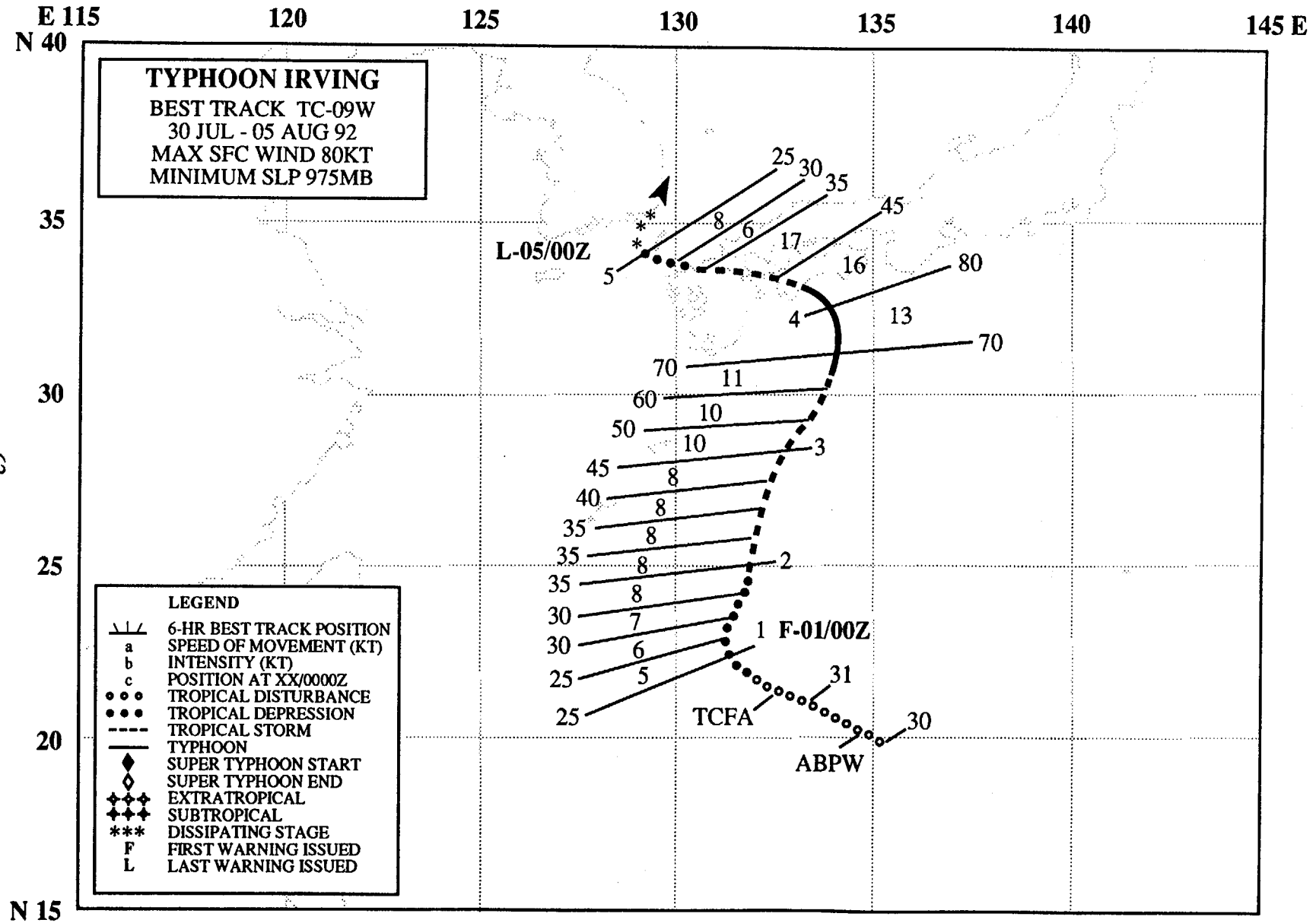
E 115
120
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TYPHOON IRVING
BEST TRACK TC-09W
30 JUL - 05 AUG 92
MAX SFC WIND 80KT
MINIMUM SLP 975MB
L-05/00Z
F-01/00Z
TCFA
ABPW
LEGEND
6-HR BEST TRACK POSITION
a SPEED OF MOVEMENT (KT)
b INTENSITY (KT)
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
*** DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED

TYPHOON IRVING (09W)

I. HIGHLIGHTS

The last of five significant tropical cyclones to develop in July, Irving was the first of two successive typhoons to affect Southwest Japan. It formed at the eastern end of the monsoon trough where several low-level vorticity centers were embedded in a broad area of poorly organized convection, and slowly intensified. Initially, track forecasts suffered due to a difficulty in distinguishing a clear-cut, low-level circulation center. Once an accurate track history was established and the Joint Typhoon Warning Center committed to a north-oriented track followed by westward motion due to the expected reestablishment of the mid-level subtropical ridge north of Irving, forecast errors were significantly reduced. Intensity estimates based solely on satellite imagery proved to be too low as all forecast agencies peaked Irving as a tropical storm. Post-storm analysis has revealed enough synoptic data to justify upgrading Irving to a typhoon.

II. TRACK AND INTENSITY

Initially, synoptic and satellite data indicating a definite, albeit weak, low-level cyclonic circulation within the monsoon trough that extended from the South China Sea to the central Philippine Sea. This circulation was mentioned on the 300600Z July Significant Tropical Weather Advisory. While multiple low-level vorticity centers were present at this early stage of development, JTWC focused on the circulation near a major flare-up of convection occurring in the southwestern portion of the tropical disturbance. The detection of curved low-level cloud lines on the visual satellite imagery resulted in JTWC issuing a Tropical Cyclone Formation Alert at 310800Z. By 01 August at 0000Z, the cloud organization had improved sufficiently to classify this system as a tropical depression, and the first warning was issued. A short time after this warning, a weather reconnaissance aircraft from the Tropical Motion Cyclone Experiment (TCM-92) explored the structure of the tropical depression, and determined that the primary low-level circulation was most probably situated 120 nm (220 km) further to the north than inferred from the satellite data. The circulation proceeded slowly northward over the next two days and gradually intensified. This slow northward motion was attributed to the tropical cyclone being situated near the western periphery of the subtropical ridge. At 020000Z, the amount of centralized deep convection had increased, prompting forecasters to upgrade the tropical depression to a tropical storm.

From the standpoint of satellite intensity estimates, Irving appeared to reach its peak intensity of 55 kt (28 m/sec) at 031200Z based on the curvature of the convection. However, synoptic data indicated that Irving continued to intensify, and attained a peak intensity of 80 kt (41 m/sec) at 040000Z. The surface pressure pattern and key wind reports are depicted in Figure 3-09-1. The figure shows the tight pressure gradient that existed to the north of the typhoon. The visual imagery (Figure 3-09-2) nearest the time of the synoptic data shows Irving with an elliptic eye that was approximately 100 nm (185 km) in diameter. With the ridge established to the north, the tropical cyclone began to track west-northwestward. Upon landfall over southwestern Shikoku, Irving turned sharply to the west, rapidly weakened, and later, dissipated over the Korea Strait near Pusan, Korea.

