

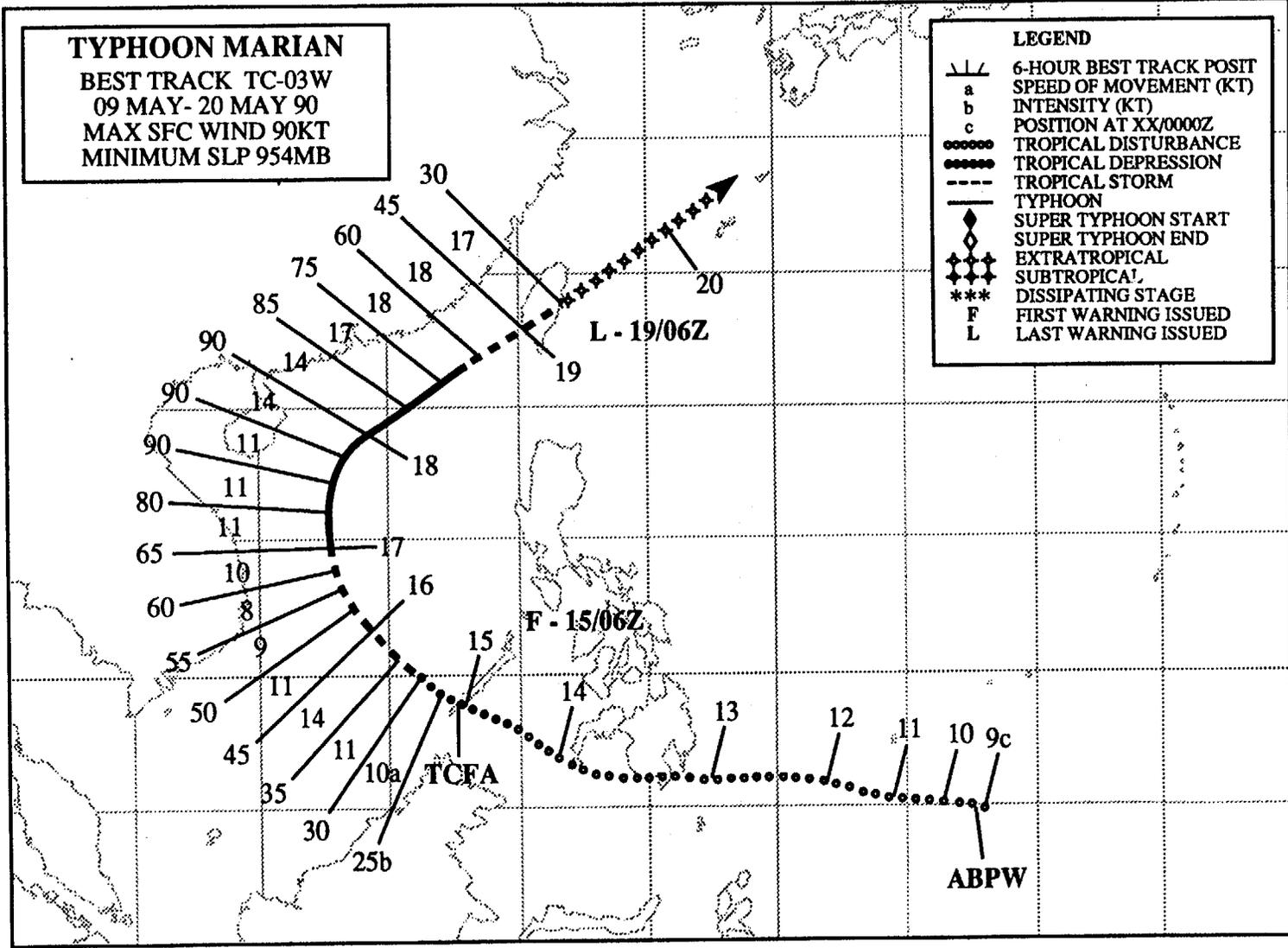
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TYPHOON MARIAN
BEST TRACK TC-03W
09 MAY- 20 MAY 90
MAX SFC WIND 90KT
MINIMUM SLP 954MB

LEGEND

- ∖∖∖ 6-HOUR BEST TRACK POSIT
- 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 MARIAN (03W)

I. HIGHLIGHTS

Marian, the second typhoon of 1990 in the western North Pacific and the only significant tropical cyclone to form in May, persisted in low latitudes for almost a week before intensifying. Its convective cloud mass tracked westward initially, passing south of Yap and Palau in the western Caroline Islands. After entering the South China Sea, the system finally developed into a typhoon. Marian then recurved and merged with a frontal system to form an extratropical low.

