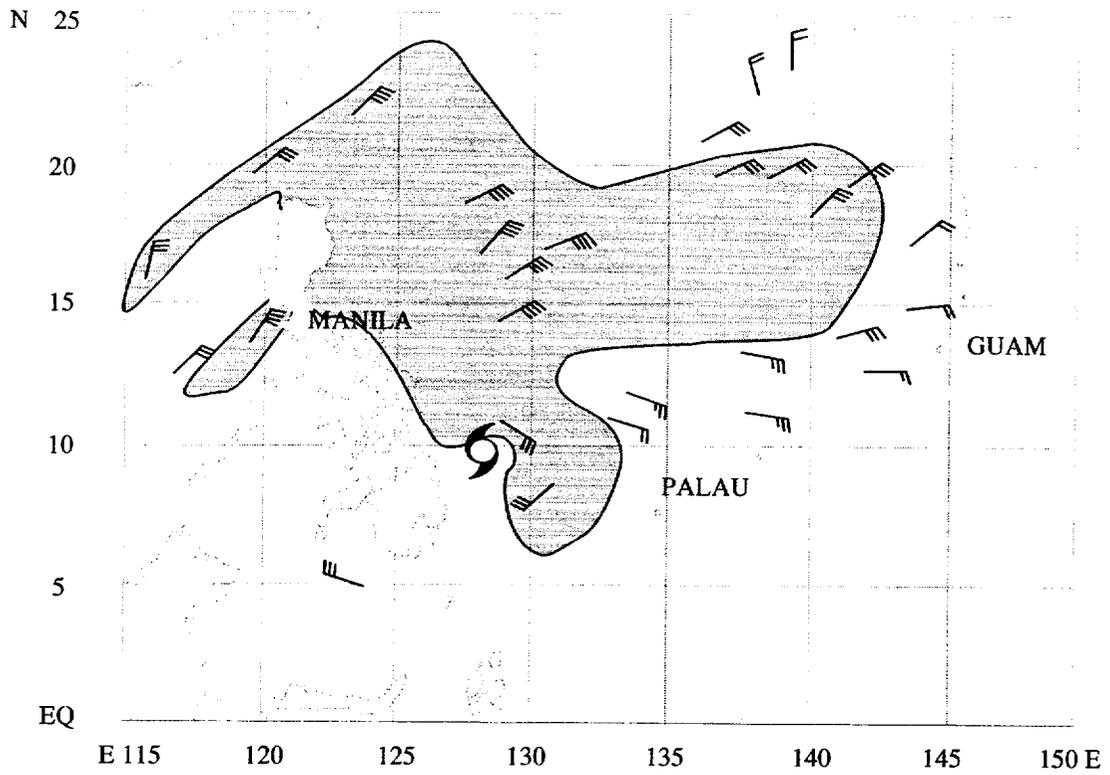


Figure 3-35-3 Ship reports and low-cloud velocities observed between 270600Z to 280000Z December reveal a large area of 30-40-kt (15-21-m/sec) winds (within the shaded area) to the north and northeast of Dan.