

TROPICAL STORM BETTY

BEST TRACK TC-04W

06 JULY - 09 JULY 1984

MAX SFC WIND 55 KTS

MINIMUM SLP 983 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

TROPICAL STORM BETTY (04W)

Tropical Storm Betty originated in the eastern extension of the monsoon trough early in July but took several days to develop into a significant tropical cyclone. Once developed, Betty moved steadily to the northwest through the South China Sea eventually making landfall and dissipating over southern China.

At 0000Z on the 2nd, a disturbance which later developed into Tropical Storm Betty was located approximately 550 nm (1019 km) southwest of Guam. Synoptic data showed the disturbance to be a broad, weak surface circulation with winds of 10 to 15 kt (5 to 8 m/s). Concurrent satellite imagery showed the disturbance as an area of poorly organized convection. Strong surface ridging was present between the disturbance and the developing Tropical Storm Alex (03W) to the north which was then located off the east coast of Luzon. Above this surface ridging a TUTT was providing good upper-level outflow to the north of the disturbance enhancing the convective activity.

When the disturbance was mentioned on the 030600Z Significant Tropical Weather Advisory (ABEH PGTW), it had moved northwest behind now Typhoon Alex (03W) which was located east of Taiwan and moving rapidly northward. With the TUTT providing good upper-level outflow over the disturbance, the convection exhibited a marked increase in organization and intensity over 24 hours earlier.

By 0200Z on the 4th, the disturbance had moved to near 15N 128E and was becoming more organized. At this time the first TCFA was issued on the system. Figure 3-04-1 shows the disturbance at the time the TCFA was issued. Note the banding in the convection and anticyclonic upper-level outflow. Synoptic data indicated that only a broad 10 to 15 kt (5 to 8 m/s) surface circulation was present. Strong ridging still persisted north of the disturbance. This ridging was instrumental in preventing Betty from following a path similar to that of Typhoon Alex (03W).

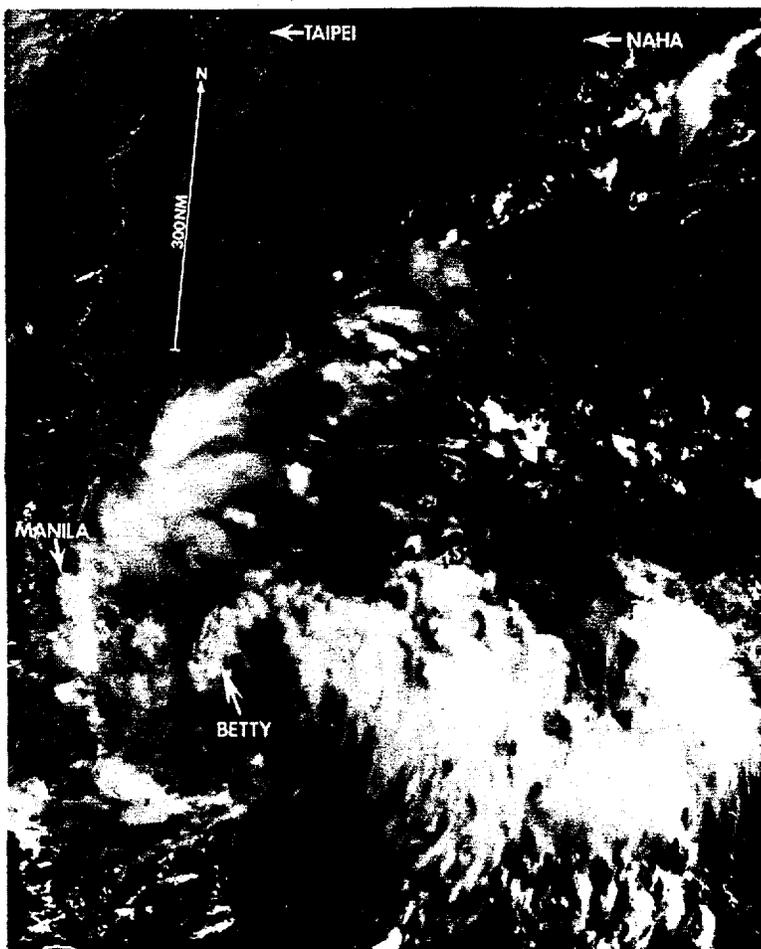


Figure 3-04-1 Tropical storm Betty at the time the first TCFA was issued [040116Z July DMSP visual imagery.

