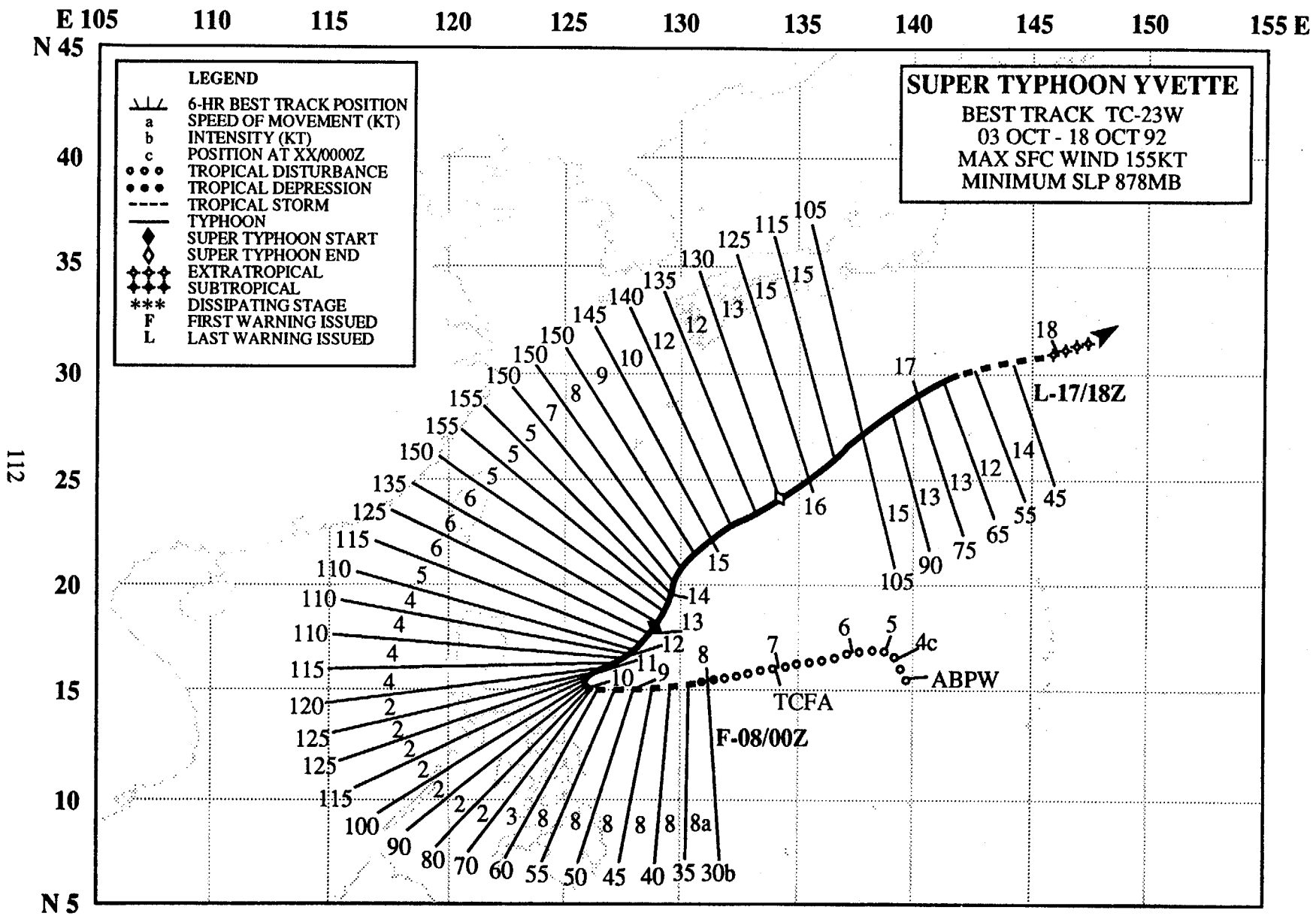
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LEGEND
6-HR BEST TRACK POSITION
a SPEED OF MOVEMENT (KT)
b INTENSITY (KT)
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
*** DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED
SUPER TYPHOON YVETTE
BEST TRACK TC-23W
03 OCT - 18 OCT 92
MAX SFC WIND 155KT
MINIMUM SLP 878MB
L-17/18Z
F-08/00Z
TCFA
ABPW
112

