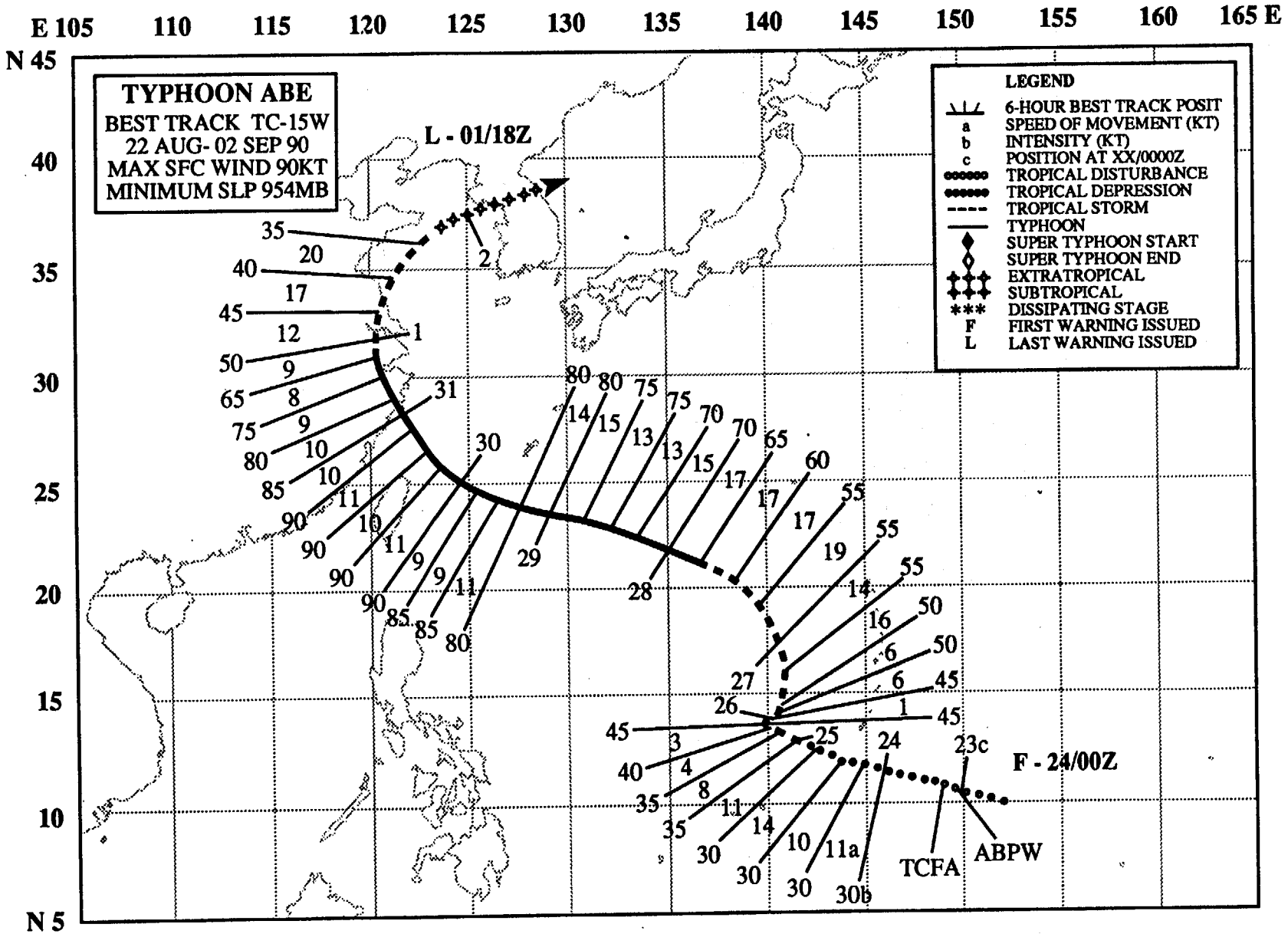
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TYPHOON ABE
BEST TRACK TC-15W
22 AUG- 02 SEP 90
MAX SFC WIND 90KT
MINIMUM SLP 954MB
L - 01/18Z
F - 24/00Z
TCFA
ABPW
LEGEND
6-HOUR BEST TRACK POSIT
SPEED OF MOVEMENT (KT)
INTENSITY (KT)
POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