Aircraft reconnaissance flights on 3 and 4 July at the 1500 ft (457 m) level were unable to close-off a circulation center, finding instead a broad surface trough. The TCFA was reissued at 050200Z July since the possibility existed that the system would remain east of Luzon and develop. Aircraft reconnaissance during the afternoon of the 5th indicated that the system had intensified slightly into a weak tropical depression with an MSLP of 1002 mb and maximum surface winds of 25 kt (13 m/s). However, no further development occurred as the system moved west and approached the Philippines.

By the 6th, the depression had weakened as it transited Luzon. At this time the third and final TCFA was issued since it was considered likely that a significant tropical cyclone would finally develop once the disturbance moved out over the South China Sea.

At 1200Z on the 6th, synoptic data indicated that the disturbance had moved offshore west of Luzon and was developing. With surface reports of 20 to 25 kt (10 to 13 m/s) and further intensification very likely, the first warning was issued. Visual satellite imagery late on the 6th (Figure 3-04-2) showed Betty, then a depression, with a large, mostly clear area at its center. An exposed low-level circulation is evident as indicated by the spiraling low-level cumulus clouds. Convective activity is heaviest in the southern semicircle surrounding the mostly convection-free center. Aircraft reconnaissance at about the same time reported a large light and variable center 50 to 60 nm (93 to 111 km) in diameter associated with the depression. Surface winds of 25 to 30 kt (13 to 15 m/s) were observed southeast of the center where the depression's flow was enhanced by the southwest monsoon.

