

Thelma, the second typhoon of the 1977 season, wrought more destruction on Taiwan than any event since World War II. While Typhoon Sarah was still crossing the South China Sea, Thelma was detected by satellite on the morning of July 20th as a tropical disturbance in the central Philippine Sea. The disturbance continued to organize during the subsequent 24 hours, and the first warning was issued on TD 06 at 0000Z on the 21st.

Reconnaissance aircraft at 0918Z on the 21st found flight level winds of 55 kt (28 m/sec), a central pressure of 993 mb, and surface winds estimated at 50 kt (26 m/sec). Based on the aircraft data and corroborating satellite data, TD 06 was upgraded to Tropical Storm Thelma at 1200Z. During the following 30 hours, Thelma continued to intensify at a rate of 5 kt (2.6 m/sec) per 6 hours. At 2050Z on the 22nd, aircraft fixed the tropical storm 255 nm (472 km) northeast of Manila, and observed 60 kt (31 m/sec) winds at its 700 mb flight level. The aircraft further indicated that the central pressure had fallen to 965 mb. As a result of those observations, the system was upgraded to Typhoon Thelma at 0000Z on the 23rd.

The trigger for Thelma's intensification was nearly identical to that of Sarah's a week earlier. Highly efficient outflow channels were provided Thelma by intense cyclonic cells in the TUTT, to the north, and by strongly divergent upper level northeasterlies over Indonesia and the South China Sea, to the south. This situation lasted from the 21st to the 24th when the TUTT receded northward, and Thelma ceased her intensification.

The typhoon continued to move northwestward at 9 kt (17 km/hr) toward the southern periphery of the mid-tropospheric subtropical ridge. On the evening of the 23rd, the storm entered the Bashi Channel, passing 10 nm (19 km) northeast of Escarpada Point on northeastern Luzon. At this time the Kakuho Maru reported 80 kt (41 m/sec) winds and 20 ft (6 m) seas just northwest of the center.

Since the time of Thelma's development, the mid-tropospheric subtropical ridge had been intense over the western Pacific and extended well into China. By 1200Z on the 23rd, geopotential heights at the 500 mb level began to fall over northern China as a low developed over eastern Mongolia and deepened rapidly. On the morning of the 24th, the subtropical ridge north of the tropical system showed signs of weakening.

During the evening of the 24th, reconnaissance aircraft positioned Thelma 145 nm (269 km) south-southwest of Kao-hsiung, which indicated that the storm was beginning to move northward. At this time the typhoon attained its maximum intensity of 85 kt (44 m/sec) with a minimum pressure of 957 mb, and slowed to 6 kt (11 km/hr). At 1800Z the passenger liner, President McKinley, reported 45 kt (23 m/sec) winds and 20 ft (6 m) seas while some 70 nm (130 km) northeast of the eye.

On the morning of the 25th, radar data

showed that Thelma had turned toward the north-northeast and had accelerated to 10 kt (19 km/hr). When satellite confirmed the radar movement, the 241800Z warning was amended to reflect the system's impending threat to southern Taiwan. During early afternoon of the 25th, Thelma crashed into Kao-hsiung harbor (Fig. 4-2). The Chinese Weather Central reported that Kao-hsiung (WMO 46744) observed 86 kt (44 m/sec) peak winds accompanied by a 991.5 mb pressure minimum at 250939 local. Satellite, aircraft, radar, and synoptic data all indicated that the typhoon was small, but very intense. Most damage was confined to the direct path of Typhoon Thelma as the central mountain range of Taiwan drastically weakened the peripheral winds east of the typhoon's track.

After moving across southwestern-Taiwan, Thelma began to weaken, and move on a track slightly west of north. On the evening of the 25th, Thelma entered the Taiwan Straits, and on the following morning went ashore on mainland China, 30 nm (56 km) north of Fuchou with 50 kt (26 m/sec) winds.

During her rampage over Taiwan, Thelma claimed more than 30 lives, injured thousands, and rendered an estimated 5,000 homeless. The typhoon ripped down 53 steel towers supporting high-tension power lines. The loss of power shut down more than one-half of the island's 45,000 factories. Taiwan's largest harbor at Kao-hsiung was virtually destroyed. All eight giant cranes used to load and unload cargo were badly damaged or destroyed. At least 17 ships capsized in the harbor. In her few short hours over southern Taiwan, Thelma left destruction amounting to several millions of dollars (U.S.). According to the Central Weather Bureau of Taiwan, Typhoon Thelma was the most destructive tropical cyclone to hit Taiwan in more than 80 years.

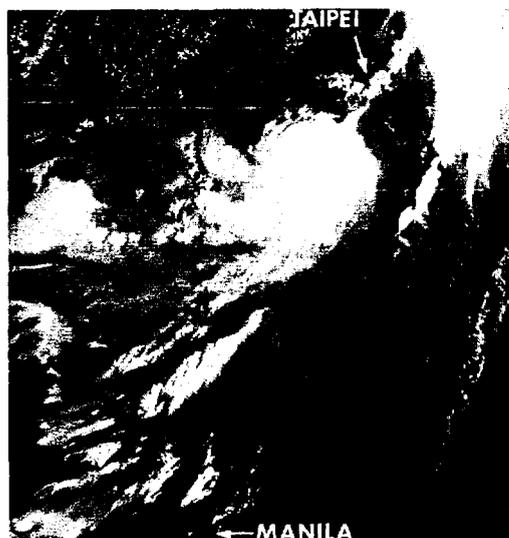


FIGURE 4-2. Typhoon Thelma entering southwestern Taiwan with an 80 kt (41 m/sec) intensity, 25 July 1977, 0243Z. [DMSP imagery]