TYPHOON ABE (15W)

I. HIGHLIGHTS

Typhoon Abe, the fourth of five tropical cyclones in August, caused extensive damage from the Republic of the Philippines through eastern China during its nine day life. Abe was also noteworthy as a classic example of the erratic motion and rapid reorganization that can occur in association with an intense monsoon surge.

II. CHRONOLOGY OF EVENTS

230100Z - First mentioned on Significant Tropical Weather Advisory as an area of persistent convection at the end of an active monsoon trough. Minimum sea-level pressure estimated to be 1007 mb.
230600Z - First Tropical Cyclone Formation Alert based on increased convection, organization, and outflow aloft.
240000Z - First warning issued due to continued development.
250000Z - Upgraded to a tropical storm based on increased central convection.
271200Z - Upgraded to a typhoon after detection of a ragged eye.
300000Z - Peak intensity - 90 knots (46 m/sec) - based on intensity estimate of CI 5.0
311200Z - Downgraded to tropical storm as convection decreased due to land interaction.
011800Z - Final warning issued due to extratropical transition.

III. TRACK AND MOTION

From its initial mention on the Significant Tropical Weather Advisory until 250000Z, Abe tracked steadily west-northwestward under a well-developed subtropical ridge. By 251200Z, an intense, deep surge in the monsoon westerlies began to develop south of Abe, arresting its westward motion. The enhanced convection associated with the surge (Figures 3-15-1a, 3-15-1b and 3-15-1c) initially formed east of Abe's convective cloud mass and grew as it wrapped around to the north. Eventually, Abe's circulation center reorganized to the north, between the competing convective masses. The intensity and horizontal extent of the monsoon surge is illustrated by the time sequence of gradient level winds recorded at the National Weather Service Observatory at Taguac, Guam (WMO 91217) and shown in Figure 3-15-2. During the timeframe of the figure, Abe was located between 270 and 540 nm (500 to 1000 km) from Guam. Following the monsoon surge event that pushed the system on a brief eastward then northward track, Abe resumed a west-northwestward track along the periphery of the subtropical ridge. The typhoon eventually recurved through a weakness in the subtropical ridge associated with a passing short-wave trough. The recurvature track took Abe along the coasts of the Zhejtang and Jiangsu Provinces of China, into the Yellow Sea, and across the middle portion of South Korea.

IV. INTENSITY

From the initial warning at 240000Z until 270600Z, Abe intensified by only 25 kt (13 m/sec) due to the disruptive shearing effects of the monsoon surge. The subsequent three days of intensification to its peak of 90 kt (46 m/sec) at 300000Z was also slower than normal. The slow intensification may be attributed to some restriction of Abe's outflow into the tropical upper-level easterlies caused by the outflow of Typhoon Becky (16W). Any additional intensification that might have resulted from the eventual establishment of good outflow into the midlatitude westerlies at 310000Z was negated by the terrain effects as Abe approached China.

