

Dinah, the final typhoon of the 1980 season and the third tropical cyclone this season to threaten Guam, began to develop in mid-November as a focal point of cumulus banding embedded in the monsoon trough oriented east-west near Kwajalein. Initial development of this system was slow and erratic, as four successive Tropical Cyclone Formation Alerts (TCFAs) were issued for this area between 18 and 20 November. On the 21st however, this system finally established a well-developed outflow pattern, and its heaviest associated convection, which was initially more evident along the periphery of the circulation, began to consolidate about the system's center. The first warning on Tropical Storm Dinah was issued at 210600Z. At that time, having established a well-developed outflow to all quadrants, Dinah intensified rapidly and subsequently reached typhoon strength at 211800Z, just 12 hours after the initial warning.

A post-analysis of Dinah's development reveals some unique properties. First, she exhibited a very compact circulation, which she maintained throughout her lifespan as a tropical cyclone. The 30 kt (15 m/sec) wind radius was significantly less than normal. Second, a persistent easterly flow occurred near the surface during Dinah's initial development and may have been a primary factor for her slow and erratic development. For example, the surface analysis at 200000Z (Fig. 3-27-1) indicated an associated surface circulation near 4N 168E and a brisk easterly gradient-level flow north of the surface circulation. This flow pattern resulted in both the abnormally rapid movement of the developing system and an unusually pronounced asymmetry in her wind field which displaced the maximum wind band to the north of the circulation center. A subsequent surface analysis, at 211200Z (Fig. 3-27-2), however, did not indicate a surface circulation, but rather weak easterly flow south of where the