II. CHRONOLOGY OF EVENTS

- 090600Z - First mentioned on Significant Tropical Weather Advisory as an area of persistent convection with an estimated minimum sea-level pressure of 1006 mb.
- 150230Z - Tropical Cyclone Formation Alert based on better convective organization with increased low-level inflow and outflow aloft.
- 150600Z - First warning due to increased amount of central convection and cloud organization.
- 151800Z - Upgraded to a tropical storm prompted by steady intensification, favorable outflow aloft in all quadrants and the first intensity estimate of CI 2.5.
- 170000Z - Upgraded to typhoon following improved outflow, expected formation of an eye and the first CI 4.0.
- 171800Z - Peak intensity - 90 kt (46 m/sec) - coincident with visible eye with intensity estimate of CI 5.0.
- 181800Z - Downgraded to tropical storm because of increased vertical wind shear and start of extratropical transition. Convection decreased in amount and organization.
- 190600Z - Final warning - (extratropical) - followed interaction with rugged mountains of Taiwan. Principle low-level circulation center passed east of the island.

III. TRACK AND MOTION

The system developed in low latitudes in the central Caroline Islands and tracked slowly westward on the south side of the subtropical ridge. After passing over Mindanao in the southern Philippine Islands, Marian tracked around the western end of the subtropical ridge (Figure 3-03-1). As

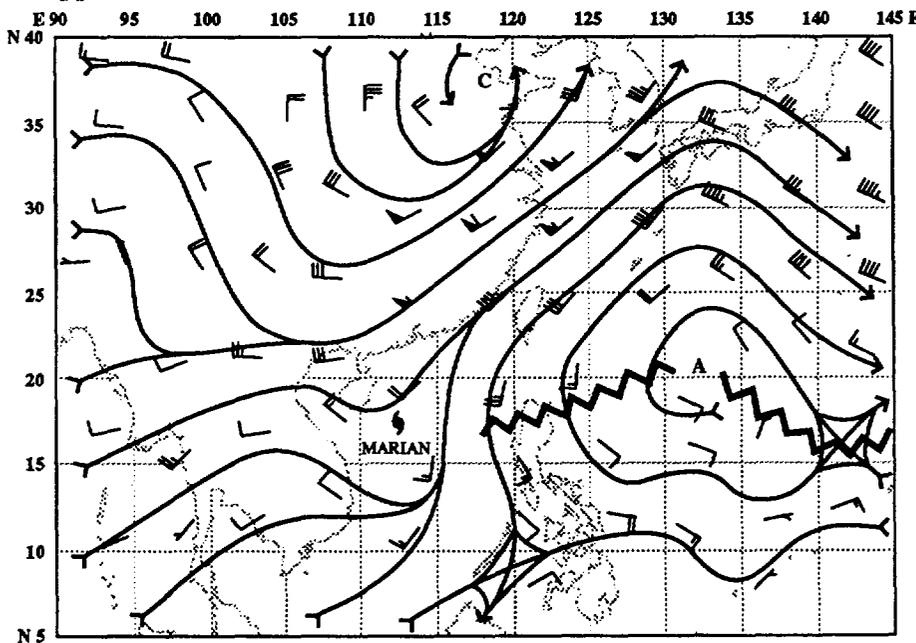


Figure 3-03-1. 500 mb NOGAPS analysis from 171200Z May, showing the cutoff low over eastern China, subtropical ridge to the east of Marian's surface position. The tropical cyclone, is tracking around the western periphery of the subtropical ridge and beginning to accelerate.

the tropical cyclone approached the south coast of China, increased southwesterlies aloft accelerated Marian northeastward along the edge of the modifying polar air.