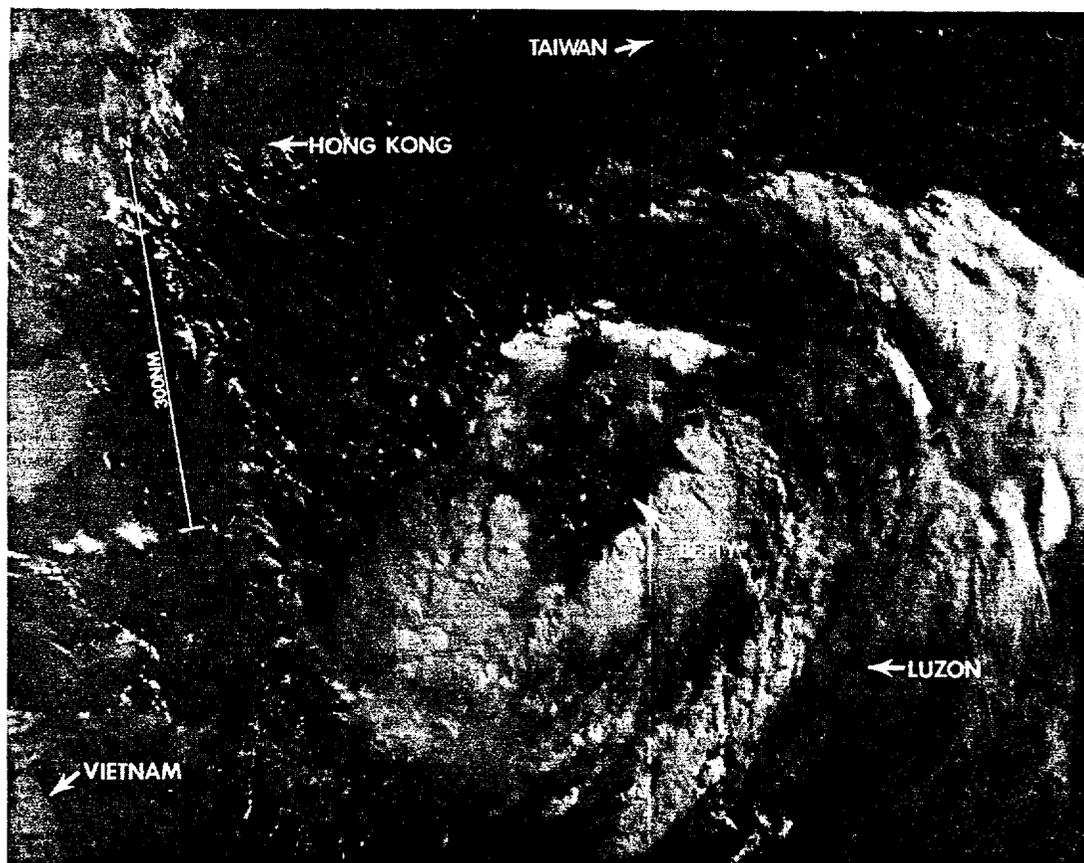


Figure 3-04-2. Tropical Storm Betty as a tropical depression after having crossed the Philippines. Note the exposed low-level circulation center as indicated by spiraling cumulus inside a large convection-free central area [062333Z July NOAA visual imagery].

Betty was upgraded to a tropical storm at 1200Z on the 7th based upon receipt of 35 kt ship reports and satellite imagery showing improved convective organization. Aircraft reconnaissance at 080034Z indicated that Tropical Storm Betty had intensified further with maximum surface winds of 50 kt (26 m/s) being reported in a small area in the east semicircle.

The Hong Kong Royal Observatory (WMO 45005) picked up Betty on weather radar at approximately 080300Z and transmitted position fixes until 090600Z. These hourly reports aided greatly in positioning the tropical storm during this period.

Between 0600Z on the 8th and 0600Z on the 9th, Betty maintained an intensity of 50 to 55 kt (26 to 28 m/s), making landfall at 090300Z approximately 135 nm (250 km) west-southwest of Hong Kong. Figure 3-04-3 shows Betty at maximum intensity just prior to landfall. Dissipation occurred after 091800Z over the southwestern portion of the Peoples Republic of China. No forecast problems were encountered with Tropical Storm Betty since it moved steadily to the northwest around the southwestern periphery of the subtropical ridge.

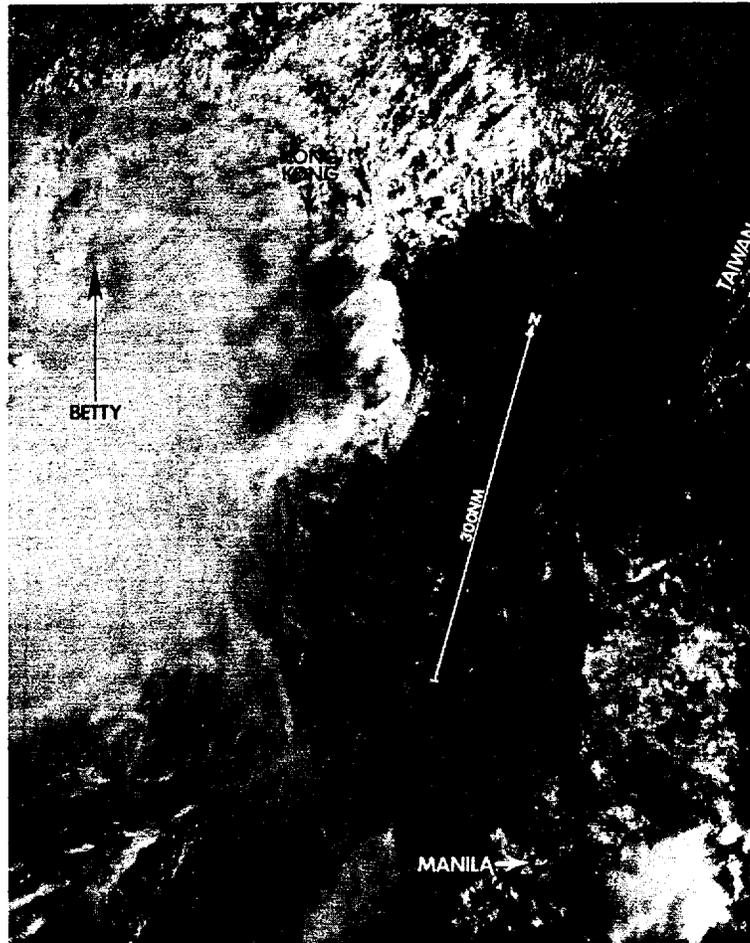


Figure 3-04-3. Tropical Storm Betty at maximum intensity of 55 kt (28 m/s) just prior to landfall (090137Z July DMSP visual imagery).