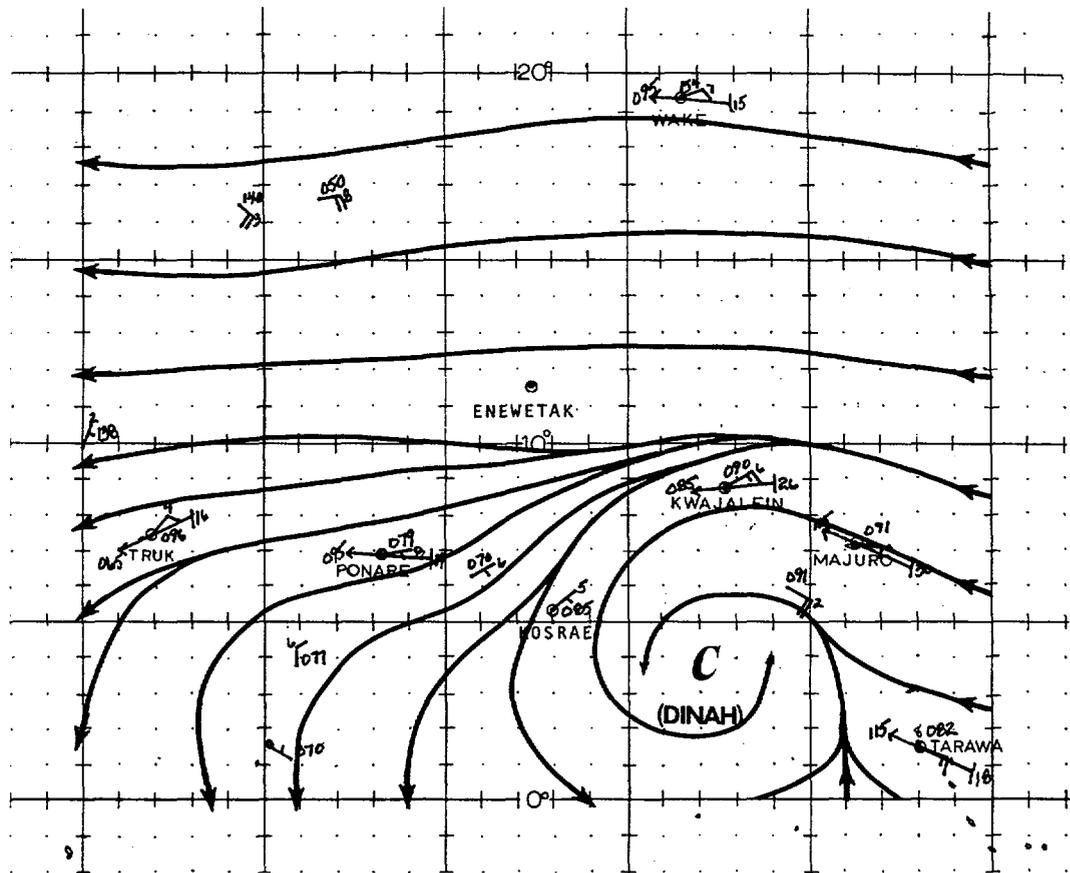


FIGURE 3-27-1. The 200000Z November 1980 surface (—) / gradient-level (ddd←) wind data and streamline analysis. Wind speeds are in knots.

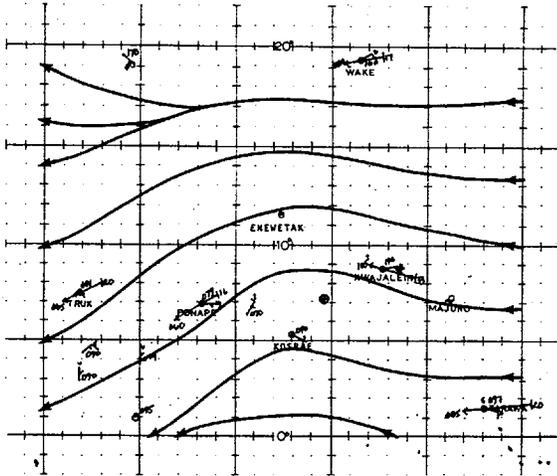


FIGURE 3-27-2. The 201200Z November 1980 surface (---) / gradient-level (---) wind data and streamline analysis. Wind speeds are in knots. ● indicates satellite position of Dinah at about the same time.

circulation's position was indicated in satellite imagery. At the same time, cyclonic flow was present over the area at 500 mb and a closed cyclonic center existed just northwest of the disturbance at 200 mb. In view of the above data, it is probable that Dinah developed from a mid- or upper-level cyclone that subsequently generated its own surface circulation. The Aerial Reconnaissance Weather Officer (ARWO)¹ aboard the initial flight into what ultimately became Typhoon Dinah, stated "the storm was compact, with a very sharp pressure gradient and good banding... We had difficulty closing off the circulation to the north and northwest because it may just have actually closed [itself] off".

By the time Dinah intensified to a typhoon, she posed a definite threat to Guam within 48 hr; thus, the decision was made to evacuate military aircraft from the island. A comparison of the 500 mb analysis (which is generally considered the primary steering level for tropical cyclones) just prior to and subsequent to the aircraft evacuation, demonstrates the great importance of enroute aircraft reports of flight-level winds (AIREPS) and the significance they can make to a tropical cyclone forecast. The 500 mb streamline analysis at 211200Z (Fig. 3-28-3) shows a strong anticyclone near Marcus Island and strong ridging west-southwestward toward the Philippine Islands. In response, JTWC forecast Typhoon Dinah to pass just off the northeastern tip of Guam. The next 500

