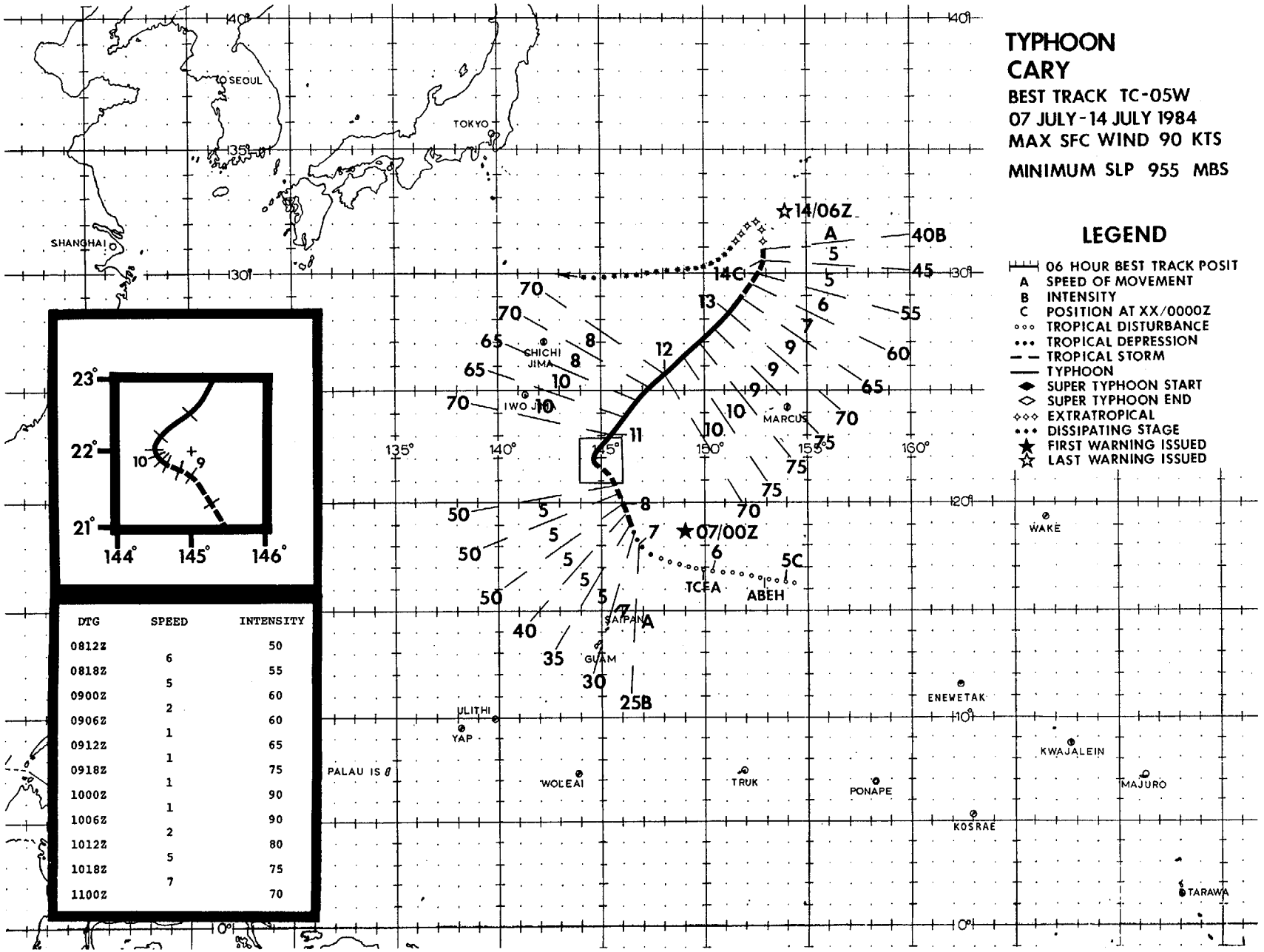
TYPHOON
CARY
BEST TRACK TC-05W
07 JULY - 14 JULY 1984
MAX SFC WIND 90 KTS
MINIMUM SLP 955 MBS
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
☆14/06Z
★07/00Z
SEOUL
TOKYO
SHANGHAI
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
TCEA
ABEH
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENEWETAK
KWAJALEIN
MAJURO
KOSRAE
TARAWA
DTG SPEED INTENSITY
0812Z 50
6
0818Z 55
5
0900Z 60
2
0906Z 60
1
0912Z 65
1
0918Z 75
1
1000Z 90
1
1006Z 90
2
1012Z 80
5
1018Z 75
7
1100Z 70

Typhoon Cary was the first storm of the season to be initiated by the Tropical Upper Tropospheric Trough (TUTT) in a manner similar to that described by Sadler (1976). While remaining over water its entire life, Cary distinguished itself by unusual intensity changes.