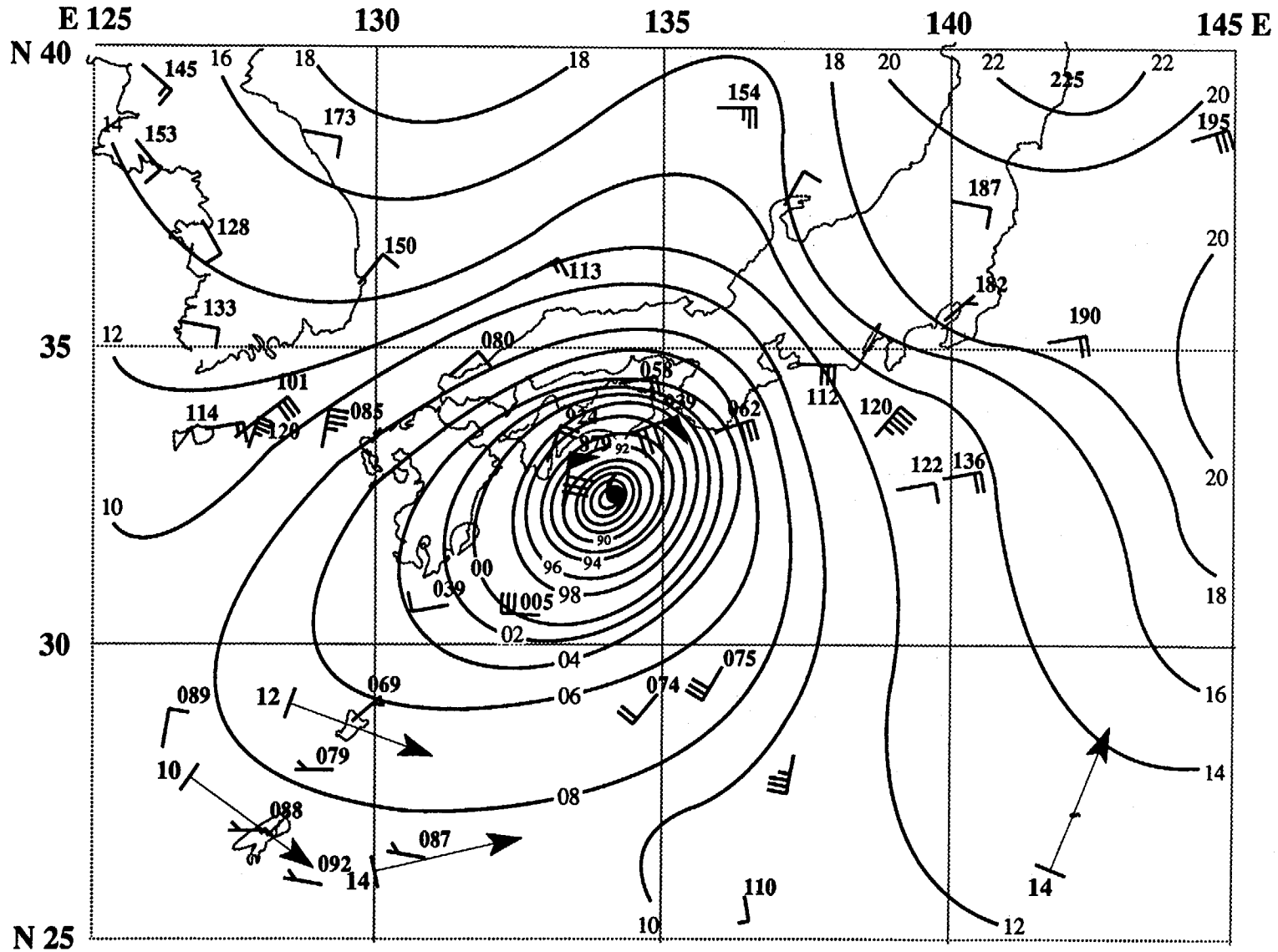

Figure 3-09-1. Synoptic data and analysis for 040000Z August reveals the tight pressure gradient to the north of Irving. The two 80 kt (41 m/sec) reports are located under the wall cloud. (The arrows at the bottom of the analysis indicate gradient-level wind reports.)