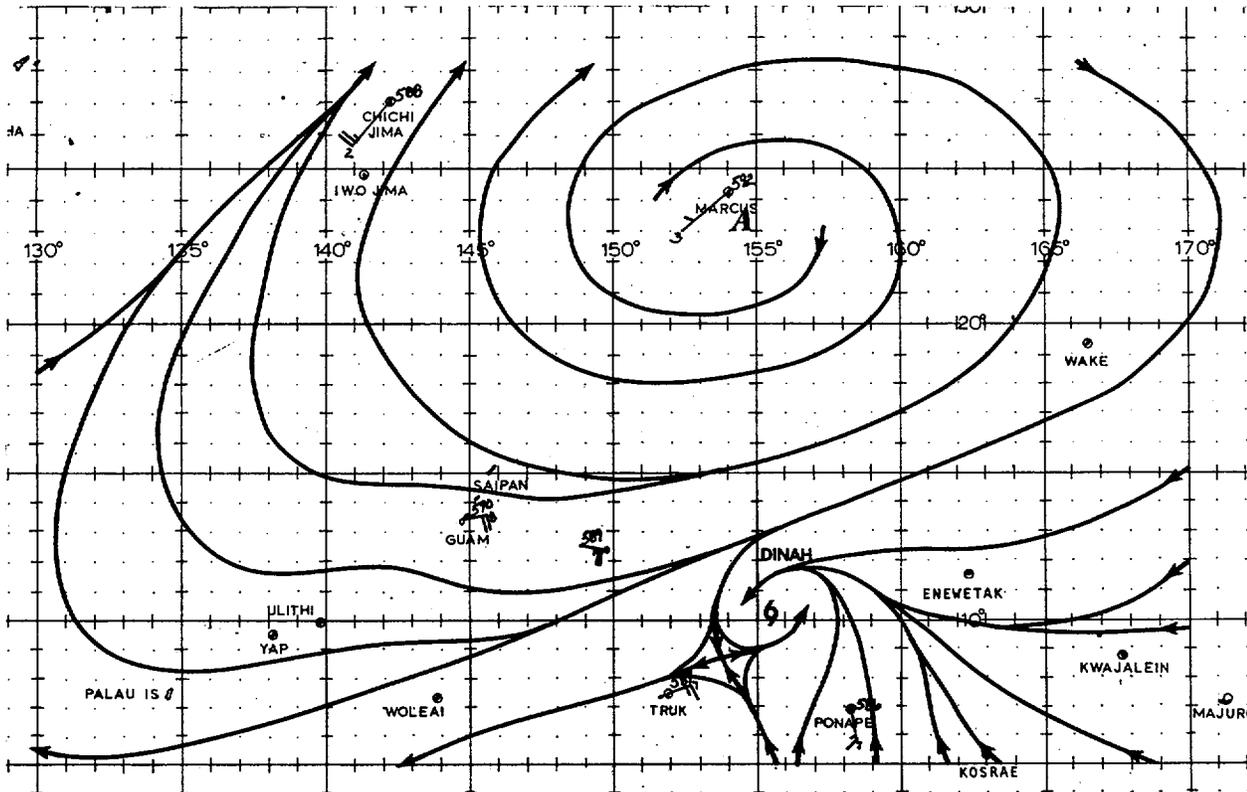


FIGURE 3-27-3. The 211200Z November 1980 500 mb wind data and streamline analysis. Wind speeds are in knots.

¹Richard F. Ferris, 1 Lt, USAF: Mission ARWO

mb streamline analysis at 220000Z (Fig. 3-28-4), which was augmented by a series of AIREPS taken by an evacuation flight enroute from Guam to Okinawa, enabled JTWC to analyze a weakness in the ridge just north of Guam. In view of this new information, JTWC amended Dinah's forecast track to predict that Dinah would track near Saipan vice Guam. Because Dinah was so compact, this small change in track was enough that Guam received very little wind as Dinah passed to the northeast, but Saipan and nearby Tinian received typhoon-force winds and sustained extensive damage.

Dinah continued to intensify rapidly as she began to move into the weakness north of Guam toward the Northern Marianas Islands. Dinah subsequently crossed the northeastern portion of Saipan at 221845Z and reached maximum intensity at 222100Z, with maximum sustained winds of 100 kt (52 m/sec) and

gusts to 130 kt (67 m/sec). After crossing Saipan, Dinah continued to move through the weakness in the ridge near 140E and began to recurve to the north on 23 November. She then weakened and accelerated to the northeast in response to a mid-tropospheric long-wave trough which was moving eastward past Marcus Island on the 24th. Dinah transitioned to an extratropical cyclone by 251200Z.

Damage to the islands of Saipan and Tinian was massive, with 60 homes destroyed and another 214 homes suffering damages. Saipan, in the aftermath of Typhoon Dinah, was completely without power for several days and 85 percent of the water system was not functioning. Carlos S. Camacho, Governor of Saipan, estimated damages totalling 7 million dollars. Shortly after damages were assessed, President Carter declared the area a major disaster area, enabling the area to qualify for federal disaster fund relief.