IV. INTENSITY

The convective cloud mass that eventually developed into Typhoon Marian remained intact, but relatively unorganized, for almost a week. Brisk easterly trade winds (Figure 3-03-2) to the north and light cross-equatorial flow to the south supported the circulation, but outflow aloft was restricted by zonal westerly winds to the north. As the disturbance passed over the southern islands of the Philippine archipelago, interaction with land further inhibited low-level development. Upper-level conditions became favorable for intensification as a new outflow channel to the north combined with the preexisting weak one to the south and west. As the cyclone entered the South China Sea, it developed into Tropical Storm Marian. Steady intensification continued until an eye formed (Figure 3-03-3). After reaching peak intensity on 17 May, increased southwesterly flow aloft ahead of a shortwave

trough began to strip away the convection. As the system recurved, it was caught up in the approaching cold front and commenced extratropical transition (Figure 3-03-4).



V. FORECASTING PERFORMANCE

Overall JTWC forecast performance is shown in Figure 3-03-5. The initial forecasts did not call for recurvature. The NOGAPS prognostic series retained a weak mid-level ridge over the South China Sea, suggesting continued west-northwestward motion and eventual landfall in Vietnam. Because of the proximity of the shortwave trough over China, an alternate scenario was developed to weaken the subtropical ridge, allowing Marian to recurve. This alternate soon became the primary forecast, as the ridge did weaken and Marian recurved.

VI. IMPACT

No information was received.

Figure 3-03-2. Marian approaches the southern Philippine Islands. To the north of the central cloud mass at point A, low-level cloud arcs can be seen in the brisk easterly trade flow. Towering cumulus and cumulonimbus forming on these arcs were sheared away by westerly winds aloft (110051Z May DMSP visual imagery).

