

**LEGEND**

- 6 HR BEST TRACK POSITS
- A B C SPEED INTENSITY
- POSITION AT XX/0000 Z
- TYPHOON
- TROPICAL STORM
- TROPICAL DEPRESSION
- TROPICAL DISTURBANCE
- ◆◆◆ EXTRATROPICAL
- \*\*\* DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ★ LAST WARNING ISSUED

**TYPHOON ORA**  
**BEST TRACK TC-25**  
**10 OCT - 15 OCT 1978**  
**MAX SFC WIND 85KTS**  
**MINIMUM SLP 944MBS**

ENEWPT  
 41C  
 KO

## TYPHOON ORA

During the early part of October, extensive monsoon troughing existed from the South China Sea, across the Philippine Islands to an area southeast of Guam. The surface analyses for that period showed a combination of strong northeasterlies north of the monsoon trough axis and well defined cross-equatorial flow into the trough from the Southern Hemisphere. The entire area was, therefore, ripe for continued tropical cyclone development and, indeed, by 081200Z, Tropical Storm Nina was gathering strength east of the Philippines. At about the same time an area of convergence about 300 nm (556 km) west-southwest of Guam began to show increased organization.

JTWC began to monitor this area using satellite and ship synoptic data and issued a Tropical Cyclone Formation Alert at 090707Z. Based on reconnaissance aircraft data at 092254Z October, the disturbance was upgraded to Tropical Storm Ora with the first warning valid at 100000Z October 1978.

The 500 mb analysis at this time showed that the mid-tropospheric subtropical ridge axis was broken between Japan and the Philippine Islands, with a high pressure cell centered over Thailand and another located near Marcus Island. This break was created by a deepening long wave trough that was moving into the western Pacific from the Asian mainland. The circulations of Tropical Storm Nina and Tropical Storm Ora also helped to maintain this break.

Computer aids, climatology and the current synoptic situation supported a northward

track; the JTWC forecast showed Ora recurring to the north-northeast around the western periphery of the high pressure cell that was centered near Marcus Island.

By 101800Z, however, it became apparent that Ora and Nina were beginning to interact. At this time Nina, the dominant system, was trying to force Ora to follow a westward track, while at the same time the long-wave trough, then over the Sea of Japan, was inducing more northward movement. The net effect of these two steering influences caused Ora to follow an overall northwestward track at a speed of 12-15 kt (22-28 km/hr).

On the 11th, it was apparent that Tropical Storm Nina and Tropical Storm Ora were engaging in a Fujiwhara interaction. Nina would have been expected to move eastward in the classic Fujiwhara style. However, because she was the dominant system, the axis of rotation was closer to her. (Figure 3-23 shows the relative positions of Nina and Ora at 112342Z.) Instead of moving eastward, therefore, she merely stalled and then executed two, small loops while causing Ora to move west-northwestward. During this time period, JTWC continued to forecast Ora to cross the southern tip of Taiwan. This forecast was based on persistence and objective forecast aids which had been verifying quite well up to that point. Tropical Storm Ora then began to show increased organization on satellite and radar data. Aircraft reconnaissance at 120304Z reported the first signs of eye formation and a central pressure of 969.6 mb. Post analysis revealed that typhoon intensity was reached at 111800Z.

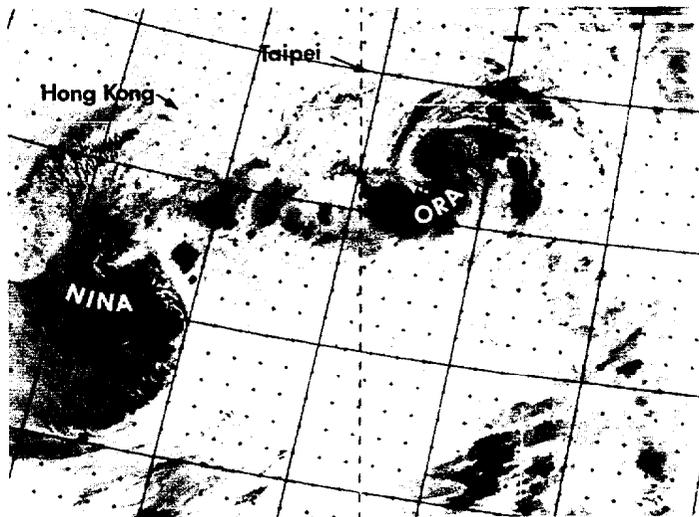


FIGURE 3-23. Infrared image of Typhoon Ora and Tropical Storm Nina during Fujiwhara interaction, 11 October 1978, 2342Z. Post-analysis showed that when the feeder band connecting the two cyclones disappeared, interaction ceased and Ora later turned north. (DMSP imagery)

As Ora approached the east coast of Taiwan, hourly radar fixes from Ishigaki-Shima, Miyako-Jima and Hua-lien indicated deceleration and by 121200Z, Ora had slowed to 4 kt (7 km/hr). By this time, Tropical Storm Nina had evidently weakened to the point where she no longer had any major influence on Ora's movement. The break in the ridge axis then became the controlling factor in determining Ora's track. Westward movement was forecast, in keeping with the upper-air, numerical progs that showed the ridge building back. Fortunately for Taiwan, this ridge failed to build back and Ora veered sharply to the north never making landfall on Taiwan (Fig. 3-24). When unexpected, northward movement was noted, an amended forecast was issued. Without constant reconnaissance, it

is conceivable that the change in Ora's movement would not have been noticed until the next scheduled, 6-hourly fix.