The disturbance which eventually developed into Typhoon Cary was first noticed on the 2nd of July as an area of very poorly organized convection near 18N 168E in the eastern, divergent side of a westward moving TUTT cell. During the next two days, the convection remained poorly organized as it moved to the west-southwest. Surface synoptic data indicated only easterly trades were present beneath the convection. Early on the 5th, the convection became more organized with satellite imagery indicating an anticyclone developing aloft over the system; however, due to sparse surface reports, the presence of a surface circulation could not be confirmed. Because of the improved organization, the area of convection was mentioned in the 050600Z Significant Tropical Weather Advisory (ABEH PGTW). Subsequent satellite imagery showed continued development of the convection and the ABEH was reissued at 051200Z indicating that the potential for significant tropical cyclone development was "fair" (meaning that it is likely that a TCFA will be issued during the advisory period). Early on the 6th, satellite imagery (Figure 3-05-1) showed that the convection had become comma shaped, with evidence that a surface circulation was forming. Consequently a TCFA was issued at 060317Z. During the following 21 hours the disturbance moved to the west-northwest, with no significant intensification.

Figure 3-05-1. Satellite imagery which prompted issuance of the TCFA. Note the comma shaped convection and the exposed low-level circulation center to the southwest (0600362 July DMSP visual imagery).

Aircraft reconnaissance late on the 6th, had no trouble locating a surface circulation and reported that the disturbance had an MLSP of 1004 mb with estimated maximum surface winds of 25 kt (13 m/s). Based on this report, the first warning on Cary was issued at 0000Z on the 7th. During the next 12 hours, satellite imagery indicated the depression was slowly intensifying. This was confirmed by the next aircraft reconnaissance flight which found Cary had intensified to storm strength with a narrow band of 35 to 40 kt (18 to 21 m/s) surface winds north of its center and an MSLP of 999 mb.

Cary continued to intensify as it moved to the northwest toward an apparent break in the subtropical ridge. Due to uncertainty in the Fleet Numerical Oceanography Center (FNOC) analysis fields in the data sparse region southeast of Japan, 400 mb synoptic track missions were flown on 8 and 9 July to better define the mid-level flow north of Cary. These flights confirmed the presence of a weakness in the ridge, which indicated that forecasts for slow northwestward movement with eventual recurvature to the northeast were sound. Cary slowed as it approached the weakness in the subtropical ridge while continuing to intensify. At 091200Z, Cary was upgraded to typhoon status based on aircraft and satellite data which indicated that a 30 nm (56 km) wide eye had formed, 700 mb flight level winds were 64 kt (33 m/s), and an MSLP of 975 mb existed. During the subsequent 12 hours Cary intensified quite rapidly, reaching a maximum intensity of 90 kt (46 m/s) with an MSLP of 955 mb at 092332Z. Figure 3-05-2 shows Cary just prior to reaching maximum intensity.

Figure 3-05-2. Typhoon Cary just prior to reaching maximum intensity (0922217 July NOAA visual imagery).

Between 0000Z on the 9th and 1200Z on the 10th, Cary moved very slowly through the ridge axis. At the same time, a mid-latitude trough was forecast to deepen in the lee of Japan, supress the subtropical ridge further south, and allow Cary to enter the westerlies and be steered to the northeast. Acceleration, although considered, was not forecast since the strong upper-level westerlies were forecast to remain well north of 30N through the forecast period.