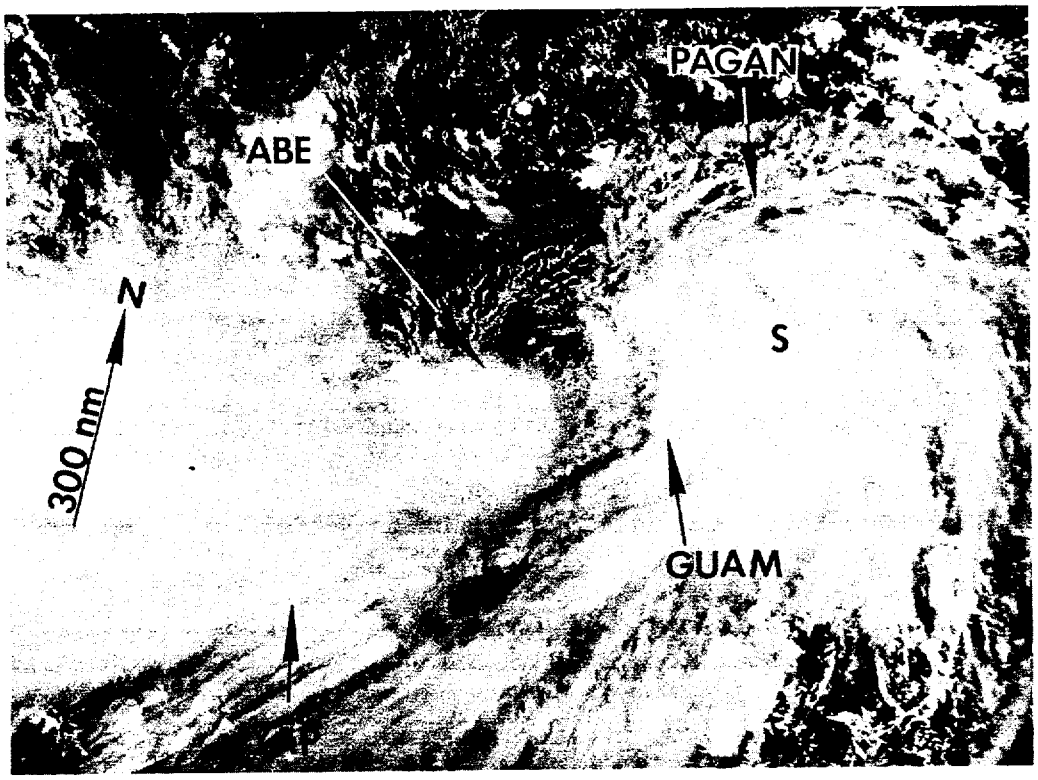

Figure 3-15-1a. The comma-shaped cloudiness (at Point S) to the northeast of Guam is associated with a monsoon surge that is wrapping around Abe's center (260441Z August NOAA visual imagery).