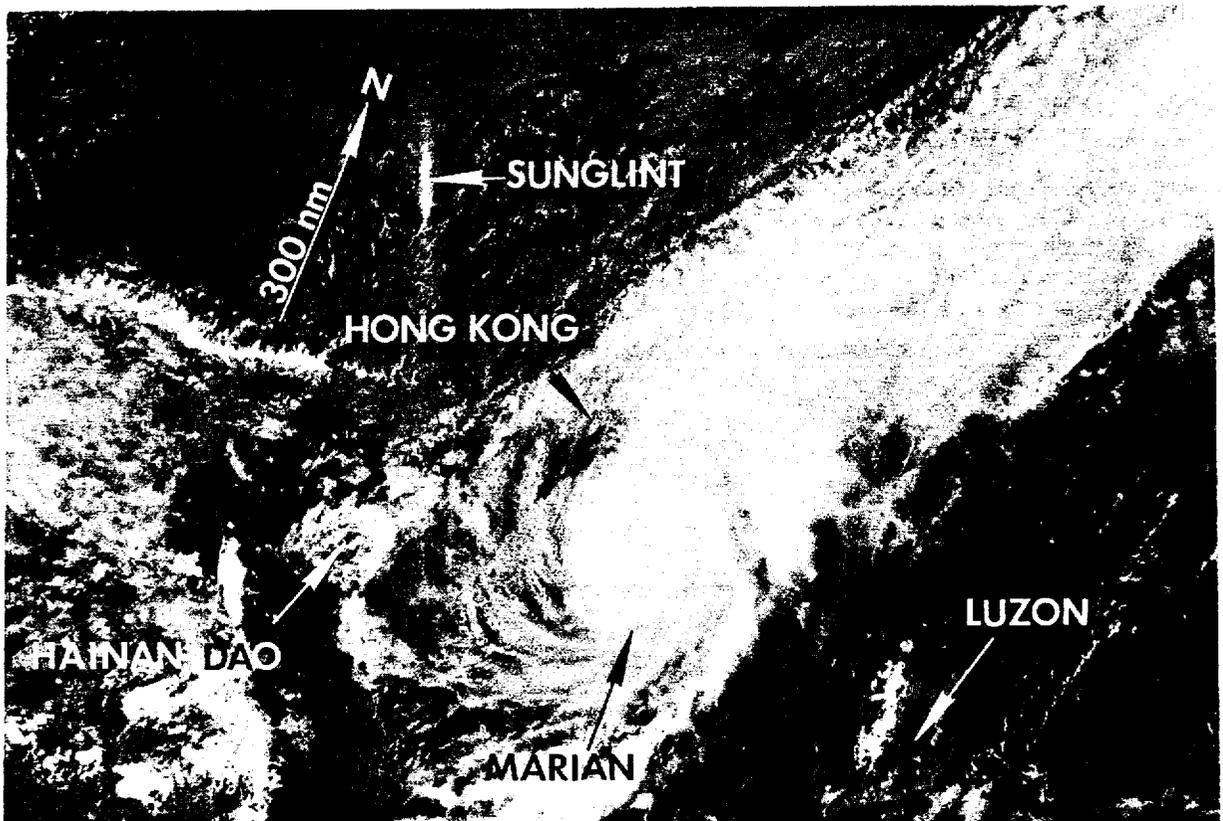


Figure 3-03-3. Typhoon Marian with a small eye interacts with a frontal system that is moving seaward from eastern Asia (180608Z May NOAA visual imagery).

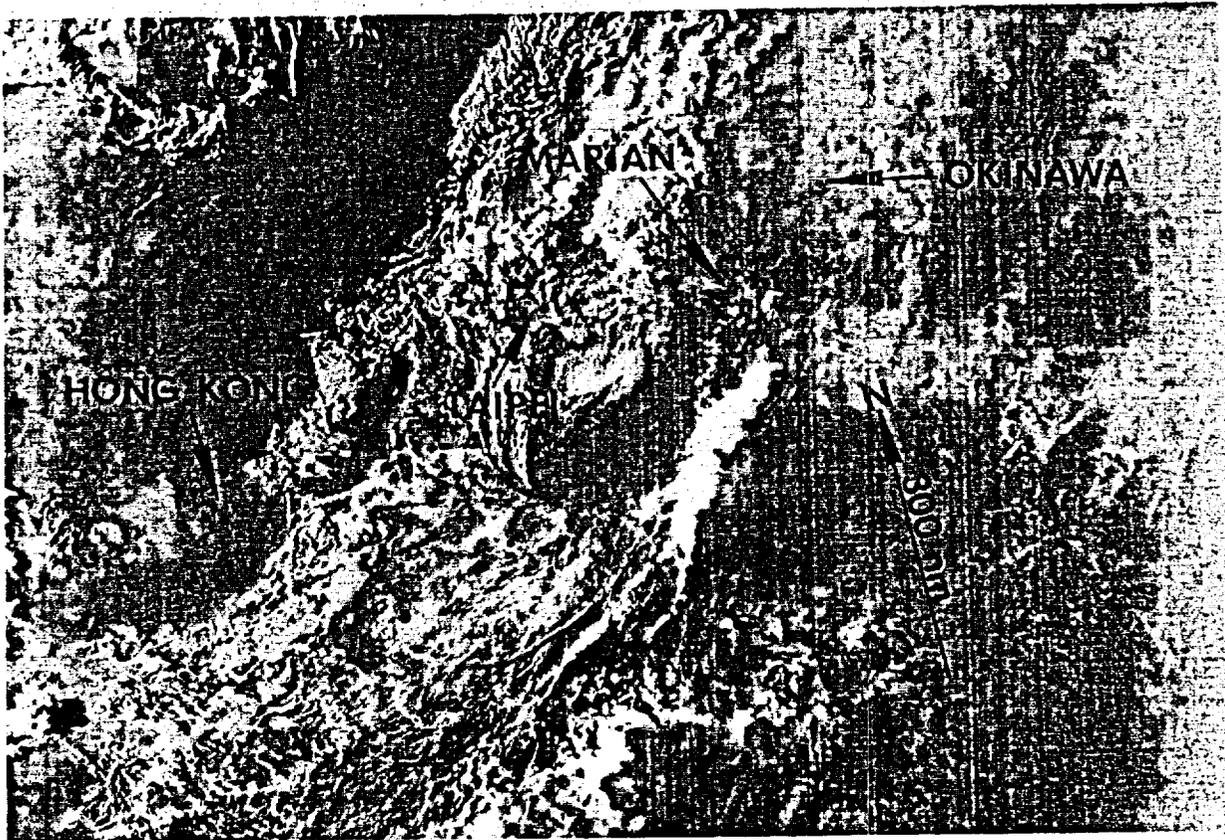


Figure 3-03-4. The remnants of Marian are embedded in the frontal zone just east of Taiwan. There appears to be no middle or high cloud in the subsiding air over the center of the vortex (191022Z May DMSP visual imagery).