Recurvature to the northeast was underway by 101200Z. This was accompanied by a significant shearing of the convection in the northwest semicircle of the storm (Figure 3-05-3) resulting in a reduction of intensity to near minimum typhoon strength. Approximately 18 hours later the trough approached a blocking ridge along 170E, turned to the north, and weakened. This allowed the shearing environment over Cary to decrease resulting in a gradual increase in convection and a halt to the weakening trend. At 111118Z the ARWO reported that Cary was once again developing an eye; this time 40 nm (74 km) across. This large eye persisted for 24 hours (Figure 3-05-4) as Cary reintensified. Figure 3-05-5 shows the intensity variations of Cary. Note the weakening when Cary was being sheared followed by reintensification as the upper-level environment improved.

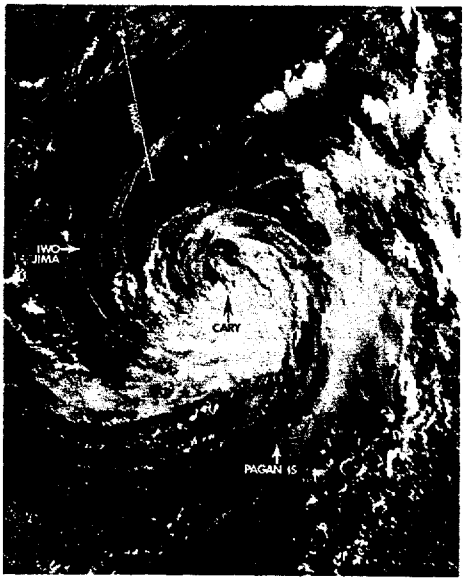

Figure 3-05-3. Typhoon Cary being sheared. Notice the complete absence of significant convection in the northwest semicircle (102156Z July NOAA visual imagery).

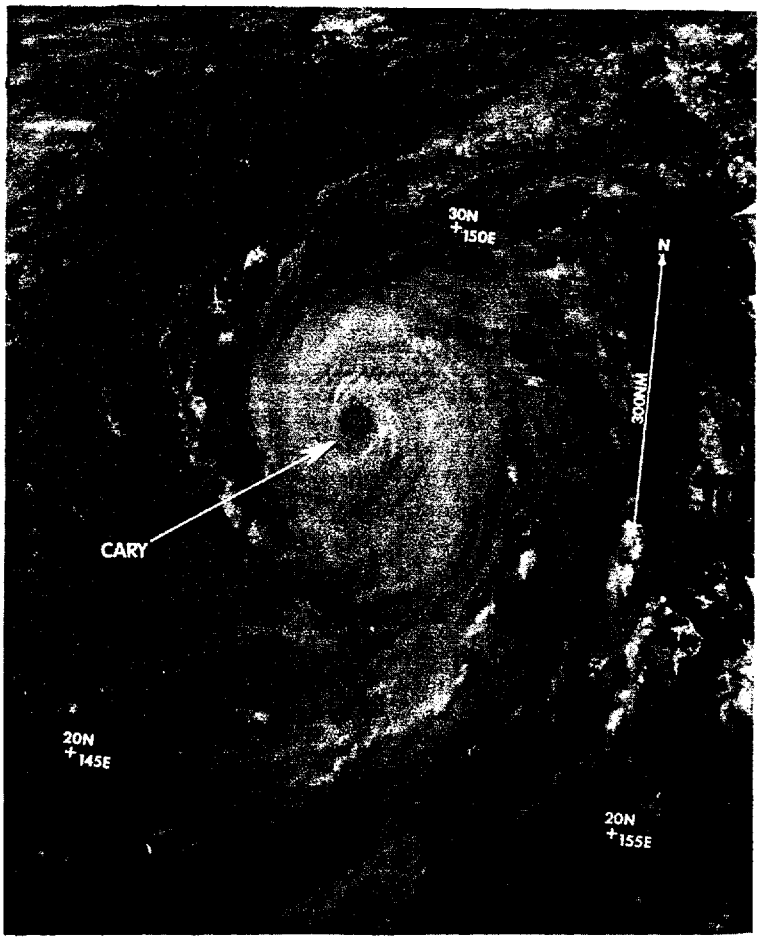

Figure 3-05-4. Typhoon Cary after reintensifying. Maximum sustained winds are 75 kt (39 m/s) (120529Z July NOAA visual imagery).