SUPER TYPHOON YVETTE (23W)

I. HIGHLIGHTS

The third Northwest Pacific tropical cyclone of 1992 to achieve super typhoon intensity, Yvette was an action-packed system which posed many forecast challenges. In the span of two weeks, Yvette developed in a moderately sheared environment, made a run toward Luzon as it intensified to a typhoon, stalled, executed a major, 150-degree track change, weakened, reintensified to a super typhoon, and transitioned to an extratropical cyclone. This tropical cyclone marked the beginning of the 1992 super typhoon season - October being the month of most frequent super typhoon occurrence.

II. TRACK AND INTENSITY

On 3 October, the monsoon trough extended from the South China Sea eastward across the southern Philippine Islands and Philippine Sea, through the southern Mariana Islands, and northeastward to Typhoon Ward (21W), located 1080 nm (2000 km) northeast of Guam . The persistence of convective activity along the trough in the Philippine Sea prompted JTWC forecasters to mention a broad tropical disturbance on the 030600Z Significant Tropical Weather Advisory. Due to moderate vertical wind shear, the low-level circulation center of this tropical disturbance, which was to become Yvette, remained poorly defined. On 5 October, the amount of convection started to increase around the center. At 070600Z, a Tropical Cyclone Formation Alert was released as the convective organization was rapidly improving. When a comma-shaped cloud mass developed in association with the center, JTWC issued the first warning for Tropical Depression 23W at 080000Z. With the rapid appearance of a central dense overcast, the system was upgraded to a tropical storm at 080600Z.

As Yvette tracked westward under the steering influence of the mid-level subtropical ridge to the north, it steadily intensified. At 091200Z, rapid intensification commenced with Yvette reaching typhoon intensity at 091800Z. The intensification process continued until the typhoon peaked at 125 kt (64 m/sec) at 110000Z (Figure 3-23-1). Coincident with the onset of rapid intensification, the typhoon virtually stalled and slowly executed a major track change to the northeast in conjunction with the subtropical ridge being weakened by the deepening and retrogression of the mid-level East Asian trough. After peaking, Yvette weakened slightly until 121200Z, when rapid intensification again started. This process of premature, low latitude recurvature and subsequent intensification has been described by Guard (1983). At the same time, a large plume of cirrus appeared, extending from the typhoon's central dense overcast to the frontal cloudiness to the north and northeast over Japan. By the time that Yvette had reached its maximum intensity of 155 kt (80 m/sec), at 131800Z, the extensive plume of cirrus to the northeast had almost disappeared, suggesting some relationship between the rapid intensification and the cirrus plume.

At 140600Z, the super typhoon (Figure 3-23-2) reached a position where it could proceed around the western end of the mid-level subtropical ridge. As vertical wind shear from southwesterlies aloft increased, Yvette's intensity decreased slowly until 16 October, then decreased more rapidly. At 171800Z, just before Yvette completed its transition to an extratropical low pressure system, JTWC issued the final warning.

III. FORECAST PERFORMANCE

The overall mean errors for the track forecasts were 85, 190 and 340 nm (155, 355 and 630 km) for 24, 48 and 72 hours, respectively. These errors were essentially the same as those for CLIPER, which is used as a performance baseline. Problems that prevented JTWC from outperforming CLIPER were: 1) the stall and major track change from west to northeast when Yvette was approaching Luzon. The northeastward drift of Yvette was mentioned as an alternate scenario and then abandoned as the system appeared to be accelerating westward shortly before it stalled. This acceleration was not real, but resulted from differences between the raw satellite data based on poorly defined upper-level cloud top fixes and the location of the low-level circulation center, which was totally obscured by the high cloud shield; 2) the reintensification-to-super-typhoon episode was not considered as a possibility until six hours before it occurred. This was due primarily to an over-reliance on extrapolating the ongoing intensity trend into the future without any reliable intensity guidance from the numerical models to contradict that assumption; 3) the rapid rate of weakening, starting on 16 October, was under forecast again based on extrapolation of the earlier trend. In this case, numerical models did predict strong shear over Yvette but, it appeared to be a system that could remain intact much longer than it did in the presence of moderate-to-strong upper-level winds; and, 4) acceleration was over forecast during the period Yvette was becoming extratropical. This was caused by the slowing of the low-level circulation center after its decoupling from the from the mid- to upper-level center has occurred.

