

TYPHOON POLLY (18W)

I. HIGHLIGHTS

Polly developed in a reverse-oriented monsoon trough that extended from the South China Sea east-northeastward to just beyond Guam. Like many other tropical cyclones that form within, or move into, a reverse-oriented monsoon trough, Polly underwent unusual motion: an “S” shaped track. Two other tropical cyclones — Oscar (17W) and Ryan (19W) — also developed in this reverse-oriented monsoon trough; and, along with Polly, formed a SW-NE chain of tropical cyclones.

II. TRACK AND INTENSITY

The tropical disturbance that became Typhoon Polly can be traced back to a large area of deep convection centered south of Guam late on 08 September. It was first mentioned on the 090600Z Significant Tropical Weather Advisory when satellite imagery and synoptic data indicated the presence of a low-level cyclonic circulation center associated with this tropical disturbance. This disturbance moved westward for three days and then slowed as it neared Luzon. The first of four Tropical Cyclone Formation Alerts (TCFA) was issued on this disturbance at 100100Z as satellite imagery indicated improving organization of the system’s deep convection and cirrus outflow, and synoptic data indicated that the sea level pressure near the center was falling. A second TCFA was issued at 102000Z when synoptic data indicated that the low-level circulation center had moved out of the area delineated by the first TCFA.

The pre-Polly tropical disturbance was slow to develop, as its deep convection failed to consolidate around a distinct center. Instead, the deep convection became more widespread and oriented east-west along the axis of the monsoon trough. Moving steadily westward, the low-level circulation center once again moved out of the area delineated by the TCFA, so a third TCFA was issued at 111330Z. The disturbance had shown little sign of further development, other than synoptic data that indicated that the central SLP had fallen to near 1004 mb. At 120600Z, the third TCFA was cancelled, as synoptic data indicated that the central sea level pressure had risen from 1004 mb to 1006 mb. At this time, the pre-Polly tropical disturbance had moved to a position just east of Luzon, where it had slowed and turned northward. A fourth TCFA was issued on this tropical disturbance at 132330Z, when satellite imagery indicated consolidation of deep convection near a low-level circulation center, and synoptic data indicated that the central SLP had fallen to 1000 mb. At this time, the large circulation of the developing Oscar (17W) was located about 1200 nm (2200 km) east-northeast of the pre-Polly tropical disturbance. Perhaps in response to deep monsoonal southwesterly flow south of the monsoon trough axis, the pre-Polly tropical disturbance began to move very slowly northeastward. The first warning on Tropical Depression 18W was issued at 140600Z when satellite imagery indicated a well-defined low-level circulation center accompanied by an area of persistent deep convection.

Polly was upgraded to a tropical storm at 141800Z as the amount of deep convection increased near the low-level circulation center, and the organization of the deep convection and cirrus outflow improved. With the very large Oscar to its northeast (Figure 3-18-1), Polly began to track east-northeastward. With little further intensification, Polly continued to move east-northeastward for approximately two days until late on 17 September when it made an abrupt turn to the north and began to intensify more rapidly. On the morning of 18 September, Polly was upgraded to a typhoon. Polly reached peak intensity of 90 kt (46 m/sec) at 181200Z (Figure 3-18-2). At 190000Z, Polly turned to the north-northeast on the final leg of its “S” track. With a remarkably stable satellite signature (i.e., a nearly con-