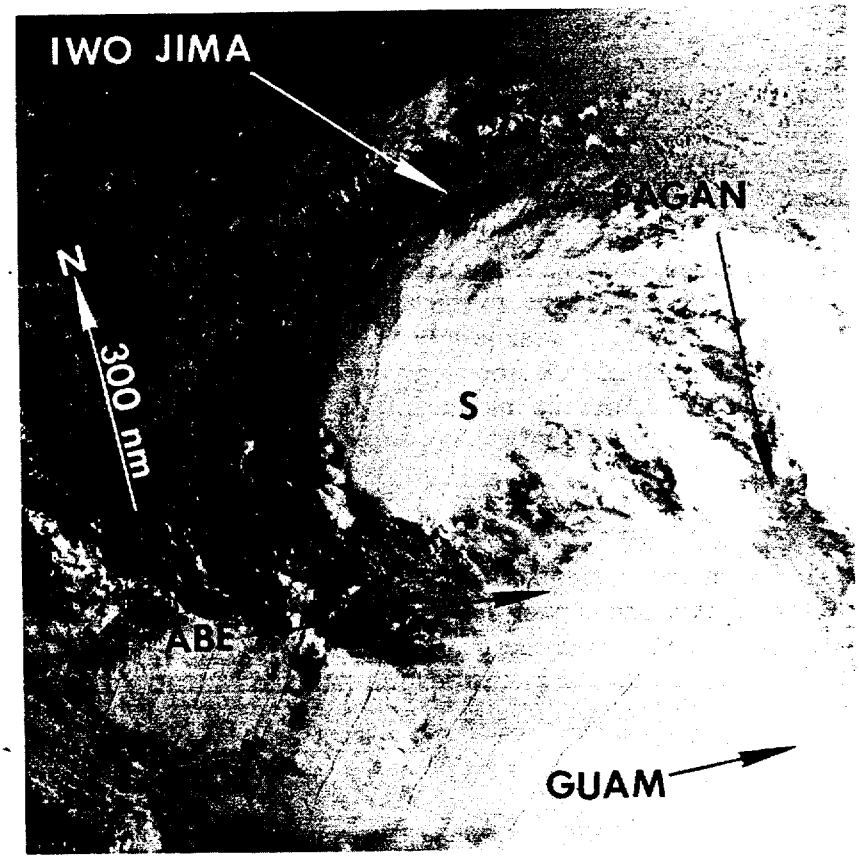

Figure 3-15-1b. The comma-shaped cloudiness (at Point S) has rotated counterclockwise around Abe's center during the past 18 hours, and is to the north (262238Z August NOAA visual imagery).

Figure 3-15-1c. The area of broken cloudiness (at Point S) which has rotated around to the west of Abel's center in the past 6 hours is associated with the monsoon surge mentioned in Figures 3-15-1a and 3-15-1b (270430Z August NOAA visual imagery).

V. FORECASTING PERFORMANCE

As illustrated by Figure 3-15-3, the overall forecast performance of JTWC for Abe was quite good with the exception of the period when Abe made the sharp turn northward due to the monsoon surge-induced reorganization. JTWC has no objective guidance that can reliably forecast the onset of deep monsoon surges or the associated track changes that might be induced. Theoretically-based synoptic reasoning that can assist forecasters in subjectively anticipating either the onset of the monsoon surge or its effects is limited. The best tool for short-range forecast intelligence is meteorological satellite imagery.

VI. IMPACT

The impact from Abe was extensive. Monsoon rains from the surge feeding into Abe caused extensive flooding in Luzon, killing 12 people in Manila. Landslides from the heavy rains resulted in 32 deaths in the provinces of Benguet, Nueva Viscaya and Nueva Ecija to the north of Manila. According to the Red Cross, the death toll in the Philippines due to the combined effects of Abe and Becky (16W) was 85. Okinawa experienced winds as high as 60 kt (31 m/sec), and high surf conditions there swept one person out to sea. Flooding in Taiwan resulted in one death and six injuries, and landfall in China resulted in 51 deaths and 250 injuries near Shanghai.

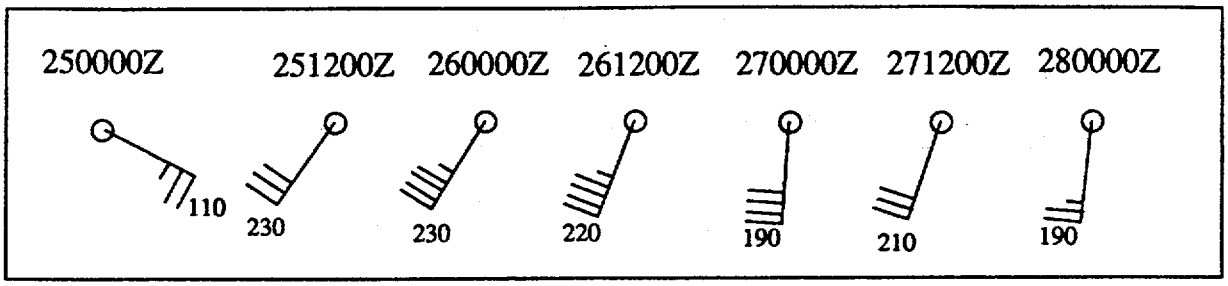

Figure 3-15-2. Gradient level winds recorded at Guam (WMO 91212) during monsoon surge associated with Abe.