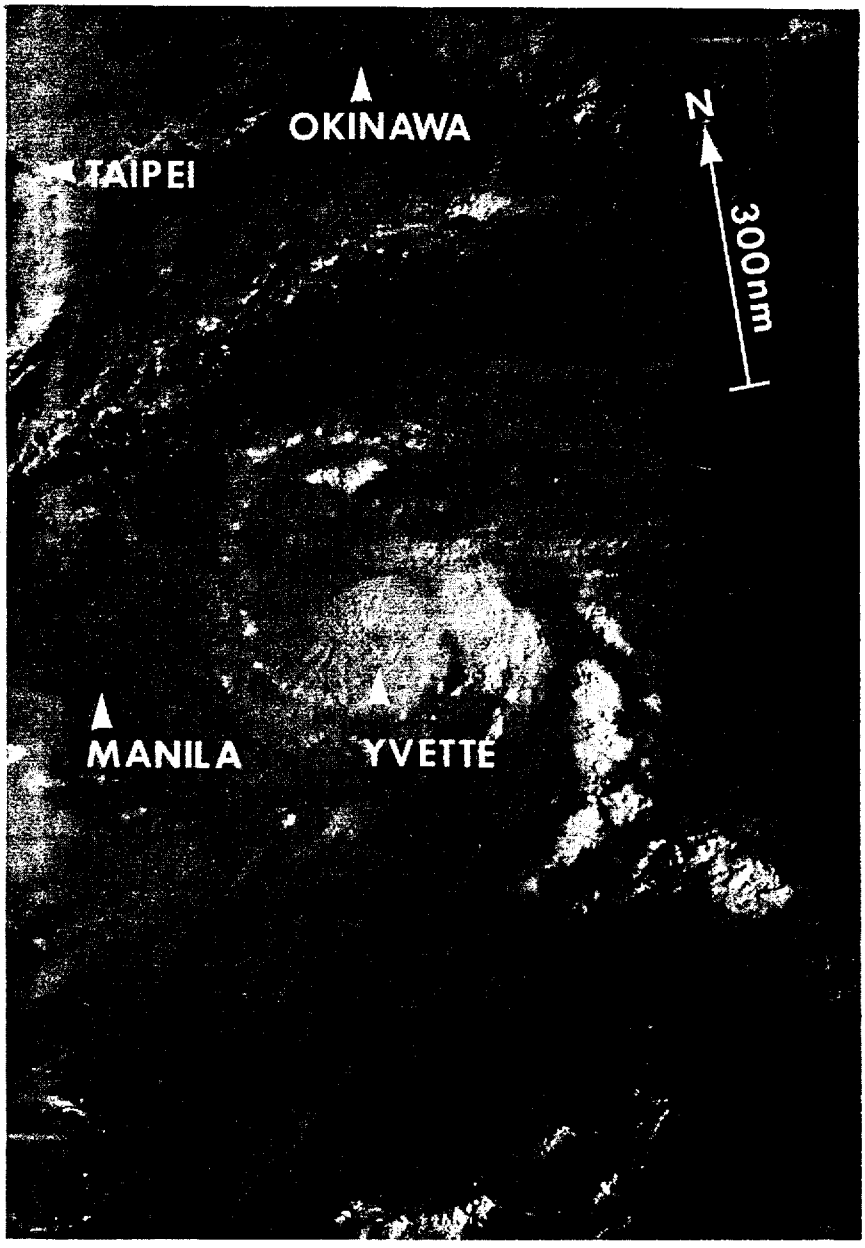

Figure 3-23-1. The tops of cumulonimbus embedded in Yvette's eye wall penetrate the cirrus overcast (100025Z October DMSP visual imagery).