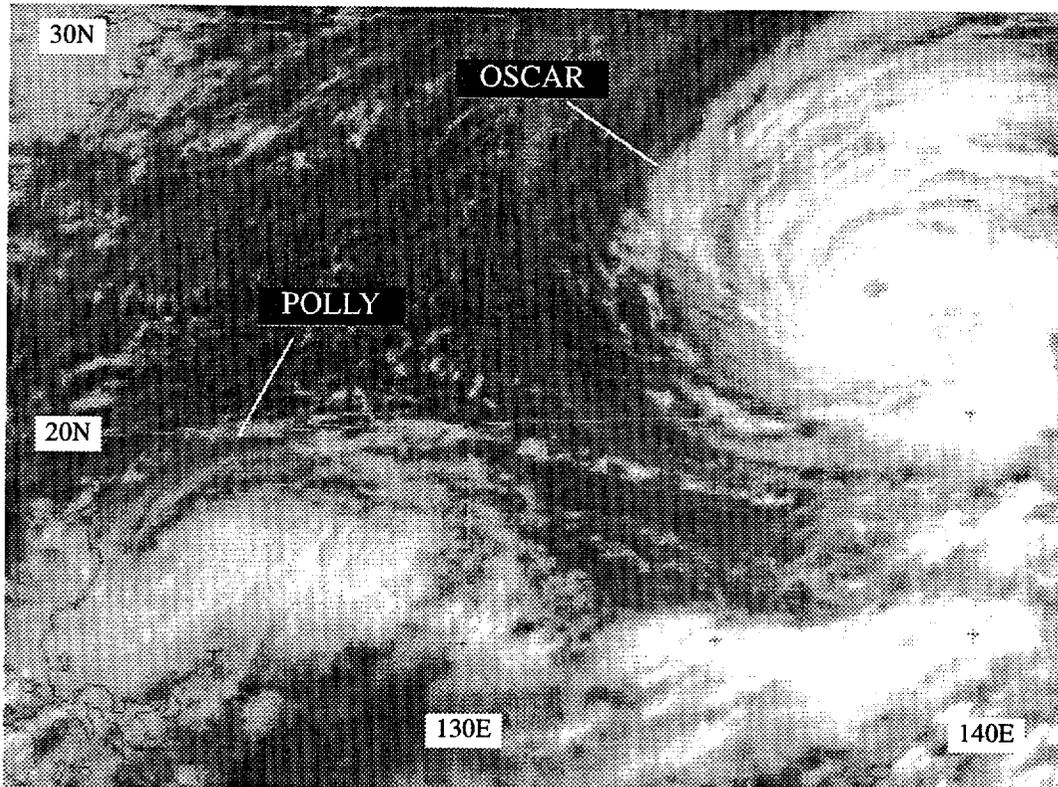


Figure 3-18-1 Polly's deep convection begins to consolidate around its low-level circulation center as it begins to move toward the east-northeast under the steering influence of southwesterly monsoonal flow and Oscar's large circulation (142331Z September visible GMS imagery).

stant Dvorak satellite intensity estimate of T 5.0), Polly's intensity remained at 90 kt (46 m/sec) for the 48-hour period 181200Z through 201200Z. After 201200Z, Polly increased its speed of translation to 30 kt (55 km/hr) as it moved northeastward into the mid latitudes. The final warning was issued on Polly, valid at 211800Z, when it appeared that it would become fully extratropical within six hours. The extratropical remains of Polly, possessing a well-defined low-level circulation, moved across the international date line on 24 September (Figure 3-18-3).

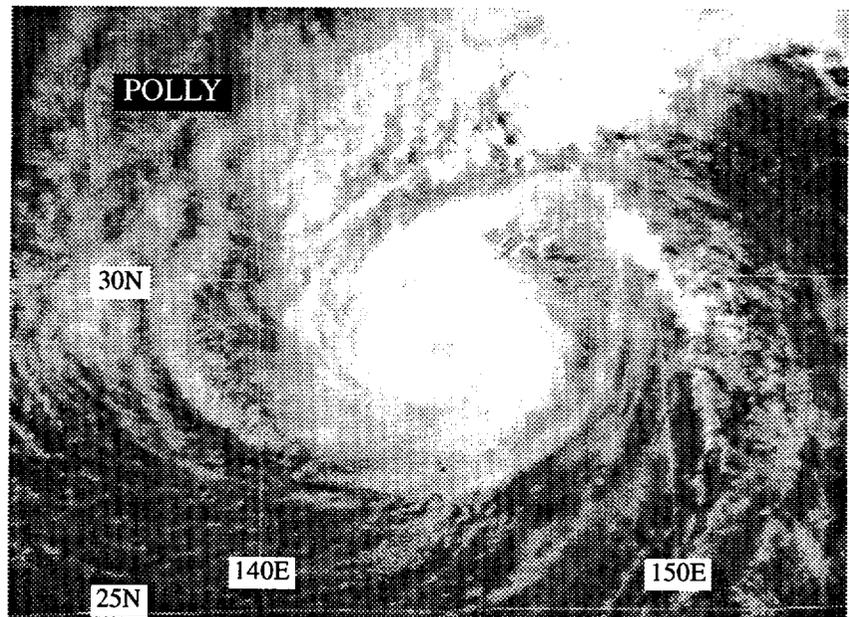


Figure 3-18-2 Polly at peak intensity of 90 kt (46 m/sec) (192224Z September visible GMS imagery).