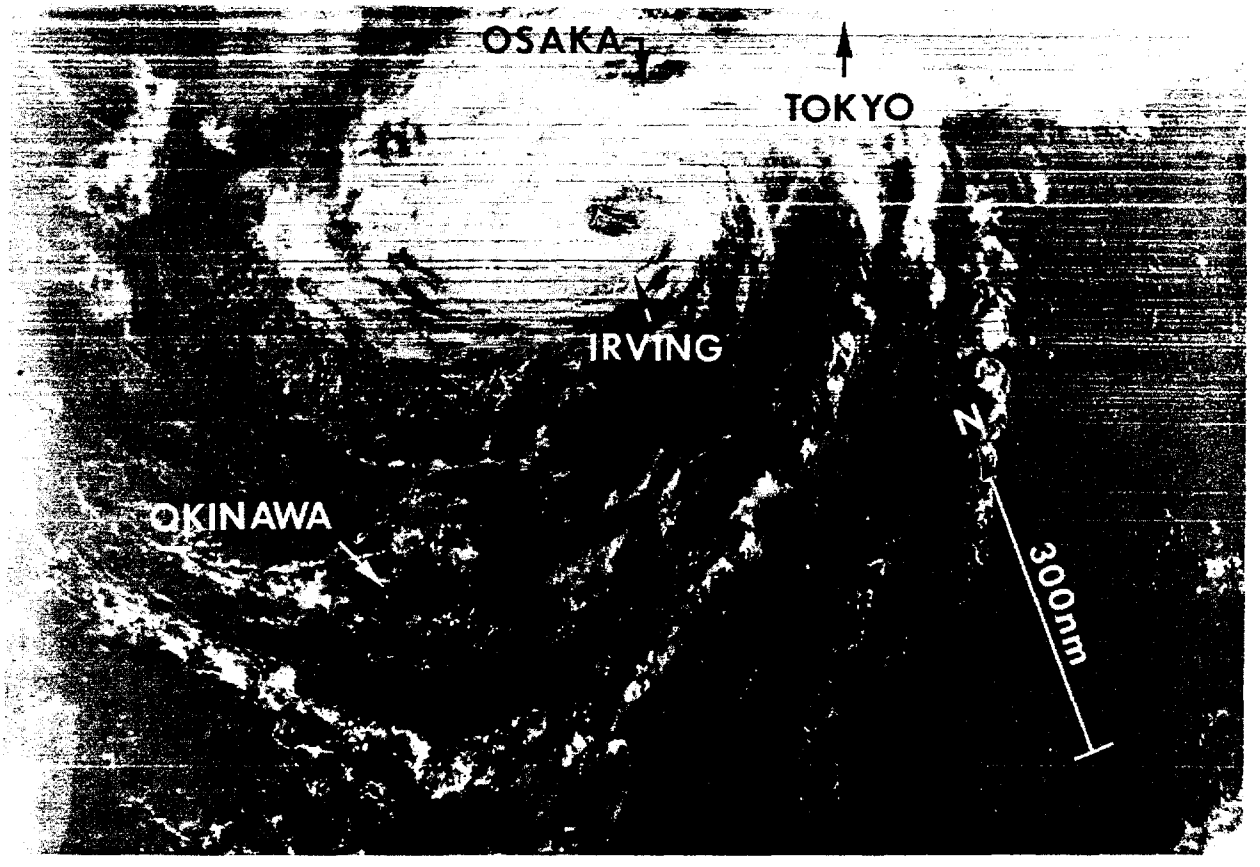

Figure 3-09-2. The satellite data, corresponding to the synoptic analysis in Figure 3-09-1, shows Irving with a large eye just before making landfall on Shikoku (040015Z August DMSP visual imagery).

III. FORECAST PERFORMANCE

Forecasting for Irving proved to be quite challenging as climatological and numerical model guidance were in almost total disagreement. To complicate the forecast difficulties, problems with locating the low-level center during the first five warnings led to four relocated warnings. Once the persistent northward motion was established, JTWC placed a heavier reliance on climatological and statistical based models. Then, when Irving was approaching Japan, predictions based on the NOGAPS model provided correct guidance. In retrospect, the Japanese Typhoon Model (JTYM), although biased right-of-track, provided accurate guidance for timing and direction of major track directional changes.

With regard to intensity forecasts, JTWC did not anticipate the further drop in central pressure of the tropical cyclone and building of the pressure gradient to the north as Irving approached Japan, which resulted in underforecasting the winds.

IV. IMPACT

Although some observations from Japan were in excess of 60 kt (31 m/sec) and orographically induced rainfall was heavy, there were no reports of significant damage received.