In retrospect and with regard to intensity forecasting, the first rapid intensification episode was successfully identified, before it occurred, based on the results of a study of tropical cyclone intensity climatology and application of a satellite pixel counting technique (Zehr, 1987).

The numerical model, NOGAPS, performed very well, identifying the exact longitude where Yvette would stall, and then its subsequent motion until it moved under strong mid- to upper-level wind flow on 11 October.

VI. IMPACT

Super Typhoon Yvette remained over open ocean its entire life, and no reports of fatalities or damage were received at JTWC.

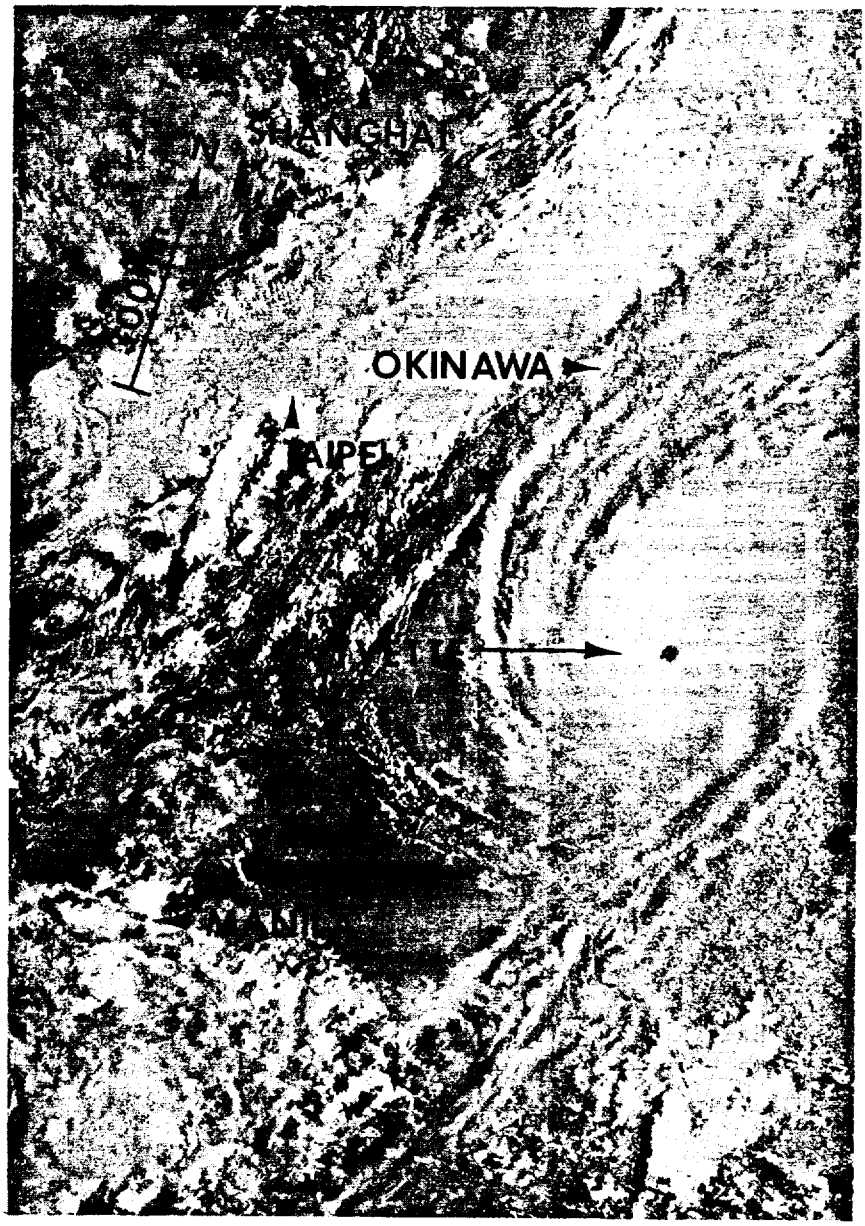

Figure 3-23-2. A moonlight image of Super Typhoon Yvette near peak intensity. Note the city lights of Shanghai, Taipei, Manila and of cities on Okinawa (141235Z October DMSP nighttime visual imagery).