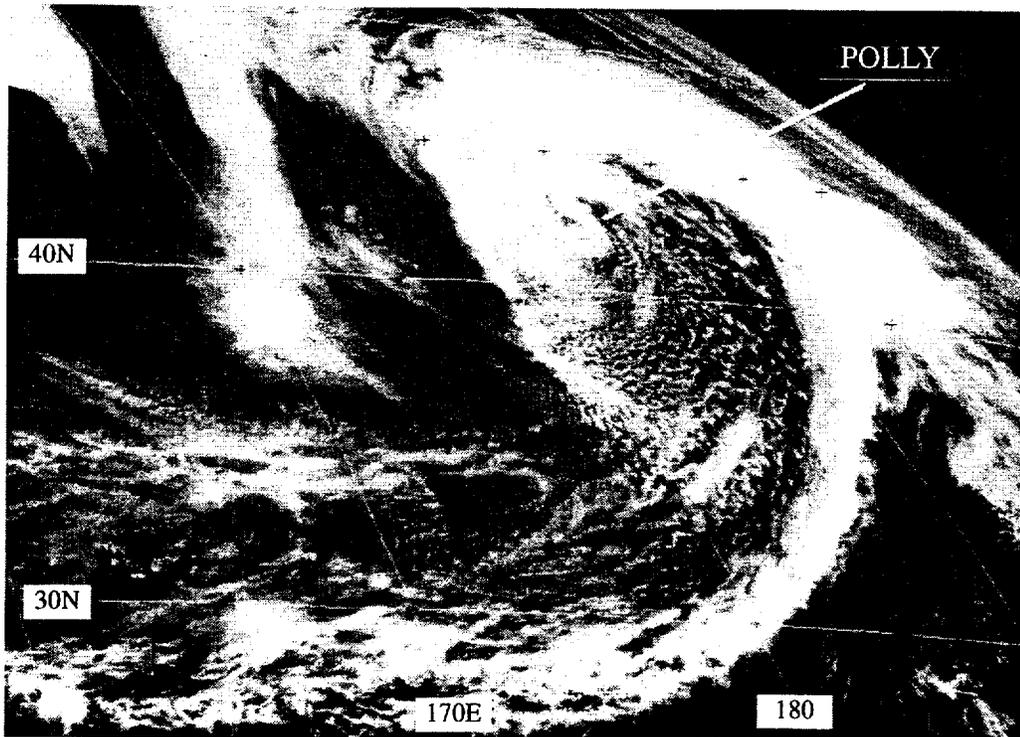


Figure 3-18-3 After the transition to an extratropical low, the well-defined low-level circulation — the remnants of Polly — crossed the international date line on a track towards the Gulf of Alaska (232331Z September visible GMS imagery).

III. DISCUSSION

a. Unusual “S” motion

During much of 1995 the low-level flow of the tropical Pacific was dominated by anomalous easterly low-level wind flow. As a consequence, the summer monsoon circulation of the western North Pacific was very weak. During June, July and August of 1995, low-level easterly wind flow dominated the low latitudes of the western North Pacific, and the normal southwest monsoon of the Philippine sea (with episodic extensions further eastward) was replaced by mean monthly easterly flow.

Only two relatively active monsoon episodes were noted during 1995: a reverse-oriented monsoon trough formed during mid-September and a large monsoon gyre formed during mid-October. The reverse-oriented monsoon trough of September stretched from the South China Sea eastward across Luzon and the Philippine Sea, and then northeastward to the northeast of Guam. This episode of reverse-oriented monsoon trough formation was associated with the simultaneous development of three tropical cyclones along the trough axis — Oscar (17W), Polly, and Ryan (19W).

When the monsoon trough axis acquires a reverse-orientation, TCs along it tend to move on north-oriented tracks. One unusual type of north-oriented track — the “S” track — is almost always associated with reverse orientation of the monsoon trough axis (Lander 1996). Consistent with Lander’s findings, Polly and Ryan (19W) moved on unusual north-oriented “S”-shaped tracks.

Though not perfectly “S”-shaped, Polly’s track nonetheless featured the requisite characteristics to be considered an example of “S” motion, as defined by Lander (1996). The “S” track — a specific variant of north-oriented motion — features eastward movement at low latitude, a later bend to the north or northwest, and then eventually northeastward motion as the system enters the mid-latitude westerlies. As was the case with Polly, a tropical cyclone undergoing “S” motion often intensifies after making its first bend to the north.

b. *Time series of Digital Dvorak (DD) numbers*

In Polly's case, there was a long period of time (181200Z to 210600Z) during which the warning intensity held steady at 85 to 90 kt (44 to 46 m/sec) — an intensity corresponding to a T 5.0 on Dvorak's scale. DD numbers were obtained during much of Polly's period of stable warning intensity. Unlike the DD number time series for Oscar (17W) (refer to the discussion section in Oscar's (17W) summary), the DD numbers for Polly showed a larger degree of short-term fluctuations (Figure 3-18-4). Nonetheless, the warning intensity represents an average value around which the DD numbers scatter. This is not the case with the next tropical cyclone — Ryan (19W) — in the three-TC (Polly, Oscar, Ryan) outbreak (refer to the discussion section in Ryan's summary).

IV. IMPACT

Polly affected the Volcano Islands where Iwo Jima reported a peak gust of 52 kt (27 m/sec) at 190424Z September, with nearby Chichi Jima reporting a minimum pressure of 987.8 mb at 1800Z the same day. Polly passed 130 nm (240 km) and 65 nm (120 km) to the northwest of these islands respectively. No reports of injuries or damage were received.

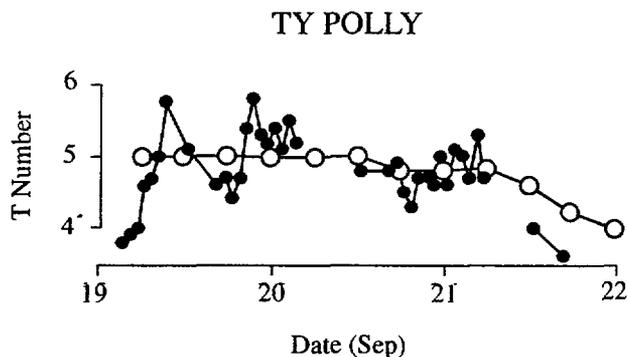


Figure 3-18-4 The hourly time series of the DD numbers obtained for Polly during the period 19 - 22 September (black dots), versus the final best track intensity (open circles). Ordinate labels are placed at 0000Z for the indicated date.