As Cary moved further north, increasing vertical shear and entrainment of cooler, drier air caused Cary to weaken and gradually become extratropical. By 140600Z Cary had completed its extratropical transition and the final warning was issued. Figure 3-05-6 shows Cary as it completed transition to an extratropical low. The extratropical remains of Cary continued to weaken and moved west under the influence of a surface ridge northeast of Japan. Cary eventually dissipated to the south of Japan. There were no reports of injuries or damages from Cary.

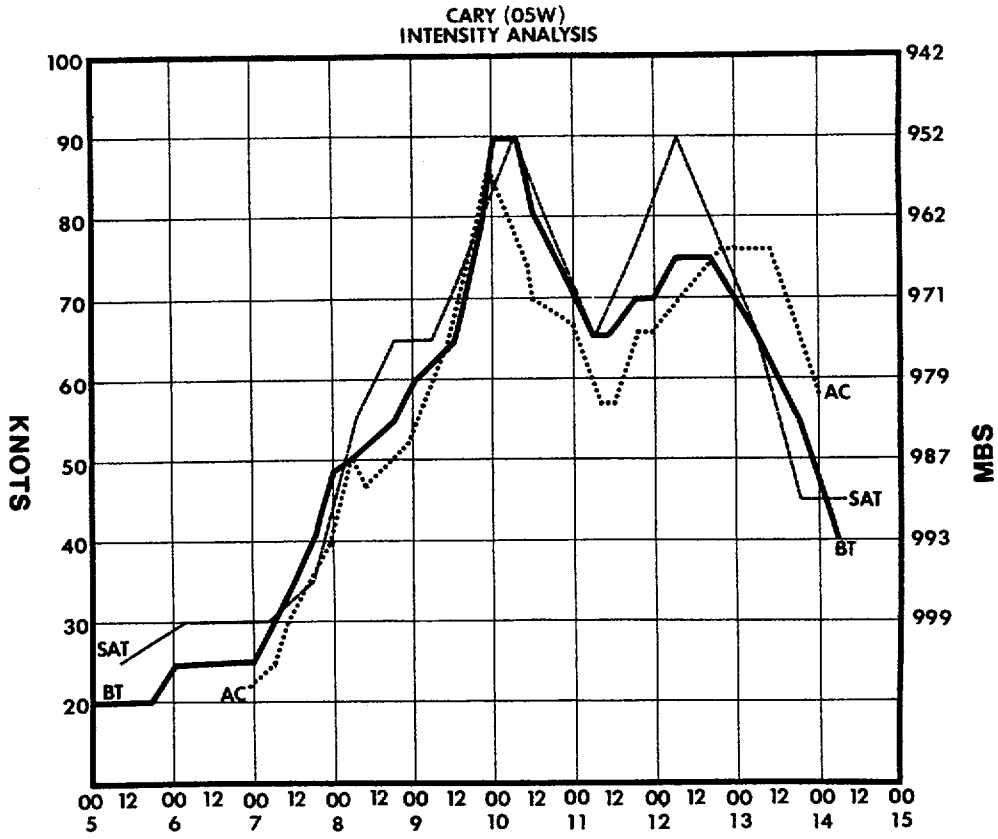

Figure 3-05-5. Satellite (Dvorak, 1973) and aircraft reconnaissance (Atkinson and Holliday, 1977) intensity estimates of Typhoon Cary. Best track intensities are shown as the solid line.

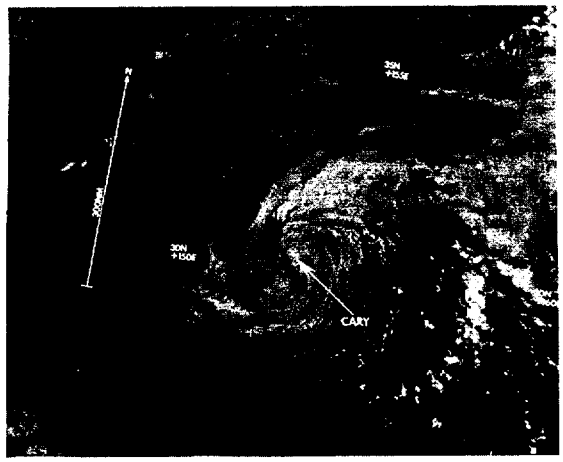

Figure 3-05-6. Cary completing extratropical transition. Note the absence of convection around the storm. Only stable stratocumulus clouds remain (1405042 July NOAA visual imagery).