Ora reached her peak intensity of 85 kt (44 m/sec) near 130600Z October as a compact typhoon (Fig. 3-25). By 131800Z, however, reconnaissance aircraft indicated that her central pressure had increased rapidly (44 mb in 17 hours) and there was evidence that her upper level center was beginning to shear off. By 140000Z Ora had weakened to tropical storm strength and was accelerating to the northeast under the influence of strong mid-level westerlies. Tropical Storm Ora then merged with the polar front and was fully extratropical by 150600Z October.

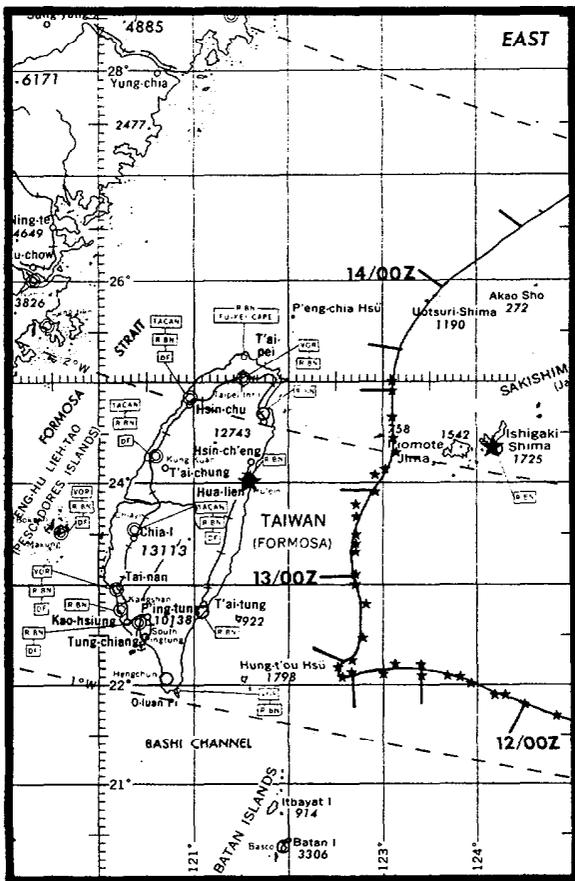


FIGURE 3-24. Hourly radar fixes show Ora's sudden turn to the North after 121200Z October 1978.

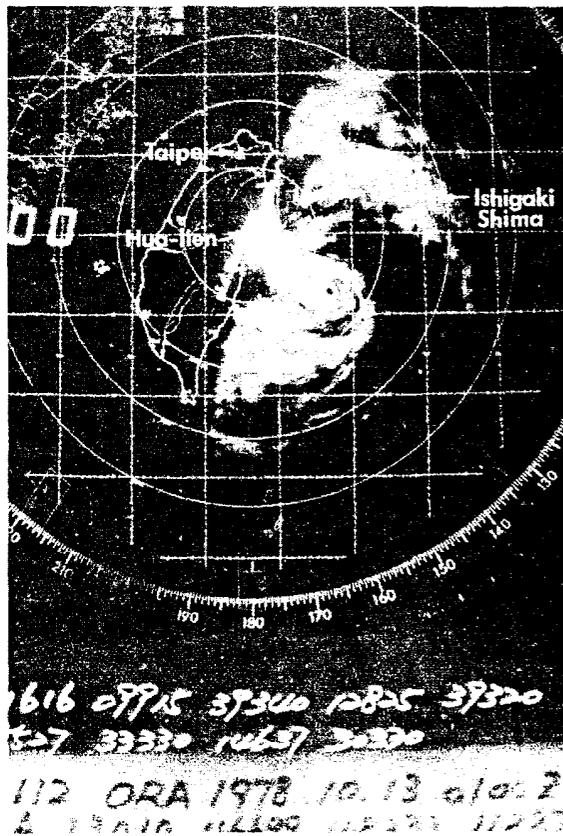


FIGURE 3-25. Hua-Lien radar presentation of Typhoon Ora at 130100Z October just prior to her reaching maximum intensity. (Photograph courtesy of the Central Weather Bureau, Taipei, Taiwan.)