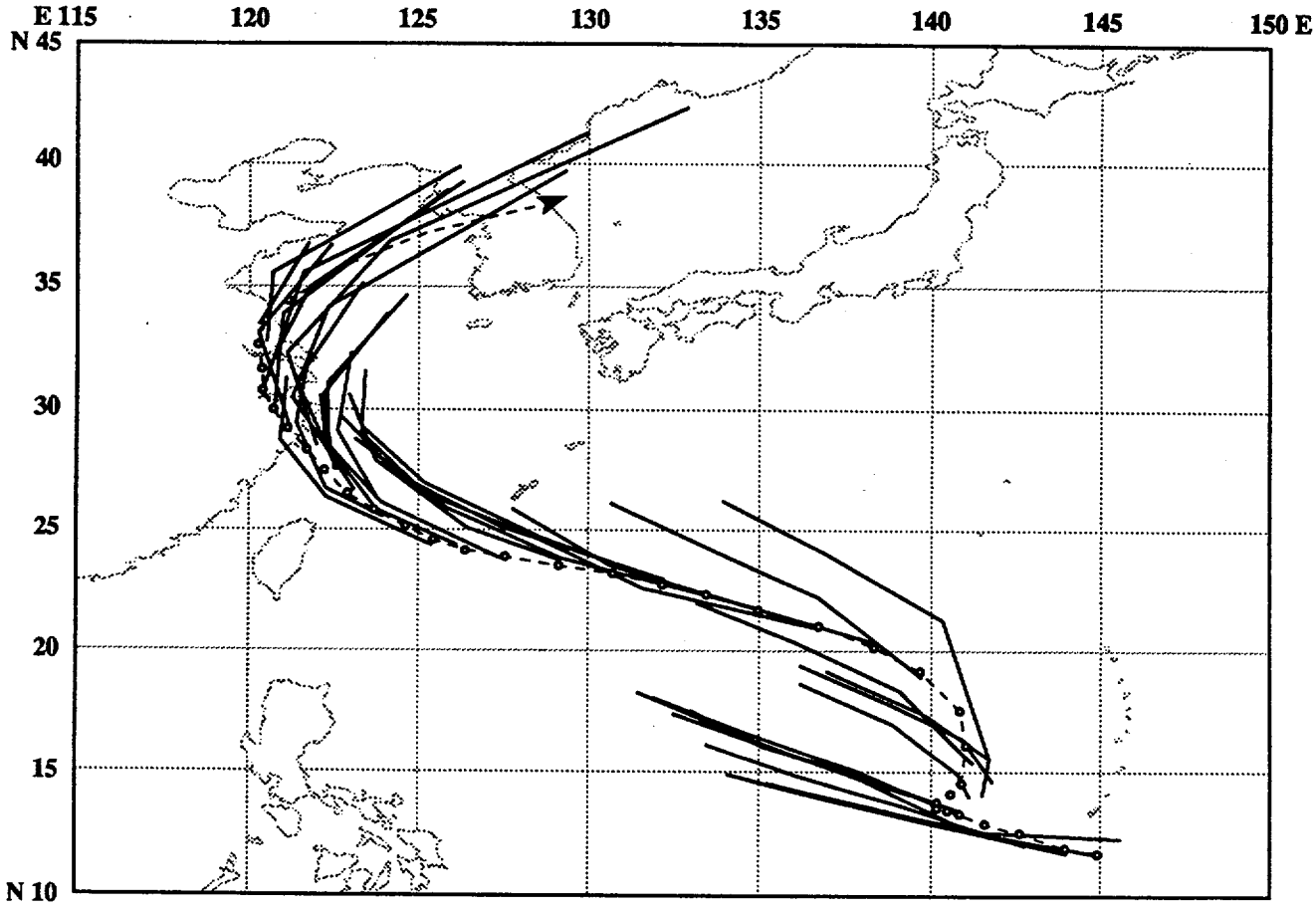

Figure 3-15-3. Summary of JTWC forecasts (solid lines) for Abe superimposed on the final best track (dashed line).