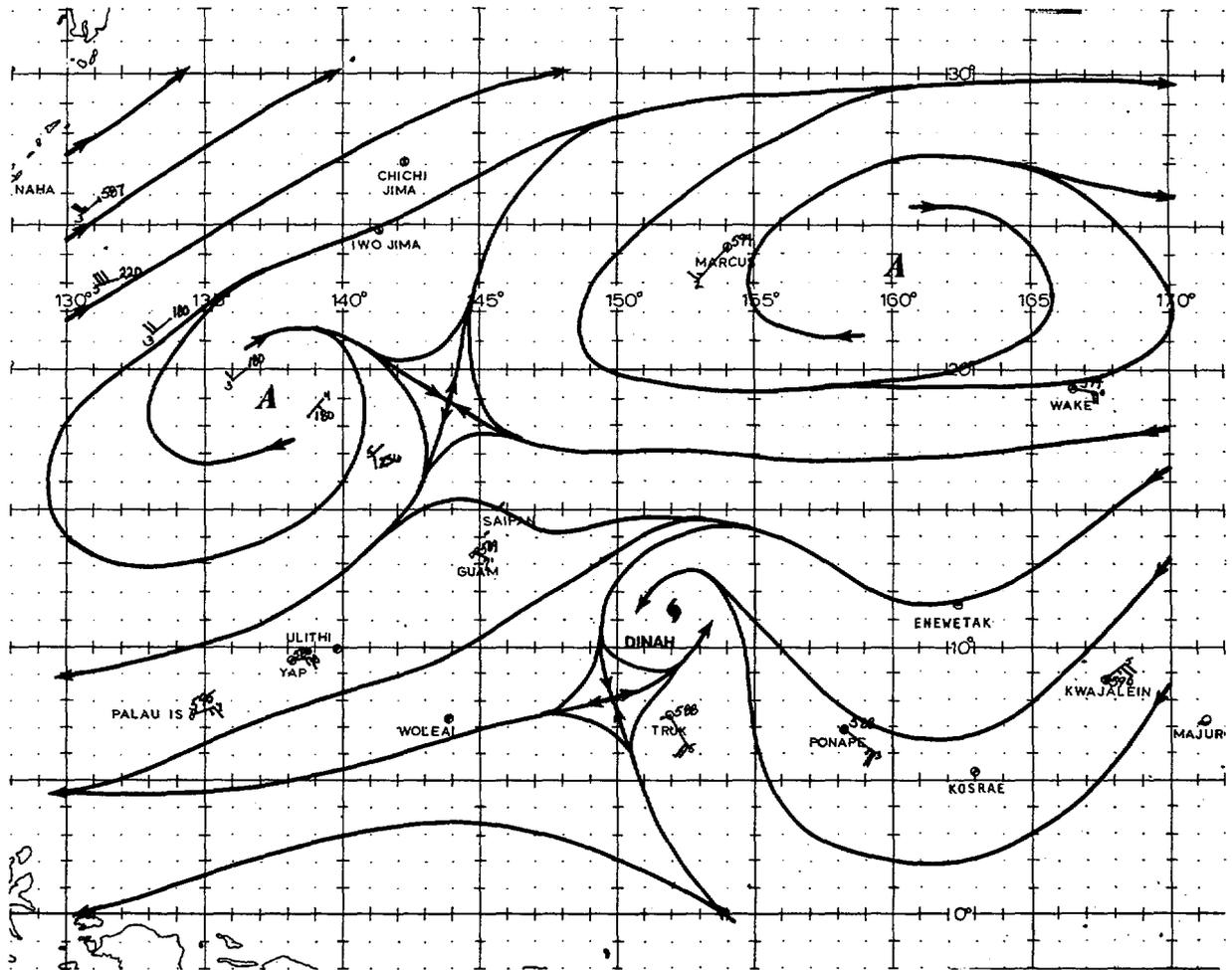


FIGURE 3-27-4. The 220000Z November 1980 500 mb wind data and streamline analysis. Wind speeds are in knots. Note the AIREPS northwest of Guam which were provided to JTWC by a Navy aircraft evacuating from Guam to Okinawa.