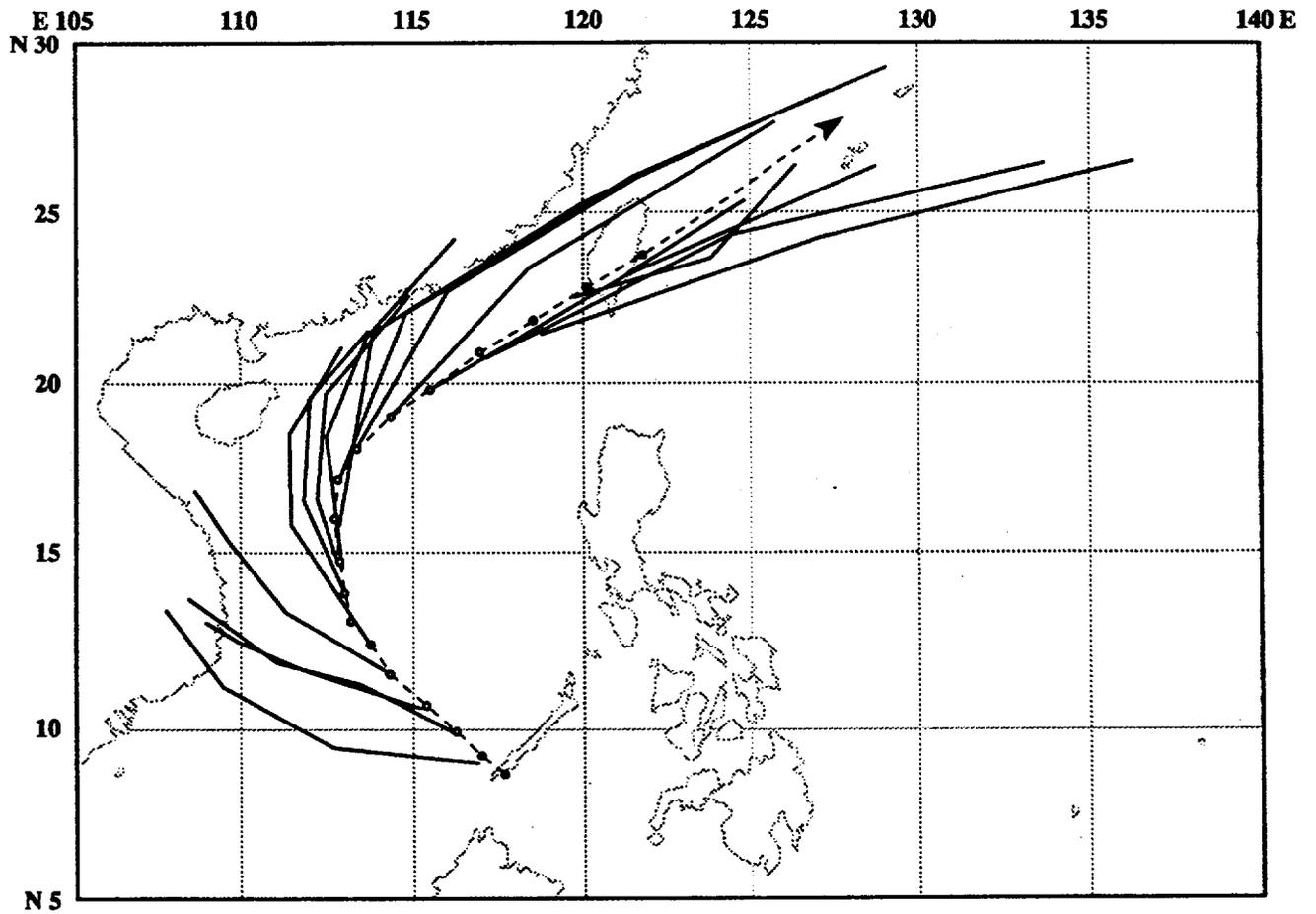


Figure 3-03-5. Summary of JTWC forecasts (solid lines) for Marian is superimposed on the final best track (dashed line).